PROJECT MANUAL

GILHAM ELEMENTARY SCHOOL
RENOVATION AND EXPANSION
PHASE 01

Eugene, Oregon

CIP # 410.193.003

Issue Date: 11 February, 2016

GMA Architects
860 West Park Street, Suite 300
Eugene, OR 97401

Bassetti Architects
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DOCUMENT 00 01 01
TITLE PAGE

PROJECT MANUAL:
Gilham Elementary School
Renovation & Expansion – Phase 01
Eugene Public School District 4J
Eugene, Oregon
C.I.P. Project No. 410.193.003

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MECHANICAL ENGINEER:
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223 West 12th Ave.,
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Principal in Charge: Gene Johnson
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ELECTRICAL ENGINEER:
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Principal in Charge: Jeffrey Graper
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ACOUSTICAL DESIGNER:
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Principal in Charge: Steve Diamond
(541) 682-8809 Office

LANDSCAPE ARCHITECT:
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Eugene, Oregon 97401
Principal in Charge: David Dougherty
(541) 683-5803 Office

DATE: 11 February 2016

Architect's Project Number: 15775

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"EXHIBIT A"

The following is a list of Divisions, Sections, and Drawings which are included in the Project Manual:

INTRODUCTORY PAGES

DIVISION 00 - BIDDING AND CONTRACTING REQUIREMENTS

DIVISION 01 - GENERAL REQUIREMENTS

DIVISION 02 - EXISTING CONDITIONS

DIVISION 03 - CONCRETE

DIVISION 09 - FINISHES

DIVISION 10 - SPECIALTIES

DIVISION 11 - EQUIPMENT

DIVISION 12 - FURNISHINGS

DIVISION 21 - FIRE SUPPRESSION

DIVISION 22 - PLUMBING

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"EXHIBIT A"

END OF DOCUMENT 00 01 10

DOCUMENT 00 11 13
INVITATION TO BID

Sealed bids will be received by Kathi Hernandez, Facilities Management Assistant, for the Gilham Elementary School Renovation and Expansion Phase 01 project on Tuesday, March 08, 2016 until the Deadline for Bid Submission at 2:00 PM, at the Eugene School District 4J Facilities Management Office, 715 West Fourth Avenue, Eugene, Oregon 97402. The Bids will be opened publicly and read aloud immediately after the deadline for submission of bids. Late Bids will not be considered.

Briefly, the work is described as Renovation and Expansion of existing facilities at Gilham Elementary School.

Beginning Thursday, February 11, 2016 Prime Bidders, Sub-bidders and Suppliers may obtain bidding documents at the following hyperlink: http://www.4j.lane.edu./bids/. Hard copies are not provided by the School District. It is the responsibility of all Prime Bidders, Sub-bidders, and Suppliers to obtain Bidding Documents and all Addenda from the hyperlink.

Bidders and Suppliers may also obtain bidding documents from Central Print and Reprographic Services, 45 West 5th Ave, Eugene, Oregon, by paying the cost of reproduction. It is the responsibility of those obtaining Bidding Documents in this manner to obtain any and all addenda from the hyperlink or the Plan Centers.

Bidding Documents may be examined at the following locations:

Eugene Builder's Exchange, 2460 W. 11th, Eugene, OR 97402
Premier Builders Exchange, 1902 NE 4th Street, Bend, OR 97701
McGraw Hill Construction, 3461 NW Yeon Ave. Portland, OR 97210
Daily Journal of Commerce Plan Center, 921 S.W. Washington St., Ste 210, Portland, OR 97205-2810
Douglas County Plan Center, 3076 NE Diamond Lake Blvd, Roseburg, OR 97470
Oregon Contractor Plan Center, 5468 SE International Way, Milwaukee, OR 97222
Reed Construction Data, 30 Technology Parkway South, Ste 500, Norcross, GA 90092
Salem Contractor's Exchange, 2256 Judson Street SE, Salem, OR 97309
Willamette Valley Bid Center, 33862 SE Eastgate Circle, Corvallis, OR 97333
Or, the office of GMA Architects.

A mandatory pre-bid conference and walk-through has been scheduled for Tuesday, February 23, 2016, at 3:00 PM. The location of the conference will be the Gilham Elementary School Main Entry Plaza, 3307 Honeywood Street, Eugene, OR. All Prime Bidders wishing to submit a bid are required to attend this conference. Statements made by the District's representatives at the conference are not binding upon the District unless confirmed by Written Addendum. Pre-qualification of bidders is not required.

Each Bid must be submitted on the prescribed form and accompanied by a Surety Bond, Cashiers Check, or Certified Check, executed in favor of Eugene School District 4J, in the amount not less than ten percent (10%) of the total bid, based upon the total bid amount for those items bid upon.

Either with the Bid or within two working hours of the Deadline for Submission of Bids, bidders shall submit, on the form provided, information regarding first-tier subcontractors furnishing labor or labor and materials, as provided in ORS 279C.370. Bids for which disclosure forms are required, but not submitted, will be rejected.

No bid for a construction contract will be received or considered unless the Bidder is registered with the Construction Contractors Board or licensed by the State Landscape Contractors Board at the time the Bid is made, as required by OAR 137-049-0230. [A license to work with asbestos-containing materials under ORS 468A.720 is not required for this project.]

For every bid $100,000 or greater, all Contractors and Subcontractors shall have a public works bond, in the amount of $30,000, filed with the Construction Contractors' Board (CCB), before starting work on the project, unless exempt. A copy of the Contractor's BOLI Public Works Bond shall be provided with the executed contract documents.

Each Bid shall contain a statement indicating whether the Bidder is a "resident bidder", as defined in ORS 279A.120.

Each Bid shall contain a statement that the "Contractor agrees to be bound by and will comply with the provisions of ORS 279C.800 through 279C.870 regarding payment of Prevailing Wages".

Contractor shall certify nondiscrimination in obtaining required subcontractors, in accordance with ORS 279A.110(4).

School District 4J reserves the right to (1) reject any or all Bids not in compliance with all public bidding procedures and requirements, (2) postpone award of the Contract for a period not to exceed sixty (60) days from the date of bid

opening, (3) waive informalities in the Bids, (4) select the Bid which appears to be in the best interest of the District, or (5) reject any or all bids.

Date:	11 February 2016
By:	Kathi Hernandez, Facilities Management Assistant
Published:	Register Guard, Daily Journal of Commerce, ORPIN (Oregon Procurement Information Network)
Posted:	School District 4J Administration Office 200 North Monroe Eugene, OR 97403

DOCUMENT 00 21 13
INSTRUCTIONS TO BIDDERS

PART 1 – GENERAL

1.1 STANDARD FORM

Instructions to Bidders - AIA Document A701, 1997 Edition, immediately following are part of this Project Manual.

END OF DOCUMENT 00 21 13

AIA® Document A701™ – 1997

Instructions to Bidders

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

THE OWNER:
(Name, legal status and address)

THE ARCHITECT:
(Name, legal status and address)

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.

TABLE OF ARTICLES

ARTICLE 1 DEFINITIONS

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

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

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

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

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

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

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

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

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

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 The Bidder by making a Bid represents that:

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

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

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

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

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 COPIES

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

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

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

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

§ 3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

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

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

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

§ 3.3 SUBSTITUTIONS

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

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

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

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

§ 3.4 ADDENDA

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

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

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

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

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 PREPARATION OF BIDS

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

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

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

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

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

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

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

§ 4.2 BID SECURITY

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

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

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

§ 4.3 SUBMISSION OF BIDS

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

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

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

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

§ 4.4 MODIFICATION OR WITHDRAWAL OF BID

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

§ **4.4.2** Prior to the time and date designated for receipt of Bids, a Bid submitted may be modified or withdrawn by notice to the party receiving Bids at the place designated for receipt of Bids. Such notice shall be in writing over the

signature of the Bidder. Written confirmation over the signature of the Bidder shall be received, and date- and time-stamped by the receiving party on or before the date and time set for receipt of Bids. A change shall be so worded as not to reveal the amount of the original Bid.

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

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

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 OPENING OF BIDS

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

§ 5.2 REJECTION OF BIDS

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

§ 5.3 ACCEPTANCE OF BID (AWARD)

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

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

ARTICLE 6 POST-BID INFORMATION

§ 6.1 CONTRACTOR'S QUALIFICATION STATEMENT

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request, a properly executed AIA Document A305, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted as a prerequisite to the issuance of Bidding Documents.

§ 6.2 OWNER'S FINANCIAL CAPABILITY

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

§ 6.3 SUBMITTALS

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

.1 a designation of the Work to be performed with the Bidder's own forces;

.2 names of the manufacturers, products, and the suppliers of principal items or systems of materials and equipment proposed for the Work; and

.3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

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

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder in writing if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, (1)

withdraw the Bid or (2) submit an acceptable substitute person or entity with an adjustment in the Base Bid or Alternate Bid to cover the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

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

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 BOND REQUIREMENTS

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

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

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

§ 7.2 TIME OF DELIVERY AND FORM OF BONDS

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

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

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

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

ARTICLE 8 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

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

DOCUMENT 00 22 13
SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

PART 1 – GENERAL

The following Supplementary Instructions to Bidders modify, change from or add to AIA Document A701 Instruction To Bidders, 1997 Edition. Where any Article of the Instructions to Bidders is modified or any paragraph, subparagraph, or clause thereof is modified or deleted by these Supplementary Instructions to Bidders, the unaltered provisions of that Article, paragraph, subparagraph, or clause shall remain in effect.

1.1 ARTICLE 2 BIDDER'S REPRESENTATIONS

A. Add the following subparagraphs to 2.1.3:

2.1.3.1 Bidders are required to attend any mandatory pre-bid conferences or tours as stated in the Advertisement for Bids. Bidders not attending this pre-bid conference and tour shall be disqualified from bidding. Bidders will be required to sign in at the project site prior to the conference or tour.

2.1.3.2 Bidders are encouraged to visit the site(s) to become familiar with existing conditions. The Owner is not responsible and shall not bear financial burden for oversights made by the Bidder for failure to inspect sites prior to submitting a bid.

2.1.3.3 In all cases, persons wishing to examine the area of work must sign in at the school office prior to visiting the work area. Prior to leaving the school, sign-out at the office is required.

2.1.3.4 If access is required at times when the school office is not staffed, contact the Facilities Office, 541-790-7417, for assistance.

B. Add the following paragraph 2.1.5:

2.1.5 The Bidder certifies by signing the Bid that the Bidder has a drug-testing program in place for its employees that includes, at a minimum, the following:

.1 A written employee drug-testing program,

.2 Required drug testing for all new Subject Employees, or alternatively, requiring testing of Subject Employees every six months on a random selection basis,

.3 Required testing of a Subject Employee when the Contractor has reasonable cause to believe the Subject Employee is under the influence of drugs, and

.4 Required testing of a Subject Employee when the Subject Employee is involved in: (I) an incident causing an injury requiring treatment by a physician, or (ii) an incident resulting in damage to property or equipment.

A drug-testing program that meets the above requirements will be deemed a "Qualifying Employee Drug-testing Program". For purposes of this rule an employee is a "Subject Employee" only if that employee will be working on the Project job site; and

That if awarded the Public Improvement Contract, the Bidder will execute a contract in which the Contractor shall represent and warrant to the District that the Qualifying Employee Drug-testing Program is in place at the time of contract execution and will continue in full force and effect for the duration of the Public Improvement Contract; and that the Contract will condition the Agency's performance obligation upon the Contractor's compliance with this representation and warranty; and

That the Public Improvement Contract shall contain Contractor's covenant requiring each subcontractor providing labor for the Project to:

.1 Demonstrate to the Contractor that it has a Qualifying Employee Drug-testing Program for the subcontractor's Subject Employees, and represent and warrant to the Contractor that the Qualifying Employee Drug-testing Program is in place at the time of subcontract execution and will continue in full force and effect for the duration of the subcontract; or

.2 Require the subcontractor's Subject Employees to participate in the Contractor's Qualifying Employee Drug-testing Program for the duration of the subcontract.

1.2 ARTICLE 3 BIDDING DOCUMENTS

A. 3.3 SUBSTITUTIONS

1. Add the following:

3.3.2.1 All requests for approval must be submitted in duplicate on "Substitution Request Form". Include a self-addressed stamped envelope. Requests received by Architect less than ten (10) days prior to bid will not be considered.

B. 3.4 ADDENDA

1. Delete paragraph 3.4.1 and substitute the following:

3.4.1 Addenda will be issued to plan centers listed in the Advertisement for Bids and all firms listed on the Planholder List.

1.3 ARTICLE 4 BIDDING PROCEDURES

A. 4.1 PREPARATION OF BIDS

1. Add the following Paragraphs:

4.1.8 Bidders shall certify to non-collusion practices on the form included as part of the Bid Form, to be submitted with the Bid Form.

.1 A Non-Collusion Affidavit is required for any contract awarded pursuant to the bid. According to the Oregon Public Contracts and Purchasing Laws, a public contracting agency may reject any or all bids upon a finding of the agency that it is in the public interest to do so (ORS 279C.395). This agency finds that it is in the public interest to require the completion of this affidavit by potential contractors.

.2 The Non-Collusion Affidavit must be executed by the member, officer or employee of the bidder who makes the final decision on prices and the amount quoted in the bid.

.3 Bid rigging and other efforts to restrain competition, and the making of false sworn statements in connection with the submission of bids are unlawful and may be subject to criminal prosecution. The person who signs the Affidavit should examine it carefully before signing and assure himself or herself that each statement is true and accurate, making diligent inquiry, as necessary, of all other persons employed by or associated with the bidder with responsibilities for the preparation approval or submission of the bid.

.4 In the case of a bid submitted by a joint venture, each party to the venture must be identified in the bid documents, and an Affidavit must be submitted separately on behalf of each party.

.5 The term "complementary bid" as used in the Affidavit has the meaning commonly associated with the term in the bidding process, and includes the knowing submission of bids higher than the bid of another firm, any intentionally high or noncompetitive bid, and any other form of bid submitted for the purpose of giving a false appearance of competition.

.6 Failure to file an Affidavit in compliance with these instructions will result in disqualification of the bid.

4.1.9 Bidders shall certify to non-discrimination in employment practices on the form, included as part of the Bid Form, to be submitted with the Bid Form. By submitting its bid, the Bidder certifies conformance to the applicable federal acts, executive orders, and Oregon statutes and regulations concerning affirmative action toward equal employment opportunities. All information and reports required by the federal or Oregon state governments having responsibility for the enforcement of such laws shall be supplied to the Owner in compliance with such acts, regulation, and orders.

.1 Failure to file an Affidavit in compliance with these instructions will result in disqualification of the bid.

4.1.10 Bidder shall indicate, on the Bid Form where provided, the bidder's status as a "resident" or "non-resident" in accordance with ORS 279C.365 and ORS 279A.120.

4.1.11 First-Tier Subcontractor Disclosure:

.1 Within two working hours after the date and time of the deadline when the bids are due, a Bidder shall submit to the District a disclosure of the first-tier subcontractors that will be furnishing labor or will be furnishing labor and materials in connection with the public improvement; and will have a contract value that is equal to or greater than 5% of the project bid or $15,000, whichever is greater, or $350,000, regardless of the percentage of the total project bid.

.2 The disclosure of first–tier subcontractors shall include the name of each subcontractor, the category of work that the subcontractor would be performing, and the dollar value of each subcontract.

.3 The first-tier subcontractor disclosure applies only to public improvements with a contract value of more than $100,000.

.4 The District will consider the bid of any contractor that does not submit a required subcontractor disclosure to the District to be a non-responsive bid. A non-responsive Bid will not be considered for Award.

.5 Contractor shall certify that all subcontractors performing Work are registered with the Construction Contractors Board or licensed by the State Landscape Contractors Board in accordance with ORS 701.035 to 701.055 before the subcontractors commence work under the Contract.

B. 4.2 BID SECURITY

1. Delete paragraphs 4.2.2 and 4.2.3 and substitute the following:

4.2.2 Each Bid shall be accompanied by a surety bond, cashiers check, or certified check, executed in favor of Eugene School District 4J, in the amount not less than ten percent (10%) of the total bid, based upon the total bid amount for those items bid upon. Should the Bidder refuse to enter into such Contract or fail to furnish Performance and Labor and Materials Payment Bonds and Certificates of Insurance as required by the Supplementary Conditions within ten (10) working days after contract forms are provided to the Bidder, the amount of the Bid Security may be forfeited to the Owner as liquidated damages, not as a penalty.

.1 The Surety Bond shall be written by a Bonding Company authorized and licensed by the Oregon Insurance Commissioner. The bonding company must be listed on the most current US Government Treasury List, Department Circular 570, or approved PRIOR TO BID SUBMISSION by the Eugene School District 4J's Risk Manager. The Bond shall be on a AIA Document A310, most current edition. The Attorney-in-Fact who executes the Bond on behalf of the Surety shall affix to the Bond, a certified copy of a power of attorney.

.2 The Owner will have the right to retain the Bid Security of Bidders until either; a) the Contract has been executed and Bonds have been furnished, or b) the specified time has elapsed so that Bids may be withdrawn, or c) all Bids have been rejected.

C. 4.4 MODIFICATION OR WITHDRAWAL OF BID

1. Delete paragraph 4.4.1 and substitute the following:

4.4.1 A Bid may not be withdrawn or canceled by the Bidder following the time and date designated for the receipt of bids to the expiration of a 60 day period. The Bid for that sixty days is irrevocable and each Bidder so agrees in submitting a Bid.

1.4 ARTICLE 6 POST-BID INFORMATION

A. Delete Paragraph 6.1.

B. Modify paragraph 6.3.1 as follows:

In the first sentence delete the phase "as soon as practicable" and add "within 48 hours."

C. Add the following:

6.3.1.4 Where asbestos abatement is required, Contractor or appropriate subcontractor shall be licensed by the Department of Environmental Quality to perform "asbestos abatement work", per OAR 340-248-0120,

Adopted 1/25/90, and meet requirements of AHERA as specified in the Federal Register, 40 CFR part 763. Bidder shall submit evidence of licensing to Owner.

1.5 ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

A. 7.1 BOND REQUIREMENTS

1. Delete paragraphs 7.1.1, 7.1.2 and 7.1.3 and add the following:

7.1.1 Unless otherwise stated in the solicitation document, prior to execution of the Agreement, the successful Bidder shall furnish a separate Performance Bond and a Labor Bond and Materials Payment Bond that in all respects conform to the requirements of ORS 279C.380 covering faithful performance of the Contract, and the payment of all obligations arising thereunder, each in an amount equal to one hundred percent (100%) of the Contract sum. The duration of the performance bond shall match the length of the project warranty.

7.1.2 Bonds shall be submitted on AIA Document A312, latest edition.

7.1.3 The surety issuing such bonds shall be duly authorized and licensed to issue bonds in the State of Oregon. The bonds shall be executed by an attorney-in-fact, principal or other authorized representative for the surety company, showing the Oregon agent for service, and bears the seal of the surety company. Where the bond is executed by a person outside the state of Oregon, his authority to execute bonds shall be shown. The Bonds shall be fully executed, payable to the Owner.

7.1.4 The cost of furnishing such bonds shall be included in the Bid.

B. BOLI Public Works Bond:

1. Add the following:

Pursuant to ORS 279C.836, for any contract awarded where the contract price is $100,000.00 or greater, the Contractor and every subcontractor shall have a Public Works bond filed with the Construction Contractors Board before starting work on the project. This bond is in addition to performance bond and payment bond requirements. A copy of the Contractor's BOLI Public Works Bond shall be provided with the executed contract.

1.2 TIME OF DELIVERY AND FORM OF BONDS

A. Delete paragraph 7.2.1 and substitute the following:

7.2.1 The successful Bidder will be provided with contract forms through the Architect. These forms shall be executed and delivered to the Owner, along with Performance Bond and Labor and Material Payment Bond, within ten (10) days after receiving forms.

B. Add the following article:

ARTICLE 9 MISCELLANEOUS PROVISIONS

9.1 ADMINISTRATIVE RULES

All bidders are required to comply with the provisions of Oregon Revised Statutes and 4J Board Policy. Attention is directed to ORS 244, Government Ethics; ORS 279A and 279C, Pubic Contracting Code; Oregon Administrative Rules, Chapter 137, Divisions 46, 48 and 49; and 4J Board Policy DJC.

9.2 PROTEST OF BID

Protests of bid specifications or contract terms shall be presented to the Owner in writing five (5) calendar days prior to bid opening. Such protest or request for change shall include the reason for protest or request, and any proposed changes to specifications or terms. No protest against award because of the content of bid specifications or contract terms shall be considered after the deadline established for submitting such protest.

9.3 PROTEST OF AWARD

Any actual bidder or proposer who is adversely affected by the Owner's notice of award of the contract to another bidder or proposer on the same solicitation shall have seventy two (72) hours from the notice of award to submit to the Owner, a written protest of the notice of award. In order to be an adversely affected or aggrieved bidder or proposer with a right to submit a written protest, a bidder or proposer must itself claim to

be eligible for award of the contract as the lowest responsible bidder or best proposer and must be next in line for award.

9.4 FINAL AWARD

The written notice of award of the contract shall constitute a final decision of the Owner to award the contract if no written protest of the notice of award is filed with the Owner within the designated time.

PART 1 – PRODUCTS

Not Used.

PART 1 – EXECUTION

Not Used.

END OF DOCUMENT 00 22 13

DOCUMENT 00 31 32
GEOTECHNICAL DATA

PART 1 - GENERAL

1.1 REPORT

A. Geotechnical Report prepared by Branch Engineering, Inc. dated 20 October 2015 follows as an attachment.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF DOCUMENT 00 31 32

Geotechnical Investigation

Gilham Elementary School
3307 Honeywood St.
Eugene, OR

BEI Project No. 15-176

For

Larry Massey
District Architect
Eugene School District 4-J
A&E Department/Facilities Management
715 W. 4th Avenue, Eugene OR 97402

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October 20, 2015

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October 20, 2015

Mr. Larry Massey
District Architect
Eugene School District 4J
A&E Department / Facilities Management
715 W. 4th Avenue-Eugene, OR 97402

RE: GEOTECHNICAL INVESTIGATION
GILHAM ELEMENTARY SCHOOL
3307 HONEYWOOD ST.
EUGENE, OREGON
BRANCH ENGINEERING INC. PROJECT NO. 15-176

Pursuant to your authorization Branch Engineering Inc. (BEI) performed a geotechnical engineering investigation at the subject site for the proposed building additions at Gilham Elementary School. The proposed development of the subject site consists of several perimeter building additions and storm water facilities.

The accompanying report presents the results of our site research, field exploration and testing, data analyses, and our conclusions and recommended geotechnical design parameters for the project. Based on the results of our study, no geotechnical/geologic hazards were identified at the site and the site is suitable for the proposed development, provided that the recommendations of this report are implemented in the design and construction of the project.

Sincerely,

Branch Engineering Inc.

REGISTERED PROFESSIONAL ENGINEER #16,170 OREGON SEPT 15, 1992 RONALD J. DERRICK
EXPIRES: DECEMBER 31, 2015

Ronald J. Derrick
Digitally signed by Ronald J. Derrick
Date: 2015.10.21 16:25:30 -07'00'

CERTIFIED OREGON GARY C SANDSTROM E1452 ENGINEERING GEOLOGIST

Ronald J. Derrick P.E., G.E.
Principal Geotechnical Engineer

Gary Sandstrom, C.E.G.
Engineering Geologist

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1.0 INTRODUCTION

The subject site is located at 3307 Honeywood Street in north Eugene, Oregon approximately 1 mile northwest of the junction of the Randy Pape Beltline (Hwy 569) and Coburg Road. The site consists of a parcel of land approximately 15.8-acres in size at approximate elevation of 400-feet above mean sea level, situated southeast of the intersection of Gilham Road and Honeywood Street. The focus or this investigation was around the perimeter of the existing school structures.

This report presents the results and findings of Branch Engineering, Inc. (BEI) field observations, testing, and research for the subject site. Our investigation included the evaluation of the subsurface soil conditions at the site to provide geotechnical recommendations for the design and construction of the proposed addition and storm water disposal system.

1.1 Site and Project Description

The site consists generally of athletic fields and parking areas in the western half and the school buildings in the eastern. Access to the site is from Honeywood Street east of Gilham Road. The site is landscaped with lawn areas and trees. The site topography is relatively flat, but the USGS 2014 Eugene East Topographic Quadrangle Maps shows an unnamed seasonal waterway running diagonally through the approximate center of the site, flowing the northwest. No surface indications of the presence of this feature were observed, the flow has possibly been diverted to storm drains. Some relatively moist low spots were observed in one of the courtyard areas near the third infiltration pit location during our visit.

Our understanding of the project is that additional buildings will be constructed at the locations shown in diagonal hatching on the attached Site Plan; site drainage will be directed to surface system detention/retention facilities also indicated on the Site Plan.

1.2 Scope of Work

Our scope of work included a site visit and subsurface investigation on October 3, 2015 followed by infiltration testing performed on October 6, 2015. Three exploratory borings were excavated to a maximum depth of approximately 15-feet below ground surface (BGS) with a GeoProbe 7822DT by Pacific Northwest Drilling. Vane Shear and Dynamic Cone Penetrometer testing were also performed to gain soil shear strength and bearing capacity information. The soil was visually classified in accordance with the American Society of Testing and Materials (ASTM) Method D-2488, representative soil samples were collected for laboratory in-situ moisture content, and Free Swell (IS 2720) testing. Four additional shallow test borings were advanced for infiltration testing between depths of 24- to 40-inches below ground surface.

Field log summaries of the site exploratory borings, including field test results, are presented in Appendix A. Also included in Appendix A are copies of nearby well logs from the Oregon Department of Water Resources on-line database, and the soil survey mapping of the site. Field and laboratory test results are summarized on the test pit log summaries.

1.3 Site Information Resources

The following site investigation activities were performed and literature resources were reviewed for pertinent site information:

- Review of the DOGAMI Preliminary Geologic Map of the Eugene East and Eugene West Quadrangles, Oregon, State of Oregon, DOGAMI, Madin and Murray, OFR-O-06-17, 2006
- Review of on-line aerial photographs of site since 1995.
- Three exploratory geoprobe borings and four hand-augered infiltration test pits were advanced on site at the approximate locations shown on Figure-1.
- Review of geotechnical reports prepared by BEI and others in the vicinity of the site.
- Review of the Lane County area Web Soil Survey, United States Department of Agricultural (USDA) Natural Resources Conservation Service (NRCS), see Appendix A.
- Review of Oregon Department of Water Resources Well Logs, see Appendix A.

2.0 SITE SUBSURFACE CONDITIONS

The analyses, conclusions and recommendations contained in this report are based on site conditions as they presently exist and assume the exploratory test pits, presented in Appendix A, are representative of the subsurface conditions throughout the site. If, during construction, subsurface conditions differ from those encountered in the exploratory test pits; BEI requests that we be informed to review the site conditions and adjust our recommendations, if necessary.

The NRCS Web Soil Survey maps three different soil units across the project area consisting of Courtney gravelly silty clay loam, Salem gravelly silt loam and Awbrig silty clay loam. A band of Courtney gravelly silty clay loam extends generally along the southwest margin of the parking lot and existing school building, generally coinciding with the seasonal drainage mapped on the USGS Eugene East Topo Map. A parallel band of Salem gravelly silt loam underlies the majority of the main parking lot and school building, and Awbrig silty clay loam is mapped underlying the northern parking lot and the northeast corner of the school building. The Courtney gravelly silty clay loam is described as poorly drained gravelly and clayey alluvium (drainage way deposits), Salem gravelly silt loam soil unit is described as well drained alluvial stream terrace deposits, and the Awbrig silty clay loam is described as poorly drained silty and clayey alluvium.

The subsurface soil stratigraphy exposed in the exploratory test pits is consistent with mapped soil unit descriptions. The subsurface soil observed in the majority of the exploratory test pits beneath the topsoil consists of dark brown, medium-high plasticity silty clay with varying fine-grain sand content grading to medium to light brown, medium to low plasticity silt with clay and sand. Dense gravel/cobble deposits referred to as bar-run gravel were encountered at depths varying from 4- to 8-feet BGS generally beneath the sandy silt and occasional sand. Boring B-3 encountered less clayey materials overlying shallower bar-run gravel.

Possible shallow fill on the site was observed in boring B-1 adjacent to the main building entrance east of the main parking lot and in B-2 on the east side of the school. Scattered gravels suggesting possible spoils/fill mixed with topsoil were encountered near the surface during excavation of some of the infiltration test pits. Soil resembling the silty clay loam of the mapped site soils was, at times, observed to underlie dark, gray and brown clay with rounded rock.

2.1 Ground Water

No groundwater seepage or water table was encountered in the exploratory borings. Well logs from the Oregon Department of Water Resources in the vicinity of the site were reviewed. BEI obtained five well logs from within 0.8-mile of the site; static water levels were reported to be between 15- and 32-feet BGS.

We expect that ground water levels (from the regional water table or perched lenses) will fluctuate with the seasons and should be expected to be highest during the late winter and spring months when rainstorms are more intense and frequent, and soils are near saturation. The presence of groundwater is not expected to impact the proposed development.

3.0 GEOLOGIC SETTING

The following sections describe the regional and local site geology. Our field findings are consistent with the geologic mapping of the site area by the Oregon Department of Geology and Mineral Industries (Walker & MacLeod, 1991).

3.1 Regional Geology

The subject site lies within the central southern portion of the Willamette Valley Geomorphic Province (WVGP), east of the Coast Range and west of the Cascade Mountains Provinces. The WVGP is regional lowland that extends from just south of Eugene, Oregon to Vancouver, British Columbia. In Oregon, this alluvial plain is approximately 130 miles long and 20 to 40-miles wide (Orr and Orr, 1996). The WVGP is drained by the north flowing Willamette River.

The Willamette River Valley in the area of the subject site is believed to be underlain by undifferentiated sedimentary rock, tuffs and basalt from the Miocene and Oligocene epochs (approximately 15 to 35 million years ago). Deposits of silt and clay from fluvial and lacustrine environments covered the bedrock to various depths during the presence of low energy streams and lakes in the mid-Willamette Valley. Subsequent compression forces and uplifting of the Cascade and Coast Range Mountains depressed the Willamette River Valley. The rapid uplift of the Cascade and Coast Range mountains steepened stream gradients causing increased erosion of the mountains and resulting deposition of thick gravel layers incised within the fluvial and lacustrine deposits.

Approximately 13,500 years ago the Willamette Valley was cyclically flooded by catastrophic breaks in the ice dams of Lake Missoula. These flood events filled the valley to an elevation of 350 to 400- feet before retreating, causing sequences of upward fining deposits of silt and clay

that may or may not still be present in areas depending on erosion by subsequent creek and river actions.

3.2 Site Geology

The USGS Geologic Map of Oregon (Walker and MacLeod 1991) maps the site lacustrine and fluvial deposits of unconsolidated to semi consolidated clay, silt, sand, and gravel. The observed site conditions of fine grain soils consisting of silty clay, clay, and fine grain sand overlying bar-run gravel are consistent with the mapped geology of the site and that of the general geologic setting described above.

The nearest mapped faults are located approximately 6-miles to the southwest of the site and 11-miles to the east of the site. These faults are not known to be active; however, seismic activity is not uncommon in the Willamette Valley as evidenced by the 1993 Scotts Mills Earthquake east of Salem that registered a 5.7 Richter magnitude and most recently a 4.2 magnitude earthquake about 12-miles east of Eugene.

4.0 CONCLUSIONS

Based on our field observations, subsurface explorations, and data analyses, we conclude that the site is geologic and geotechnically suitable for the proposed development provided that the recommendations of this report are incorporated into the design and construction of the project. Our investigation did not reveal any specific site features or subsurface conditions that would impede the proposed building design or construction.

5.0 RECOMMENDATIONS

The following sections present site specific recommendations for site preparation, drainage, foundations, utility excavations, and slab/pavement design. General material and construction specifications for the items discussed herein are provided in Appendix B.

5.1 Site Preparation and Foundation Subgrade Requirements

The following recommendations are for earthwork in the building foundation areas, roadways, and parking areas. Earthwork shall be performed in general accordance with the standard of practice as generally described in Appendix J of the 2014 Oregon Structural Specialty Code and as specified in this report.

All areas intended to directly or laterally support structures, roadways, or parking areas shall be stripped of vegetation, organic soil, unsuitable fill, and/or other deleterious material. These strippings shall be removed from the site or reserved for use in landscaping or non-structural areas. The depth to suitable subgrade is 18- to 30-inches BGS below topsoil, soft fill, and loose soil. The subgrade soils are moisture sensitive and will soften with prolonged exposure to moisture.

Areas of Non-Structural Hardscapes
The depth to suitable subgrade for non-structural hardscape areas, which are expected to consist of PCC concrete or asphalt concrete walkways and playground pavements, is generally about 12-inches to remove dry surface soil. If areas of soft soil and/or undocumented or unsuitable fill are encountered areas of over-excavation should be expected. Should site conditions or grading plans require engineered fill, see section 5.2 for engineered fill requirements.

The subgrade in hardscape areas shall be protected from soil moisture fluctuations and covered with at least 6-inches of compacted aggregate. Utility trenches excavated below hardscapes shall be backfilled to the top of the subgrade elevation with granular material compacted to 95% relative compaction as determined by ASTM D1557/AASHTO T-180 (modified Proctor). On-site material is not recommended for used as engineered fill, but may be suitable in landscape areas not intended to support structures or pavements.

Construction of Building Pads
In areas intended to directly or laterally support structural foundations shall be stripped of vegetation, organic soil, unsuitable fill, and/or other deleterious material and removed from the site or reserved for use in landscaping or non-structural areas. The depth to suitable subgrade observed in our site exploratory borings varied from 24- to 36-inches due to the presence of landscape fills and remnant former thicknesses. Some of the areas for proposed new building construction contain large trees that will require additional excavation to remove roots down to at least ½-inch in diameter. Areas of soft soil due to over irrigation or undocumented fill may also require additional excavation. After excavation to subgrade, the Geotechnical Engineer of Record or designated representative shall observe and approve subgrade soils prior to the placement of the following aggregate base rock section. Suitable subgrade shall be protected from soil moisture fluctuations and covered with at least 12-inches of compacted, crushed aggregate in a timely manner. The aggregate shall be compacted to 95% relative compaction as determined by ASTM D1557/AASHTO T-180 (modified Proctor).

The subsurface conditions observed in our site investigation test pits are consistent; however, the test pits only represent a very small portion of the site. Should soft or unsuitable soils extend to a depth greater than that described herein, or areas of distinct soil variation be discovered, this office shall be notified to perform site observation and additional excavation may be required.

5.2 Engineered Fill Recommendations

All engineered fill placed on the site shall consist of homogenous material and shall meet the following recommendations.

- Prior to placement, fill material shall be approved by the Geotechnical Engineer. Acceptable fill shall be free of organics or other deleterious materials. A site visit to the fill source or other means of sampling the fill is recommended.
- The fill shall be moisture conditioned within +/- 2% of optimum moisture content and compacted in lifts with loose lift thickness not exceeding 8- inches.

- Periodic visits to the site to verify lift thickness, source material, and compaction efforts shall be conducted by the Geotechnical Engineer or designated representative and documented.
- The recommended compaction level for crushed aggregate fill is 95% of ASTM D-1557/ AASTHO T-180 (modified Proctor). Compaction shall be measured by testing with nuclear densometer ASTM D-6938, or D-1556 sand cone method. If compaction testing by nuclear densometer is not possible due to the nature of the approved fill material, proof rolling with a fully loaded 10 CY dump truck observed by the Geotechnical Engineer or designated representative shall be conducted.

5.3 Excavations

Utility excavations in the site soils should stand near vertical to at least 5- feet in depth. Heavy equipment should not be placed within 10-feet of an open trench. The site soils are classified as OSHA Type A. However, if groundwater seepage, sand, or bar-run gravel is encountered beneath the near surface site soil the soil is classified as OSHA Type C and the stability of excavation or trench walls will be decreased.

5.4 Drainage and Infiltration Testing Discussion

An on-site storm water drainage system is expected to be engineered for this project. Our understanding is storm water infiltration facilities will be designed and installed as a primary means to manage runoff. Falling head infiltration tests were performed in accordance with the 2014 City of Eugene Stormwater Management Manual Appendix G as part of the Geotechnical Investigation. Four infiltration test locations were prepared and pre-saturated on October 3 and 5, 2015. BEI staff returned to the site on October 6, 2015 to measure infiltration rates and backfill the test holes. Infiltration test locations are shown on the attached Figure-1. The measured infiltration rates are presented in Table-1 below along with the calculated hydraulic conductivity, which accounts for the wetting front, head pressure variation of the measured water level changes. The recorded field test measurements are provided in Appendix A. No factor of safety has been applied to either the measured or calculated rates.

Table 1:

Test Location	Average Drop in Water Level (in/hr)	Hydraulic Conductivity, k (in/hr)	Depth (in)	Soil Description
HA-1	14	12	40	Clayey Silt with gravel
HA-2	16.5	14	29	Silty gravel
HA-3	0	0	24	Gravelly Clay
HA-4	15.5	13.5	31	Gravelly Clay

The infiltration rates measured during the site investigation indicate that disposal of storm water runoff through infiltration facilities sited in the clay loam is viable. The fine grain soils present at the depths of the proposed infiltration facilities are subject to consolidation and accumulation of materials that can slow infiltration rates over time. BEI recommends that care is taken to preserve the unconsolidated nature of the subgrade soil in these locations; equipment should not be driven on or through the facility bottoms after excavation to avoid compressing the subgrade soil.

We expect final site grading to affect drainage patterns on the site however neighboring properties should not be impacted. Perimeter landscape and hardscape grades shall be sloped away from the foundations and water shall not be allowed to pond adjacent to residential footings during or after construction.

5.5 Soil Bearing Capacity and Settlement

Conventional perimeter style, spread foundations are suitable for the single-story school additions; we recommend that loads are distributed evenly to mitigate the potential for differential settlement. If building pad areas are prepared as described in Section 5.1 of this report, the allowable bearing capacity of the subgrade and aggregate cover is 1,700 psf. Periodic site observations by a geotechnical representative of BEI are recommended during the construction of the project; the specific phases of construction that should be observed are:

Table 2:

Recommended Construction Phases to be Observed by the Geotechnical Engineer	
At completion of street excavation	Subgrade observation by the geotechnical engineer before fabric and aggregate placement.
Imported fill material	Observation of material or information on material type and source.
Placement or Compaction of fill material	Observation by geotechnical engineer or test results by qualified testing agency.

After preparation of the foundation subgrade as described in Section 5.1, the total and differential settlements are not expected to exceed ¾-inch to ½ -inch, respectively.

5.6 Slabs-On-Grade

After site preparation to expose suitable subgrade, load bearing concrete slabs shall be underlain by a minimum of 12-inches of compacted, crushed aggregate. If soft or saturated subgrade is encountered over-excavation and replacement with engineered fill will be required. A free draining aggregate is recommended beneath structural slabs. The modulus of subgrade reaction

(k) of the in-situ soil at about 2-feet below existing grade is 100 lb/in^3 and the correlated California Bearing Ratio of the soil is correlated to be 3.

5.7 Soil Shrink/Swell Potential

Representative samples of the subsurface site materials were collected and tested for In-Situ Moisture Content and Free Swell (IS 2720) Potential by air drying a pulverized sample and rehydrating in a graduated column. The in-situ moisture contents of the samples ranged from 27% to 36%. Free Swell test results showed 10% to 20% Free Swell potential of the fine grain soils in the upper 3-feet of the site. This is considered to be a low shrink/swell potential. The Plasticity Index of a representative sample from 2- to 3-feet below ground surface is 12.5 with a liquid limit of 45 indicating a low plasticity silt material at a dry density of 91 pcf.

Native soil subgrade should be covered with aggregate in a timely manner to minimize moisture fluctuations. Water should not be allowed to pond or saturate the soil during the wet season and during the months of the year with the highest temperatures and low humidity the soil should not be allowed to significantly dry, exacerbating the shrink/swell potential of the material.

5.8 Wet Weather/Dry Weather Construction Practices

The site material is moisture sensitive and will soften with exposure to precipitation. BEI recommends that foundation subgrade preparation and general site earthwork be performed during the dry season, generally May through October. Construction during the wet season may require special drainage considerations, such as covering of excavations, removal of standing water in footing excavations, and/or over-excavation of soft soils.

If construction of the site improvements is to take place during the wet season BEI recommends implementing a wet weather provisional sub-base course of aggregate to protect the subgrade soil from disturbance and saturation from construction traffic. If excavation work for underground utilities takes place on the platform of a roughly excavated roadway subgrade consisting of the native soil only, over-excavation and replacement of saturated subgrade soil is likely to be required. The site soils are moisture sensitive and not capable of supporting construction traffic loads in their present state, especially if exposed to prolonged precipitation or moisture.

5.9 Pavement Design Recommendations

The correlated CBR for the silty clay and clay loam below the topsoil is 3, which is a “poor” classification. Our design for the public street improvements used the guidance of the 1993 AASHTO Guide for Design of Pavement Structures and the 2003 revised Asphalt Pavement Design Guide, published by the Asphalt Pavement Association of Oregon, a Structural Number of 3.5 was selected for the local public street with an estimated annual equivalent 18-kip single axle loading of 2,500 with an annual growth rate of 1.5% for a 30-year design life. Based on 95% reliability and serviceability factor of 1.7, the City of Eugene's minimum roadway structural

section consisting of 6-inches of AC Pavement over 12-inches of compacted base rock is adequate for the 30-year design life.

Private access ways and parking facilities will receive less traffic and pavement sections can be reduced to 4-inches of AC over 12-inches of aggregate base in areas of moderate truck traffic such as garbage and delivery trucks. In light vehicle parking and access areas, the recommended pavement section is 3-inches of AC over 12-inches of aggregate base.

The above recommended structural pavement sections are designed for the type of vehicle use on the site after construction completion, not for construction vehicle traffic which is generally heavier, occurs over a short time, and impacts the site before full pavement sections are constructed. The construction traffic may cause subgrade failures and the site contractor should consider over-building designated haul routes through the site to mitigate soft areas at the time of final paving.

5.10 Seismic Site Classification and Hazards

Based on the soil properties encountered in our site pits and on-site well log information, Site Class D (Table 20.3-1 ASCE 7) is recommended for design of site structures. In the event of a subduction zone earthquake event off the Oregon coast, the site is expected to incur moderate to severe ground movement.

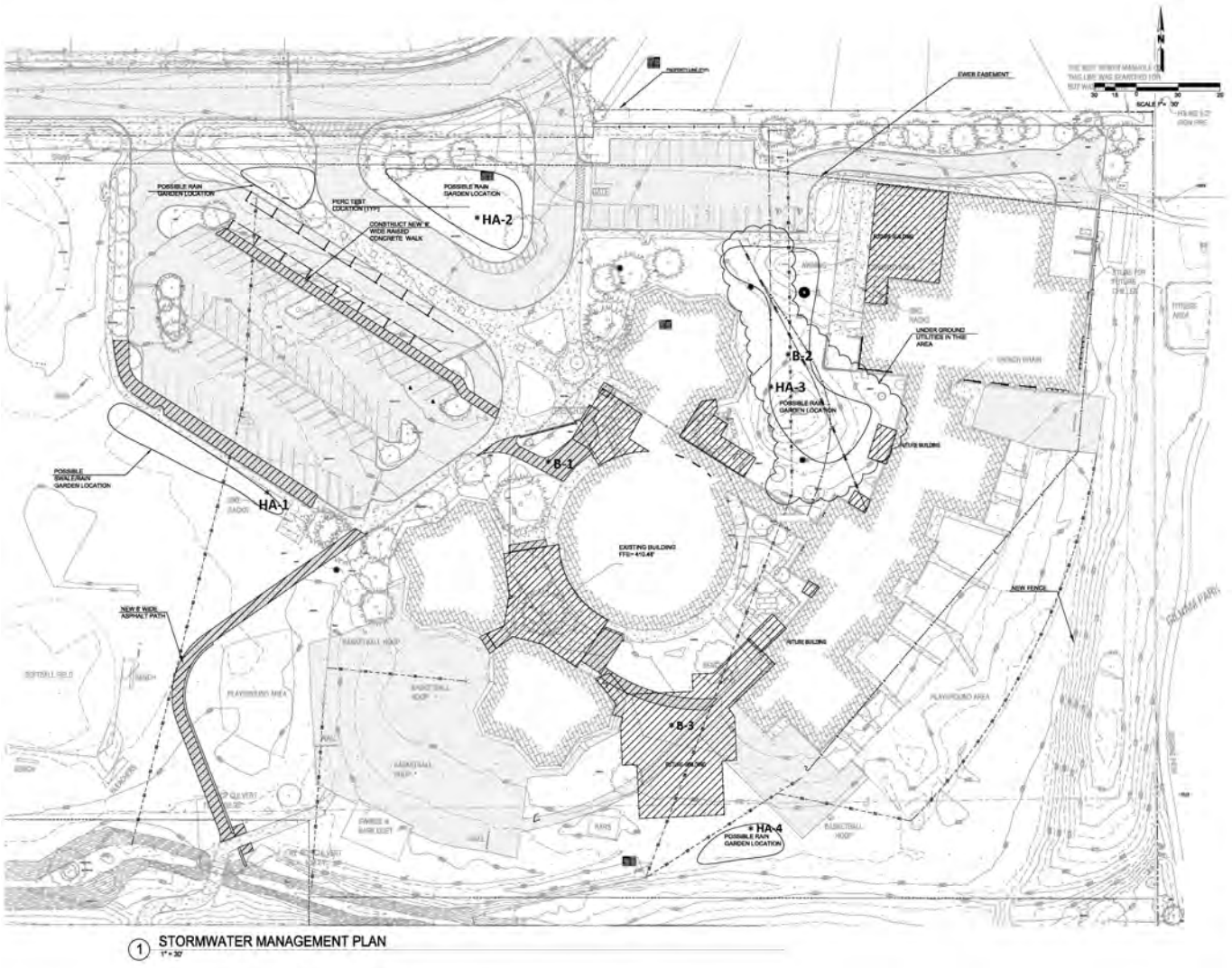
- The site is flat and offers no risk of slope instability or gross land mass movement.
- There are no known faults on the site and the closest mapped Quaternary age faults are 6-miles to the southwest. The risk of surface rupture is low.
- There are no abrupt changes in ground elevation on or near the site that would present a potential for lateral spreading to occur during a seismic event; the risk for lateral spread on the site is low.
- The subsurface soils are fine-grain and unsaturated; the potential for soil liquefaction at the site is low.
- The closest water body is the Willamette River, approximately 0.8-miles west of the site which poses no risk of a seiche or tsunami.

6.0 REPORT LIMITATIONS

This report has presented BEI's site observations and research, subsurface explorations, geotechnical engineering analyses, and recommendations for the proposed site development. The conclusions in this report are based on the conditions described in this report and are intended for the exclusive use of Eugene 4J School District and their designated representatives for use in design and construction of the development described herein. The analysis and recommendations may not be suitable for other structures or purposes.

Services performed by the geotechnical engineer for this project have been conducted with the level of care and skill exercised by other current geotechnical professionals in this area. No warranty is herein expressed or implied. The conclusions in this report are based on the site conditions as they currently exist and it is assumed that the limited site locations that were physically investigated generally represent the subsurface conditions at the site. Should site development or site conditions change, or if a substantial amount of time goes by between our site investigation and site development, we reserve the right to review this report for its applicability. If you have any questions regarding the contents of this report please contact our office.

LEGEND:
HA-#: Infiltration Test Location
B-#: Boring Location



1 STORMWATER MANAGEMENT PLAN
1" = 30'

Branch ENGINEERING inc
Since 1977

GMA ARCHITECTS
860 West Park Street, Suite 300
Eugene, Oregon 97401
T (541) 344 9157

RCE Roberts Consulting & Engineering, Inc.

CIP NUMBER: 410.193.003

DESIGN DEVELOPMENT

4J SCHOOL DISTRICT
GILHAM ELEMENTARY SCHOOL RENOVATION & EXPANSION PHASE 01

STORMWATER MANAGEMENT PLAN

C3.0

FIGURE 1 - SITE PLAN

PROJECT NUMBER: 15-176

LOCATION: Gilham Elementary School
PROJECT: Gilham Elementary School Renovations and Expansion

APPENDIX A:

Boring Logs, Well Logs, Soil Survey & Infiltration Tests

RELATIVE DENSITY - COARSE GRAINED SOILS

RELATIVE DENSITY	SPT N-VALUE	D&M SAMPLER (140 lbs hammer)	D&M SAMPLER (300 lbs hammer)
VERY LOOSE	< 4	< 11	< 4
LOOSE	4 - 10	11 - 26	4 - 10
MEDIUM DENSE	10 - 30	26 - 74	10 - 30
DENSE	30 - 50	74 - 120	30 - 47
VERY DENSE	> 50	> 120	> 47

USCS GRAIN SIZE

FINES		< #200 (.075 mm)
SAND	Fine	#200 - #40 (.425 mm)
	Medium	#40 - #10 (2 mm)
	Coarse	#10 - #4 (4.75 mm)
GRAVEL	Fine	#4 - 0.75 inch
	Coarse	0.75 - 3 inch
COBBLES		3 - 12 inches

CONSISTENCY - FINE GRAINED SOILS

CONSISTENCY	SPT N-VALUE	D&M SAMPLER (140 lbs hammer)	D&M SAMPLER (300 lbs hammer)	POCKET PEN. / UNCONFINED (TSF)	MANUAL PENETRATION TEST
VERY SOFT	< 2	< 3	< 2	< 0.25	Easy several inches by fist
SOFT	2 - 4	3 - 6	2 - 5	0.25 - 0.50	Easy several inches by thumb
MEDIUM STIFF	4 - 8	6 - 12	5 - 9	0.50 - 1.00	Moderate several inches by thumb
STIFF	8 - 15	12 - 25	9 - 19	1.00 - 2.00	Readily indented by thumb
VERY STIFF	15 - 30	25 - 65	19 - 31	2.00 - 4.00	Readily indented by thumbnail
HARD	> 30	> 65	> 31	> 4.00	Difficult by thumbnail

UNIFIED SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS: More than 50% retained on No. 200 sieve	GRAVELS: 50% or more *retained* on the No. 4 sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines.
			GP	Poorly-graded gravels and gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS: 50% or more *passing* the No. 4 sieve	CLEAN SANDS	SW	Well-graded sands and gravelly sands, little or no fines.
			SP	Poorly-graded sands and gravelly sands, little or no fines.
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE-GRAINED SOILS: Less than 50% retained on No. 200 sieve	SILT AND CLAY	LIQUID LIMIT LESS THAN 50	ML	Inorganic silts, rock flour, clayey silts.
			CL	Inorganic clays of low to medium plasticity, lean clays.
			OL	Organic silt and organic silty clays of low plasticity.
		LIQUID LIMIT 50 OR GREATER	MH	Inorganic silts, clayey silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity.
HIGHLY ORGANIC SOILS			PT	Peat, muck, and other highly organic soil.

MOISTURE CONTENT

DRY: Absence of moisture, dusty, dry to the touch
DAMP: Some moisture but leaves no moisture on hand
MOIST: Leaves moisture on hand
WET: Visble free water, usually saturated

	PLASTICITY	DRY STRENGTH	DILATANCY	TOUGHNESS
ML	Non to Low	Non to Low	Slow to Rapid	Low, can't roll
CL	Low to Med.	Med. to High	None to Slow	Medium
MH	Med. to High	Low to Med.	None to Slow	Low to Med.
CH	Med. to High	High to V.High	None	High

STRUCTURE

STRATIFIED: Alternating layers of material or color > 6mm thick.
LAMINATED: Alternating layers < 6mm thick.
FISSURED: Breaks along definate fracture planes.
SLICKENSIDED: Striated, polished, or glossy fracture planes.
BLOCKY: Cohesive soil that can be broken down into small angular lumps which resist further breakdown.
LENSES: Has small pockets of different soils, note thickness.
HOMOGENEOUS: Same color and appearance throughout.

LIST OF ABBREVIATION & EXPLANATIONS

SPT	Standard Penetration Test split barrel sampler
D&M	Dames and Moore sampler
LL	Atterberg Liquid Limit
PL	Atterberg Plastic Limit
PP	Pocket Penetrometer
VS	Vane Shear
G	Grab sample
MC	Moisture Content
MD	Moisture Density
UC	Unconfined Compressive Strength

EXPLORATORY KEY

DEPTH (FT)	GRAPHIC LOG	MATERIAL DESCRIPTION SURFACE ELEVATION =	DEPTH (IN) ELEVATION	BLOW COUNT (N VALUE)	SAMPLE AND SAMPLER TYPE	POCKET PEN. RESULTS (TSF)	STANDARD PENETRATION RESISTANCE (140-LB WEIGHT, 30-IN. DROP) ▲ BLOWS PER FOOT ● MOISTURE CONTENT % □ PERCENT PASSING NO. 200 SIEVE PL LL ATTERBERG LIMITS 0 50 100
		Short grass near main entrance to school, east of main parking lot.	GL				
		GRAVEL FILL, (GP), 6-inches of grass roots/turf with silt/clay overlying 3-inches of fine gravel (landscaping topsoil and possible spoils or surface fill from site-work excavations)	0.75'				
		S-1; Clay as below	1.3'-1.7'				
5		CLAY, (CL), stiff, (PP=3.0 tsf @1.3 ft), mottled medium brown, damp/moist, medium-high plasticity (Alluvial topsoil)	0.75'-2'				
		Becoming moister, gradational transistion to underlying material.	2'				
		S-2; Clay as below	2'-2.7'				
10		Silty CLAY (CL) grading with depth to Clayey SILT (MH), stiff (PP=2.0 tsf @ 2.0 feet), moist, medium platsicity, gradational transition to underlying material (Alluvium)	2'-4'				
		Becoming orange with some brown, slightly moist (alluvium/ colluvium)	3.5'-4'				
15		S-3; Sandy SILT with clay as below	4.3'-4.7'				
		Drive hammer 150-160cm = 5 blows Drive hammer 160-170cm = 7 blows Shear vane @ 190cm = 75+ Drive hammer 190-200cm = 25 blows	5'				
20		Sandy SILT with clay (ML) grading with depth to statified Silty SAND (SM), stiff (PP=1.25-1.5 tsf @ 4.5 feet), light brown, low-medium plasticity grading to non-plastic with depth (Alluvium)	4'-8'				
25		GRAVEL with Sand (GP), dense, gravel is fine to coarse rounded, brown fine- to course-grained sand matrix, moist to slightly wet, non-plastic, driller reports gravel at 8 feet (Alluvial gravel)	8'-15'				
		Bottom of boring; materials as above: Gravel with sand, slightly moist; no groundwater encountered.	15'				
30							

CLIENT:

DRILLING CONTRACTOR: Pacific Northwest Drilling

DRILLING METHOD: GeoProbe 7822DT

NOTES:

LOGGED BY: GCS CHECKED BY:

DATE OF BORING: 10/3/15

GROUNDWATER LEVEL:

EXPLORATORY BORING NO. B-1

Branch ENGINEERING Inc Since 1977
310 5th Street, Springfield OR 97477 | p: 541.746.0637 | www.branchengineering.com

PROJECT: Gilham Elementary School Renovations

LOCATION: Gilham Elementary School, Eugene OR

PROJECT NO. 15-176

DEPTH (FT)	GRAPHIC LOG	MATERIAL DESCRIPTION SURFACE ELEVATION =	DEPTH (IN) ELEVATION	BLOW COUNT (N VALUE)	SAMPLE AND SAMPLER TYPE	POCKET PEN. RESULTS (TSF)	STANDARD PENETRATION RESISTANCE (140-LB WEIGHT, 30-IN. DROP) ▲ BLOWS PER FOOT ● MOISTURE CONTENT % □ PERCENT PASSING NO. 200 SIEVE PL LL ATTERBERG LIMITS 0 50 100
		GL: Short grass in courtyard facing north parking lot.	GL				
		Gravelly CLAY/SILT FILL, (CL) 4-inches of grass roots/turf with silt/clay overlying layered fine gravel and medium-high plasticity clay (landscaping topsoil and fill/spoils)	0'-1.5'				
5		S-1; Clay with Organics as below.	2'-2.5'				
		CLAY with Organics (CL), very stiff (PP=4.5+tsf @ 2-feet), dark brown, damp, medium-high plasticity, trace fine-grained sand (Alluvial Topsoil).	1.5'-3'				
10		Driller reports gravel; becoming moister, gradational transition to underlying material.	3'				
		S-2; Clay as below	2'-2.7'				
		Silty CLAY (CL) grading with depth to Clayey SILT (MH), stiff (PP=2.0 tsf @ 2.0-feet), moist, medium plasticity, gradational transistion to underlying material (Alluvium)	2'-4'				
15		Becoming orange with some brown, slightly moist (alluvium/colluvium)	3.5'-4'				
		S-3; Sandy SILT with clay as below.	4.3'-4.7'				
20		Drive hammer 150-160cm = 5 blows Drive hammer 160-170cm = 7 blows Shear vane @ 170cm = 25 Drive hammer 170-180cm = 17 blows Drive hammer 180-190cm = 24 blows Shear vane at 190cm = 75+ Drive hammer 190-200cm = 25 blows	5'				
25		Sandy SILT with clay (ML) grading with depth to stratified Silty Sand (SM), stiff (PP=1.25-1.5 tsf@ 4.5 feet), light brown, low-medium plasticity grading non-plastic with depth (Alluvium).	4'-8'				
30		GRAVEL with Sand (GP), dense, gravel is fine to coarse rounded, brown fine- to coarse-grained sand matrix, moist to slightly wet, non-plastic (Alluvial gravel).	8'-15'				
		Bottom of boring; materials as above: Gravel with sand, slightly moist; no groundwater encountered.	15'				

CLIENT:

DRILLING CONTRACTOR: Pacific Northwest Drilling

DRILLING METHOD: GeoProbe 7822DT

NOTES:

LOGGED BY: GCS CHECKED BY:

DATE OF BORING: 10/3/15

GROUNDWATER LEVEL:

EXPLORATORY BORING NO. B-2

Branch ENGINEERING Inc
Since 1977
310 5th Street, Springfield OR 97477 | p: 541.746.0637 | www.branchengineering.com

PROJECT: Gilham Elementary School Renovations

LOCATION: Gilham Elementary School, Eugene OR

PROJECT NO. 15-176

DEPTH (FT)	GRAPHIC LOG	MATERIAL DESCRIPTION SURFACE ELEVATION =	DEPTH (IN) ELEVATION	BLOW COUNT (N VALUE)	SAMPLE AND SAMPLER TYPE	POCKET PEN. RESULTS (TSF)	STANDARD PENETRATION RESISTANCE (140-LB WEIGHT, 30-IN. DROP) ▲ BLOWS PER FOOT ☐ PERCENT PASSING NO. 200 SIEVE ● MOISTURE CONTENT % PL LL ATTERBERG LIMITS 0 50 100
		GL: Short grass in lawn east of school.	GL				
		Drive hammer 55-60cm = 1 blow Drive hammer 60-70cm = 6 blows Shear vane at 70cm = 15 Drive hammer 70-80cm = 6 blows Drive hammer 80-90cm = 5 blows Shear vane at 90 cm = 15 Drive hammer 90-100 cm = 6 blows Drive hammer 100-110cm = 12 blows Drive hammer 110-120cm = 20 blows Shear vane at 120cm = 55+ (vane wet at tip when pulled from borehole)	1.75'				
5		S-1; SILT with Clay as below:	1.7'-2.4'				
		SILT with Clay, (MH/ML), stiff to very stiff (PP = 4.5 tsf @ 1.9-feet), mottled medium brown, damp, medium plasticity (Alluvial Topsoil)	1'-3'				
10		Silty GRAVEL (GM) grading to stratified Sandy GRAVEL (GP), medium dense becoming dense, moist to slightly wet, low plasticity grading non-plastic by 5-feet, gravel is fine to coarse rounded, sand is fine- to coarse-grained, driller reports gravel at 4-feet (Alluvial gravel)	4'-12'				
		Decreased density 11-11.5, then becoming denser than above	11'-12'				
15		Bottom of boring; materials as above: Gravel with sand, slightly moist; no static groundwater encountered.	12'				
20							
25							
30							

CLIENT:

DRILLING CONTRACTOR: Pacific Northwest Drilling

DRILLING METHOD: GeoProbe 7822DT

NOTES:

LOGGED BY: GCS CHECKED BY:

DATE OF BORING: 10/3/15

GROUNDWATER LEVEL:

EXPLORATORY BORING NO. B-3

Branch ENGINEERING Inc Since 1977
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PROJECT: Gilham Elementary School Renovations

LOCATION: Gilham Elementary School, Eugene OR

PROJECT NO. 15-176

DEPTH (FT)	GRAPHIC LOG	MATERIAL DESCRIPTION SURFACE ELEVATION =	DEPTH (IN) ELEVATION	BLOW COUNT (N VALUE)	SAMPLE AND SAMPLER TYPE	POCKET PEN. RESULTS (TSF)	STANDARD PENETRATION RESISTANCE (140-LB WEIGHT, 30-IN. DROP) ▲ BLOWS PER FOOT ● MOISTURE CONTENT % □ PERCENT PASSING NO. 200 SIEVE PL LL ATTERBERG LIMITS 0 50 100
		GL: Short grass south of main parking lot west of school.	GL				
		Silty CLAY/Clayey SILT with scattered gravel, (CL/ML), medium brown, damp, medium- to medium-high plasticity (Alluvial Topsoil, possible disturbed).	0'-2.7'				
5							
10							
15							
20							
25							
30							

CLIENT:

DRILLING CONTRACTOR: Pacific Northwest Drilling

DRILLING METHOD: GeoProbe 7822DT

NOTES:

LOGGED BY: GCS CHECKED BY:

DATE OF BORING: 10/3/15

GROUNDWATER LEVEL:

EXPLORATORY BORING NO. HA-1

Branch ENGINEERING Inc
Since 1977
310 5th Street, Springfield OR 97477 | p: 541.746.0637 | www.branchengineering.com

PROJECT: Gilham Elementary School Renovations

LOCATION: Gilham Elementary School, Eugene OR

PROJECT NO. 15-176

DEPTH (FT)	GRAPHIC LOG	MATERIAL DESCRIPTION SURFACE ELEVATION =	DEPTH (IN) ELEVATION	BLOW COUNT (N VALUE)	SAMPLE AND SAMPLER TYPE	POCKET PEN. RESULTS (TSF)	STANDARD PENETRATION RESISTANCE (140-LB WEIGHT, 30-IN. DROP) ▲ BLOWS PER FOOT ☐ PERCENT PASSING NO. 200 SIEVE ● MOISTURE CONTENT % PL LL ATTERBERG LIMITS 0 50 100
		GL: Short grass south of main parking lot west of school, possible staging pad.	GL				
		Silty CLAY/Clayey SILT with scattered gravel, (CL/ML), medium brown, damp, medium-high grading with depth to medium plasticity (Alluvial Topsoil, possible disturbed)	0'-1.5'				
5		Silty GRAVEL, (GM), rounded gravel in silty matrix	1.5'-2'				
10							
15							
20							
25							
30							

CLIENT:

DRILLING CONTRACTOR: Pacific Northwest Drilling

DRILLING METHOD: GeoProbe 7822DT

NOTES:

LOGGED BY: GCS CHECKED BY:

DATE OF BORING: 10/3/15

GROUNDWATER LEVEL:

EXPLORATORY BORING NO. HA-2

Branch ENGINEERING Inc Since 1977

310 5th Street, Springfield OR 97477 | p: 541.746.0637 | www.branchengineering.com

PROJECT: Gilham Elementary School Renovations

LOCATION: Gilham Elementary School, Eugene OR

PROJECT NO. 15-176

DEPTH (FT)	GRAPHIC LOG	MATERIAL DESCRIPTION SURFACE ELEVATION =	DEPTH (IN) ELEVATION	BLOW COUNT (N VALUE)	SAMPLE AND SAMPLER TYPE	POCKET PEN. RESULTS (TSF)	STANDARD PENETRATION RESISTANCE (140-LB WEIGHT, 30-IN. DROP) ▲ BLOWS PER FOOT ☐ PERCENT PASSING NO. 200 SIEVE ● MOISTURE CONTENT % PL LL ATTERBERG LIMITS 0 50 100
		GL: Grass lawn in courtyard facing north parking lot, near B-2.	GL				
		Silty CLAY/Clayey SILT with scattered gravel, (CL/ML), medium-dark brown, slightly moist to moist, medium-high plasticity (Alluvial Topsoil, possible disturbed)	0'-1'				
5		Gravelly CLAY, (CL), rounded gravel in clayey matrix (Alluvial topsoil)	1'-2'				
10							
15							
20							
25							
30							

CLIENT:

DRILLING CONTRACTOR: Pacific Northwest Drilling

DRILLING METHOD: GeoProbe 7822DT

NOTES:

LOGGED BY: GCS CHECKED BY:

DATE OF BORING: 10/3/15

GROUNDWATER LEVEL:

EXPLORATORY BORING NO. HA-3

Branch ENGINEERING Inc
Since 1977
310 5th Street, Springfield OR 97477 | p: 541.746.0637 | www.branchengineering.com

PROJECT: Gilham Elementary School Renovations

LOCATION: Gilham Elementary School, Eugene OR

PROJECT NO. 15-176

DEPTH (FT)	GRAPHIC LOG	MATERIAL DESCRIPTION SURFACE ELEVATION =	DEPTH (IN) ELEVATION	BLOW COUNT (N VALUE)	SAMPLE AND SAMPLER TYPE	POCKET PEN. RESULTS (TSF)	STANDARD PENETRATION RESISTANCE (140-LB WEIGHT, 30-IN. DROP) ▲ BLOWS PER FOOT ● MOISTURE CONTENT % □ PERCENT PASSING NO. 200 SIEVE PL LL ATTERBERG LIMITS 0 50 100
		GL: Grass lawn southeast of school, near B-3	GL				
		Silty CLAY/Clayey SILT with scattered gravel, (CL/ML), medium-dark brown, slightly moist to moist, medium-high plasticity (Alluvial Topsoil, possible disturbed)	0'-0.5'				
5		Gravelly CLAY, (CL), rounded gravel in clayey matrix (Alluvial topsoil)	0.5'-2'				
10							
15							
20							
25							
30							

CLIENT:

DRILLING CONTRACTOR: Pacific Northwest Drilling

DRILLING METHOD: GeoProbe 7822DT

NOTES:

LOGGED BY: GCS CHECKED BY:

DATE OF BORING: 10/3/15

GROUNDWATER LEVEL:

EXPLORATORY BORING NO. HA-4

Branch ENGINEERING Inc Since 1977

310 5th Street, Springfield OR 97477 | p: 541.746.0637 | www.branchengineering.com

PROJECT: Gilham Elementary School Renovations

LOCATION: Gilham Elementary School, Eugene OR

PROJECT NO. 15-176

OREGON

...NG WELL REPORT

...by ORS 537.765 & OAR 690-240-095)

...uctions for completing this report are on the last page of this form.

AUG 2 ... 1995

WATER RESOURCES DEPT.
SALEM, OREGON

LANE
523668

Start Card # 80720

(1) OWNER/PROJECT: WELL NO. B-1

Name City of Eugene

Address 858 Pearl St

City Eugene State OR Zip 97401

(2) TYPE OF WORK:

☒ New construction ☐ Alteration (Repair/Recondition)

☐ Conversion ☐ Deepening ☐ Abandonment

(3) DRILLING METHOD

☐ Rotary Air ☒ Rotary Mud ☐ Cable

☐ Hollow Stem Auger ☐ Other

(6) LOCATION OF WELL By legal description

Well Location: County Lane

Township 17 (N or S) Range 3 (E or W) Section 8

1. NW 1/4 of 1/4 of above section.

2. Either Street address of well location S.W. Crimson Ave Eugene, OR. 97401

or Tax lot number of well location

3. ATTACH MAP WITH LOCATION IDENTIFIED. Map shall include approximate scale and north arrow.

(7) STATIC WATER LEVEL:

15 Ft. below land surface. Date 7-14-95

Artesian Pressure lb/sq. in. Date

(4) BORE HOLE CONSTRUCTION

Special Standards Yes ☐ No ☒ Depth of completed well 50 ft.

Land surface

Vault 0 ft. TO 1.5 ft.

Seal 1.5 ft. TO 25 ft.

Filter pack 25 ft. TO 50 ft.

Water-tight cover

Surface flush vault

Locking cap

Casing diameter 1 in.

material PVC

Welded ☐ Threaded ☐ Glued ☒

Liner

diameter in.

material

Welded ☐ Threaded ☐ Glued ☐

Well seal:

Material 3/4 Bent Chip

Amount 7-50 lb

Grout weight

Borehole diameter 4 7/8 in.

Bentonite plug at least 3 ft. thick

Screen

material PVC

interval(s):

From 40 To 45

From To

Slot size .02 in.

Filter pack:

Material Sand

Size 8x12 in.

(8) WATER BEARING ZONES:

Depth at which water was first found

From	To	Est. Flow Rate	SWL

(9) WELL LOG: Ground elevation

Material	From	To	SWL
Silt	0	5	
Sandy Fine Gravel	5	25	15
Sandy Cobbly Gravel	25	50	

RECEIVED
MAR 31 1997
WATER RESOURCES DEPT.
SALEM, OREGON

RECEIVED
DEC 26 1995
WATER RESOURCES DEPT.
SALEM, OREGON

Date started 7-14-95 Completed 7-14-95

(5) WELL TEST:

☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Permeability Yield GPM

Conductivity PH

Temperature of water 14 °F (C) Depth artesian flow found ft.

Was water analysis done? ☐ Yes ☒ No

By whom? Foundation

Depth of strata to be analyzed. From 40 ft. to 45 ft.

Remarks:

Name of supervising Geologist/Engineer Mel

(unbonded) Monitor Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to the best knowledge and belief.

MWC Number 10026

Signed Date 7-21-95

(bonded) Monitor Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

MWC Number 1004

Signed Date 8/21/95

ORIGINAL & FIRST COPY-WATER RESOURCES DEPARTMENT SECOND COPY-CONSTRUCTOR THIRD COPY-CUSTOMER

LANE 62027

STATE OF OREGON

WATER SUPPLY WELL REPORT
(as required by ORS 537.765)

Instructions for completing this report are on the last page of this form.

WELL I.D. # L 60584
START CARD # W141739

(1) LAND OWNER Well Number L 60584
Name BRYAN MEHLHAFF
Address 3133 RIVERBEND AVE
City EUGENE State ORE Zip 97408

(2) TYPE OF WORK
☒ New Well ☐ Deepening ☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD:
☒ Rotary Air ☐ Rotary Mud ☐ Cable ☐ Auger
☐ Other

(4) PROPOSED USE:
☒ Domestic ☐ Community ☐ Industrial ☐ Irrigation
☐ Thermal ☐ Injection ☐ Livestock ☐ Other

(5) BORE HOLE CONSTRUCTION:
Special Construction approval ☐ Yes ☒ No Depth of Completed Well 100 ft.
Explosives used ☐ Yes ☒ No Type Amount

HOLE Diameter	From	To	SEAL Material	From	To	Sacks or pounds
10"	0	18'	PORT CEM	0	18'	9 SACKS
6"	18'	100'				

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E
☐ Other
Backfill placed from ft. to ft. Material
Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	6"	+1'	99	.250	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:	⊘				☐	☐	☐	☐
					☐	☐	☐	☐

Drive Shoe used ☐ Inside ☐ Outside ☒ None
Final location of shoe(s) 8

(7) PERFORATIONS/SCREENS:
☒ Perforations Method CUTTING TORCH
☐ Screens Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
99'	94'	¼x6"	10	6"	.250	☒	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
80 GPM		100'	1 hr.

Temperature of water 53° Depth Artesian Flow Found
Was a water analysis done? ☐ Yes By whom
Did any strata contain water not suitable for intended use? ☐ Too little
☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other
Depth of strata:

(9) LOCATION OF WELL by legal description:
County LANE Latitude Longitude
Township 17-S N or S Range 3-W E or W. WM.
Section 8 SE 1/4 SW 1/4
Tax Lot 200 Lot Block Subdivision
Street Address of Well (or nearest address) 155 AYERS RD EUGENE, ORE 97408

(10) STATIC WATER LEVEL:
25 ft. below land surface. Date 2-4-03
Artesian pressure lb. per square inch Date

(11) WATER BEARING ZONES:
Depth at which water was first found 15'

From	To	Estimated Flow Rate	SWL
53'	100'	80 GPM	25'

(12) WELL LOG:
Ground Elevation

Material	From	To	SWL
CLAY BROWN WITH GRAVEL MEDIUM	0	12'	
GRAVEL WITH CLAY BROWN	12	38'	
GRAVEL WITH CLAY REDISH BROWN	38	53'	
GRAVEL, SAND, CLAY TAN	53'	100'	25'

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WATER RESOURCES DEPT.
SALEM, OREGON

Date started 1-30-03 Completed 2-3-03

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
WWC Number
Signed Date

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
WWC Number 1248
Signed Glen W. Lute Date 2-5-03

ORIGINAL – WATER RESOURCES DEPARTMENT FIRST COPY – CONSTRUCTOR SECOND COPY – CUSTOMER

WATER WELL REPORT
STATE OF OREGON

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WATER RESOURCES DEPT
SALEM, OREGON

State Well No. 17/3W-8b

State Permit No. LANE 11030

(1) OWNER:
Name G. B. Saunders
Address 145 Ayres Road
City Eugene State Oregon

(2) TYPE OF WORK (check):
New Well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:
Rotary Air ☐ Driven ☐
Rotary Mud ☐ Dug ☐
Cable ☒ Bored ☐

(4) PROPOSED USE (check):
Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐
Thermal: ☐ Withdrawal ☐ Reinjection ☐

(5) CASING INSTALLED:
Steel ☐ Plastic ☐
Threaded ☐ Welded ☒
6 " Diam. from +1 ft. to 70 ft. Gauge .250
" Diam. from ft. to ft. Gauge

LINER INSTALLED:
" Diam. from ft. to ft. Gauge

(6) PERFORATIONS:
Perforated? ☒ Yes ☐ No
Type of perforator used Torch
Size of perforations 4 in. by 1/8 in.
75 perforations from 60 ft. to 65 ft.
perforations from ft. to ft.
perforations from ft. to ft.

(7) SCREENS:
Well screen installed? ☐ Yes ☒ No
Manufacturer's Name
Type Model No.
Diam. Slot Size Set from ft. to ft.
Diam. Slot Size Set from ft. to ft.

(8) WELL TESTS:
Drawdown is amount water level is lowered below static level
Was a pump test made? ☐ Yes ☒ No If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
Air test gal./min. with drill stem at ft. hrs.
Bailer test 20 gal./min. with 10 ft. drawdown after 1½ hrs.
Artesian flow g.p.m.
Temperature of water 52° Depth artesian flow encountered ft.

(9) CONSTRUCTION:
Special standards: Yes ☐ No ☒
Well seal—Material used Portland Cement Type III
Well sealed from land surface to 18 ft.
Diameter of well bore to bottom of seal 10 in.
Diameter of well bore below seal 6 in.
Number of sacks of cement used in well seal 12 sacks
How was cement grout placed? Method "C"
Was pump installed? NO Type HP Depth ft.
Was a drive shoe used? ☒ Yes ☐ No Plugs Size: location ft.
Did any strata contain unusable water? ☐ Yes ☒ No
Type of Water? depth of strata
Method of sealing strata off
Was well gravel packed? ☐ Yes ☒ No Size of gravel:
Gravel placed from ft. to ft.

(10) LOCATION OF WELL:
County Lane Driller's well number 3022/22W
¼ N.W. ¼ Section 8 T. 17 R. 3W W.M.
Tax Lot # 00500 Lot Blk Subdivision
Address at well location: 145 Ayres Road

(11) WATER LEVEL: Completed well.
Depth at which water was first found 45 ft.
Static level 23 ft. below land surface. Date 12/1/80
Artesian pressure lbs. per square inch. Date

(12) WELL LOG:
Diameter of well below casing -0-
Depth drilled 70 ft. Depth of completed well 70 ft.
Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. Report each change in position of Static Water Level and indicate principal water-bearing strata.

MATERIAL	From	To	SWL
Top Soil	0	2	
Sand, Gravel Clay	2	13	
Cemented Sand Gravel & Clay	13	36	
Sand Gravel	36	70	23

Work started 11/21/ 1980 Completed 12/1/ 1980
Date well drilling machine moved off of well 12/2/ 1980

Drilling Machine Operator's Certification:
This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.
[Signed] (Drilling Machine Operator) Date 12/2/, 1980
Drilling Machine Operator's License No. 1009

Water Well Contractor's Certification:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Name Carter's Drilling & Pump Service (Person, firm or corporation) (Type or print)
Address P.O. Box 40-Springfield, Oregon 97477
[Signed] (Water Well Contractor)
Contractor's License No. 126 Date 12/2/, 1980

NOTICE TO WATER WELL CONTRACTOR
The original and first copy of this report are to be filed with the WATER RESOURCES DEPARTMENT, SALEM, OREGON 97310 within 30 days from the date of well completion.

SP*12658-690

STATE OF OREGON
WATER WELL REPORT
(as required by ORS 537.765)

2 LANE 5032

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SALEM, OREGON

17S/3W/8

(START CARD) # W 22639

(1) OWNER: Well Number W 22639
Name PARADISE HOMES INC.
Address 3324 BARDELL AVE
City EUGENE State ORE Zip 97401

(2) TYPE OF WORK:
☒ New Well ☐ Deepen ☐ Recondition ☐ Abandon

(3) DRILL METHOD:
☐ Rotary Air ☐ Rotary Mud ☒ Cable
☐ Other

(4) PROPOSED USE:
☒ Domestic ☐ Community ☐ Industrial ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTION:
Special Construction approval ☐ Yes ☒ No Depth of Completed Well 80 ft.
Explosives used ☐ Yes ☒ No Type Amount

HOLE Diameter	From	To	SEAL Material	From	To	Amount sacks or pounds
10"	0	18	BENTONITE	0	18'	12 SACKS
6"	18'	80'				

How was seal placed: Method ☐ A ☐ B ☐ C ☐ D ☐ E
☒ Other POURED AND TAMPED
Backfill placed from ft. to ft. Material
Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	6"	+1	79'	.250	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
					☐	☐	☐	☐

Final location of shoe(s) 79'

(7) PERFORATIONS/SCREENS:
☒ Perforations Method CUTTING TORCH
☐ Screens Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
74	79'	¼"	24	6"	.250	☒	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour
☐ Pump ☒ Bailer ☐ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
40 GPM	45'		1 hr.

Temperature of Water 52 Depth Artesian Flow Found
Was a water analysis done? ☐ Yes By whom
Did any strata contain water not suitable for intended use? ☐ Too little
☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other
Depth of strata: 79'

(9) LOCATION OF WELL by legal description:
County LANE Latitude Longitude
Township 17 S N or S. Range 3-W E or W. WM.
Section 8 ¼ ¼ LAKE SHORE
Tax Lot #10 Lot Block Subdivision ESTATES
Street Address of Well (or nearest address) 1724 LAKE SHORE DR EUGENE ORE 97401

(10) STATIC WATER LEVEL:
28' ft. below land surface. Date 8-30-94
Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:
Depth at which water was first found 39'

From	To	Estimated Flow Rate	SWL
39'	80'	40 GPM	28'

(12) WELL LOG:
Ground elevation

Material	From	To	SWL
TOP SOIL BROWN	0	9'	
SAND, GRAVEL AND			
BROWN CLAY	9	90'	28'

Date started 8-25-94 Completed 8-30-94

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.

WWC Number
Signed Date

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

WWC Number 1248
Signed Dylan White Date 8-30-94

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LANE
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SALEM, OREGON

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765)

Instructions for completing this report are on the last page of this form

WELL I.D. # L 31725
START CARD # 118102

(1) OWNER: Well Number
Name Jack Harmon
Address 3400 County Farm Rd.
City Eugene State OR Zip 97408

(2) TYPE OF WORK
☒ New Well ☐ Deepening ☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD:
☒ Rotary Air ☐ Rotary Mud ☐ Cable ☐ Auger
☐ Other

(4) PROPOSED USE:
☒ Domestic ☐ Community ☐ Industrial ☐ Irrigation
☐ Thermal ☐ Injection ☐ Livestock ☐ Other

(5) BORE HOLE CONSTRUCTION:
Special Construction approval ☐ Yes ☒ No Depth of Completed Well 76 ft.
Explosives used ☐ Yes ☒ No Type ____ Amount ____

HOLE Diameter	From	To	SEAL Material	From	To	Sacks or pounds
10"	0	20'	Bentonite	0	20	19
6"	20'	76'				

How was seal placed: Method ☐ A ☐ B ☐ C ☐ D ☐ E
☒ Other as per OAR 690-210-340
Backfill placed from ____ ft. to ____ ft. Material ____
Gravel placed from ____ ft. to ____ ft. Size of gravel ____

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	6"	+1'	76'	.250	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
					☐	☐	☐	☐

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:
☐ Perforations Method
☐ Screens Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
						☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour
well output may fluctuate
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
30	54	76	1 hr.

Temperature of water 51° Depth Artesian Flow Found
Was a water analysis done? ☐ Yes By whom
Did any strata contain water not suitable for intended use? ☐ Too little
☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other
Depth of strata:

(9) LOCATION OF WELL by legal description:
County Lane Latitude ____ Longitude ____
Township 17 S N or S Range 3 W E or W. WM.
Section 8 NE 1/4 SE 1/4
Tax Lot 300 Lot ____ Block ____ Subdivision ____
Street Address of Well (or nearest address) 3400 County Farm Rd. Eugene, OR

(10) STATIC WATER LEVEL:
22 ft. below land surface. Date 11/16/99
Artesian pressure ____ lb. per square inch. Date ____

(11) WATER BEARING ZONES:
Depth at which water was first found 68

From	To	Estimated Flow Rate	SWL
68	76	30	22

(12) WELL LOG:
Ground Elevation ____

Material	From	To	SWL
Topsoil	0	2	
Gravel, silt brown	2	4	
Gravel, sm-med, sand	4	45.5	
Gravel, sm-med w/ sand	45.5	68	
Gravel large, slight sand	68	76	22

Date started 11/8/99 Completed 11/10/99

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
WWC Number ____
Signed ____ Date ____

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
WWC Number 636
Signed Paul Christensen Date 12/8/99

ORIGINAL & FIRST COPY-WATER RESOURCES DEPARTMENT SECOND COPY-CONSTRUCTOR THIRD COPY-CUSTOMER
Christensen Well Drilling Co.

STATE OF OREGON

MONITORING WELL REPORT

(as required by ORS 537.765 & OAR 690-240-095)

Instructions for completing this report are on the last page of this form.

LANE 68741

WELL I.D.# L 31753

Start Card # 118099

(1) OWNER/PROJECT:

WELL NO. MW2

Name EWEB

Address 500 E 4th AVE

City EUGENE State OR Zip 97401

(2) TYPE OF WORK:

[X] New construction [ ] Alteration (Repair/Recondition)

[ ] Conversion [ ] Deepening [ ] Abandonment

(3) DRILLING METHOD

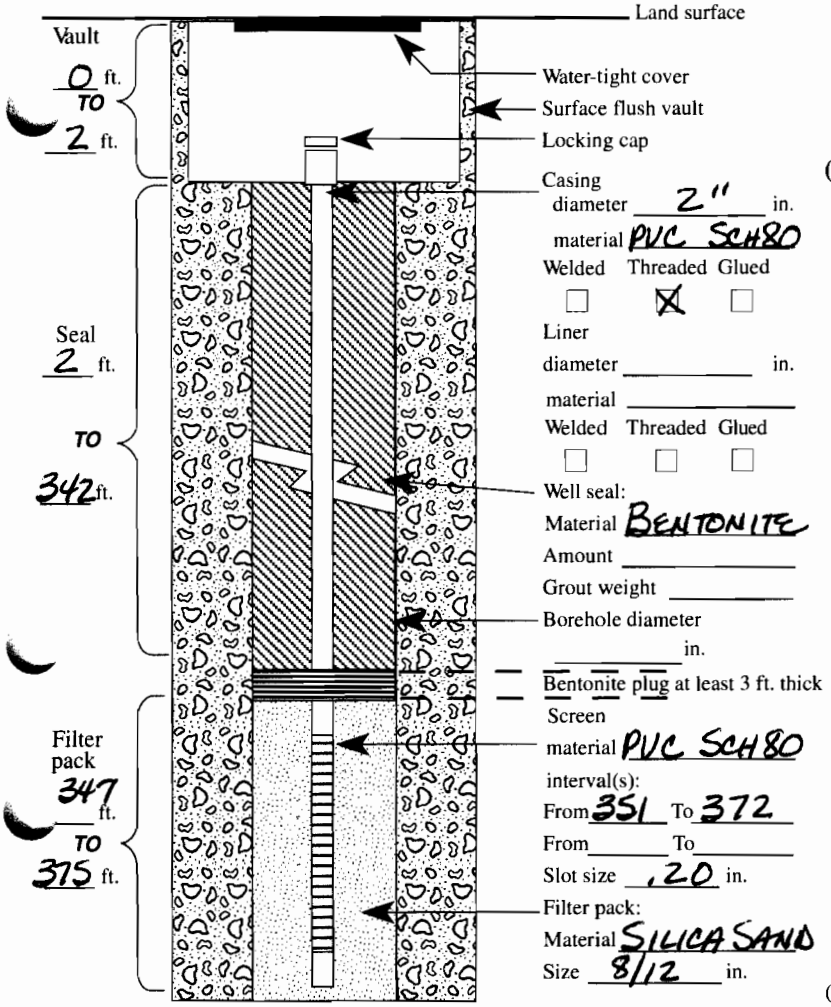
[X] Rotary Air [ ] Rotary Mud [ ] Cable

[ ] Hollow Stem Auger [ ] Other

(4) BORE HOLE CONSTRUCTION

Special Standards Yes [ ] No [X]

Depth of completed well 372 ft.



(5) WELL TEST:

[ ] Pump [ ] Bailer [ ] Air [ ] Flowing Artesian

Permeability Yield GPM

Conductivity PH

Temperature of water 51 °F/C Depth artesian flow found ft.

Was water analysis done? [ ] Yes [ ] No

By whom?

Depth of strata to be analyzed. From ft. to ft.

Remarks:

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WATER RESOURCES DEPT
SALEM, OREGON

Name of supervising Geologist/Engineer

(6) LOCATION OF WELL By legal description

Well Location: County LANE

Township 17 S (N or S) Range 3W (E or W) Section 8

1. SE 1/4 of SW 1/4 of above section.

2. **Either** Street address of well location NEAREST ADDRESS: 3307 HONEYWOOD EUGENE OR

or Tax lot number of well location 500

3. ATTACH MAP WITH LOCATION IDENTIFIED. Map shall include approximate scale and north arrow.

(7) STATIC WATER LEVEL:

32 Ft. below land surface. Date 10/18/99

Artesian Pressure lb/sq. in. Date

(8) WATER BEARING ZONES:

Depth at which water was first found

From	To	Est. Flow Rate	SWL
37	75	10 GPM	
95	147	30 GPM	
169	185	150 GPM	
212	375	300+ GPM	

(9) WELL LOG:

Ground elevation

Material	From	To	SWL
TOPSOIL	0	6	
GRAVEL FINE/CORSE, SAND FINE	6	77	
GRAVEL FINE/CORSE, SAND, SILT	77	95	
GRAVEL CORSE/FINE, SOME SAND			
CORSE/FINE, COBBLES	95	149	
SAND BRN, GRAVEL FN/CORSE SILT	149	164	
SAND BRN FINE/CORSE W/GRVL, SILT	164	168	
GRVL BRN FINE/CRSE, TRACE SILT,			
COBBLES	168	190	
SAND BRN FINE/CRSE W/GRAVEL	190	212	
SAND BRN, GRVL FINE/CRSE, SILT	212	293	
SAND GRAY FINE/COARSE, GRAVEL,			
SILT WOOD TRACE	293	332	
SAND GRAY FINE/MED, SILT,			
WOOD TRACE	332	365	
GRAVEL GRAY FINE/COARSE			
SILT TRACE	365	375	

Date started 10/4/99 Completed 10/25/99

(unbonded) Monitor Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to the best knowledge and belief.

MWC Number 10002

Signed Date

(bonded) Monitor Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

MWC Number 10002

Signed Carl Christensen V-Pres Date

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CHRISTENSEN WELL DRILLING CO.

LANE 69082

10-07-2008

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765 & OAR 690-205-0210)

WELL LABEL # L 96695

START CARD # 1005290

(1) LAND OWNER

Owner Well I.D. _____

First Name WESLEY Last Name LATHEN

Company _____

Address 3793 GILHAM RD

City EUGENE State OR Zip 97408

(2) TYPE OF WORK

☒ New Well ☐ Deepening ☐ Conversion ☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD

☒ Rotary Air ☐ Rotary Mud ☐ Cable ☐ Auger ☐ Cable Mud ☐ Reverse Rotary ☐ Other _____

(4) PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Community ☐ Industrial/ Commericial ☐ Livestock ☐ Dewatering ☐ Thermal ☐ Injection ☐ Other _____

(5) BORE HOLE CONSTRUCTION

Special Standard ☐ (Attach copy)

Depth of Completed Well 118.00 ft.

BORE HOLE Dia	From	To	SEAL Material	From	To	Amt	sacks/ lbs
10	0	18	Cement	0	18	9	S
6	18	118					

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E

☐ Other _____

Backfill placed from _____ ft. to _____ ft. Material _____

Filter pack from _____ ft. to _____ ft. Material _____ Size _____

Explosives used: ☐ Yes Type _____ Amount _____

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
◉	○	6	☒	2	118	.250	◉	○	☒	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐

Shoe ☒ Inside ☐ Outside ☐ Other Location of shoe(s) 118

Temp casing ☐ Yes Dia _____ From _____ To _____

(7) PERFORATIONS/SCREENS

Perforations Method _____

Screens Type _____ Material _____

Perf/Screen	Casing/ Liner	Screen Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size

(8) WELL TESTS: Minimum testing time is 1 hour

○ Pump ○ Bailer ◉ Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
35		118	1

Temperature 58 °F Lab analysis ☐ Yes By _____

Water quality concerns? ☐ Yes (describe below)

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)

County Lane Twp 17.00 S N/S Range 3.00 W E/W WM

Sec 8 SE 1/4 of the NW 1/4 Tax Lot 7700

Tax Map Number _____ Lot _____

Lat ° ' " or _____ DMS or DD

Long ° ' " or _____ DMS or DD

◉ Street address of well ○ Nearest address

3793 GILHAM RD EUGENE, OR 97408

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Predeepening			☐	
Completed Well	10-06-2008		☐	26

Flowing Artesian? ☐ Dry Hole? ☐

WATER BEARING ZONES Depth water was first found 36

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
10-06-2008	36	118	35		☐	26
					☐	
					☐	
					☐	
					☐	

(11) WELL LOG

Ground Elevation _____

Material	From	To
Top Soil	0	1
Brown Clay	1	4
Gravel	4	50
Gravel with Brown Silt	50	100
Gravel	100	118

Date Started 10-06-2008 Completed 10-06-2008

(unbonded) Water Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

License Number 1776 Date 10-07-2008

Electronically Filed

Signed DOUGLAS D TUCKER (E-filed)

(bonded) Water Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

License Number 1541 Date 10-07-2008

Electronically Filed

Signed CASEY JONES JR (E-filed)

Contact Info (optional) _____

ORIGINAL - WATER RESOURCES DEPARTMENT

THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK

Form Version: 0.89

LANE 63575

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765)

LANE 63575

(WELL I.D.)# L 68599
(START CARD) # 165680

Instructions for completing this report are on the last page of this form.

(1) OWNER: Well Number

Name **Chad Ruhoff**

Address **3993 Mirror Pond Way**

City **Eugene** State **OR** Zip **97408**

(2) TYPE OF WORK

☑ New Well ☐ Deepening ☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD:

☑ Rotary Air ☐ Rotary Mud ☐ Cable ☐ Auger

☐ Other

(4) PROPOSED USE:

☑ Domestic ☐ Community ☐ Industrial ☐ Irrigation

☐ Thermal ☐ Injection ☐ Livestock ☐ Other

(5) BORE HOLE CONSTRUCTION:

Special Construction approval ☐ Yes ☑ No Depth of Completed Well **80** ft.

Explosives used ☐ Yes ☑ No Type Amount

HOLE Diameter	From	To	SEAL Material	From	To	Sacks or pounds
10	0	19	Cement	0	19	9 sacks
6	19	80				

How was seal placed: Method ☐ A ☐ B ☑ C ☐ D ☐ E

☐ Other

Backfill placed from ft. to ft. Material

Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	6	+2	78	.250	☑	☐	☑	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
					☐	☐	☐	☐

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:

☐ Perforations Method

☐ Screens Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
						☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour

☐ Pump ☐ Bailer ☑ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
20	total	80	1 hr.

Temperature of water **56** Depth Artesian Flow Found

Was a water analysis done? ☐ Yes By whom

Did any strata contain water not suitable for intended use? ☐ Too little

☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other

Depth of strata:

(9) LOCATION OF WELL by legal description:

County **Lane** Latitude **N 44 06.626** Longitude **W 123 04.854**

Township **17** **S** Range **03** **W** WM.

Section **08** 1/4 1/4

Tax Lot **1300** Lot Block Subdivision

Street Address of Well (or nearest address) **4100 Gilham**

Eugene, OR 97408

(10) STATIC WATER LEVEL:

42 ft. below land surface. Date **6-14-04**

Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:

Depth at which water was first found **65'**

From	To	Estimated Flow Rate	SWL
65'	80'	20 gpm	42'

(12) WELL LOG:

Ground Elevation

Material	From	To	SWL
Loam and Top soil	0	22	
Small gravel and sand w/brown clay	22	45	42
2" gravel and sand	45	80	42

RECEIVED
JUL 01 2004
WATER RESOURCES DEPT
SALEM, OREGON

Date started **6-14-04** Completed **6-14-04**

(unbonded) Water Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

WWC Number

Signed Date

(bonded) Water Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

WWC Number **1553**

Signed Jeffrey Henderson Date **6-14-04**

ORIGINAL & FIRST COPY-WATER RESOURCES DEPARTMENT SECOND COPY-CONSTRUCTOR THIRD COPY-CUSTOMER

LANE 24389

17S/3W/8BD

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765)

(START CARD) # W83714

Instructions for completing this report are on the last page of this form.

(1) OWNER: Well Number

Name Marion Randall

Address 3839 Gilham Rd.

City Eugen State OR Zip 97401

(2) TYPE OF WORK

☒ New Well ☐ Deepening ☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD:

☒ Rotary Air ☐ Rotary Mud ☐ Cable ☐ Auger

☐ Other

(4) PROPOSED USE:

☒ Domestic ☐ Community ☐ Industrial ☐ Irrigation

☐ Thermal ☐ Injection ☐ Livestock ☐ Other

(5) BORE HOLE CONSTRUCTION:

Special Construction approval ☐ Yes ☒ No Depth of Completed Well 118½ ft.

Explosives used ☐ Yes ☒ No Type Amount

HOLE Diameter	From	To	Material	SEAL From	To	Sacks or pounds
10"	0	18'	Cement	0	18'	6 sacks
6'	18'	118½'				

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E

☐ Other

Backfill placed from ft. to ft. Material

Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	6"	+1½'	118½'	.250	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
					☐	☐	☐	☐

Final location of shoe(s) 118½'

(7) PERFORATIONS/SCREENS:

☒ Perforations Method Holte Perforator

☐ Screens Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
103'	118'	1¼'	300	6"		☒	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour

☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
75	78'	118'	1 hr.
	Could flucate		

Temperature of water 57 Depth Artesian Flow Found

Was a water analysis done? ☐ Yes By whom

Did any strata contain water not suitable for intended use? ☐ Too little

☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other

Depth of strata:

(9) LOCATION OF WELL by legal description:

County Lane Latitude Longitude

Township 17S N or S Range 3W E or W. WM.

Section 8 SE 1/4 NW 1/4

Tax Lot 7500 Lot Block Subdivision

Street Address of Well (or nearest address) 3839 Gilham Rd.

Eugene, OR

(10) STATIC WATER LEVEL:

41 ft. below land surface. Date 9-21-95

Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:

Depth at which water was first found 63'

From	To	Estimated Flow Rate	SWL
63'	118½'	75 gpm	41'

(12) WELL LOG:

Ground Elevation

Material	From	To	SWL
Topsoil	0	1'	
Brown sandy clay	1'	4'	
Brown, clay, gravel	4'	10'	
Brown,clay,sand,gravel	10'	34'	
Brown sand	34'	42'	
Gravel, sand	42'	118'	41'

RECEIVED
OCT 13 1995
WATER RESOURCES DEPT.
SALEM, OREGON

Date started 9-19-95 Completed 9-21-95

(unbonded) Water Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

WWC Number 1641

Signed Alan McCracken Date 9-21-95

(bonded) Water Well Constructor Certification:

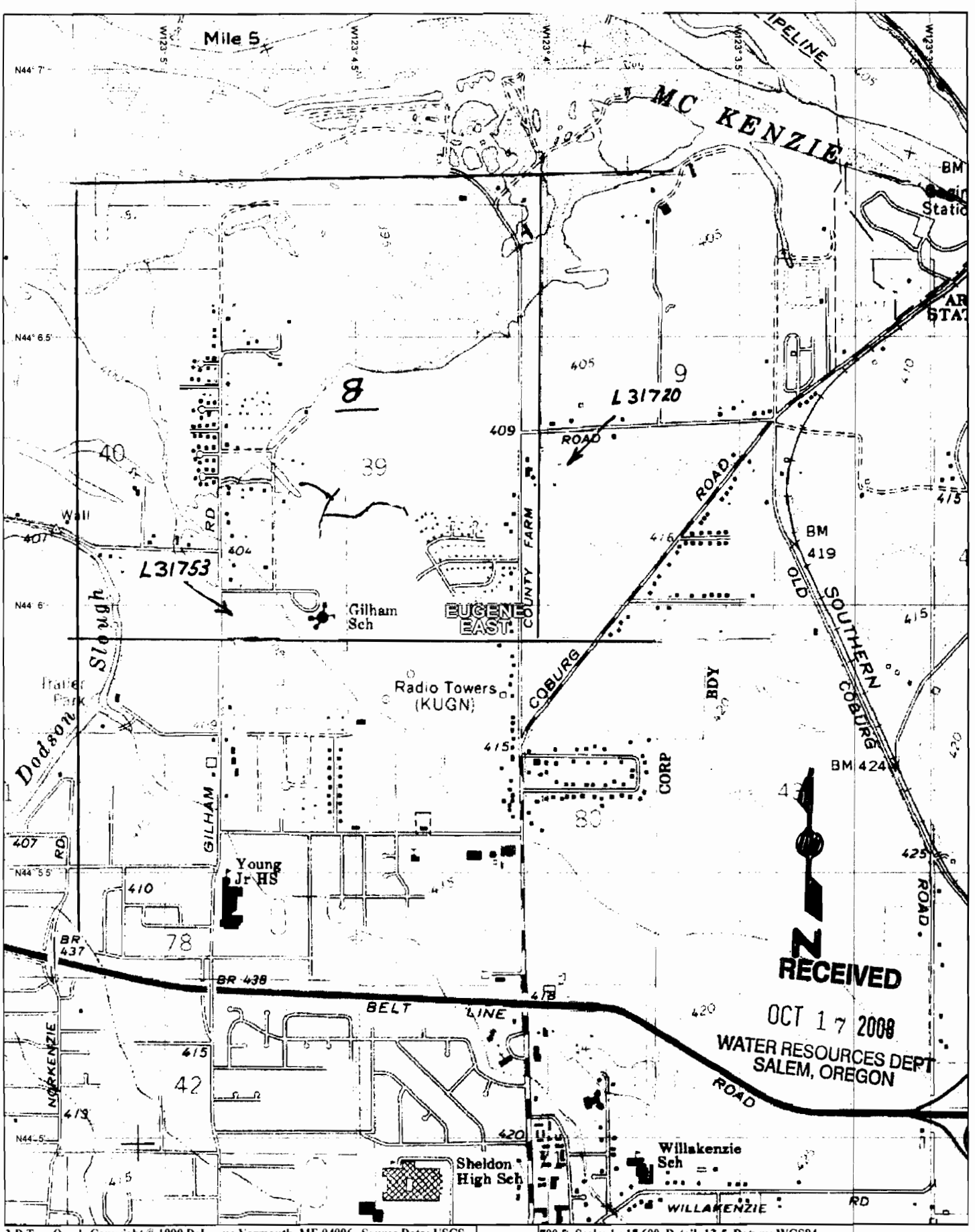
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

WWC Number 1541

Signed Craig Jones Jr. Date 9-21-95

ORIGINAL & FIRST COPY-WATER RESOURCES DEPARTMENT SECOND COPY-CONSTRUCTOR THIRD COPY-CUSTOMER

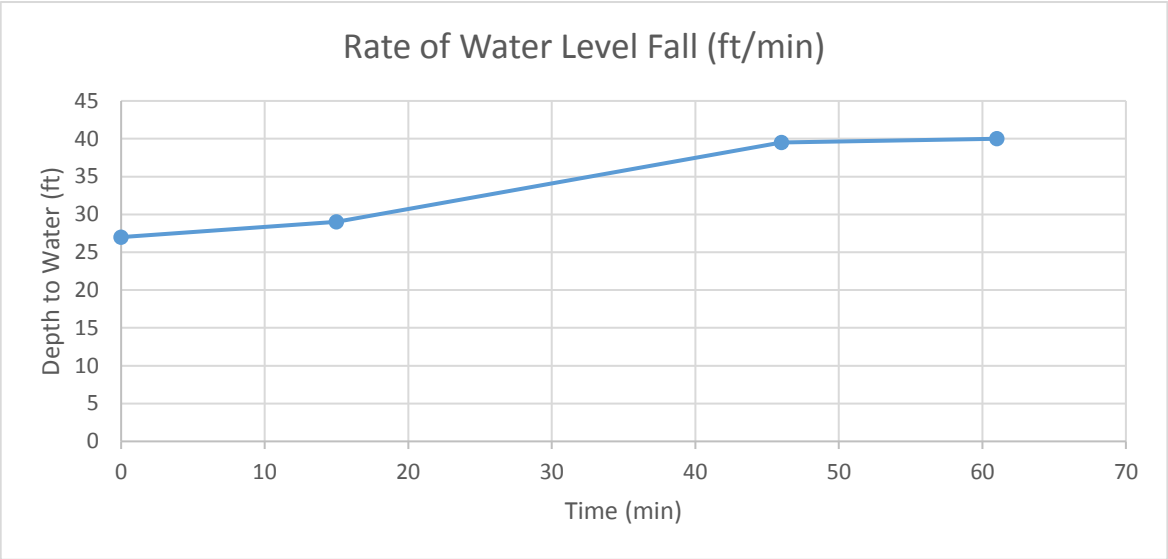
LANE 68741



3-D TopoQuads Copyright © 1999 DeLorme Yarmouth, ME 04096 Source Data: USGS 700 ft Scale: 1 : 17,600 Detail: 13-5 Datum: WGS84

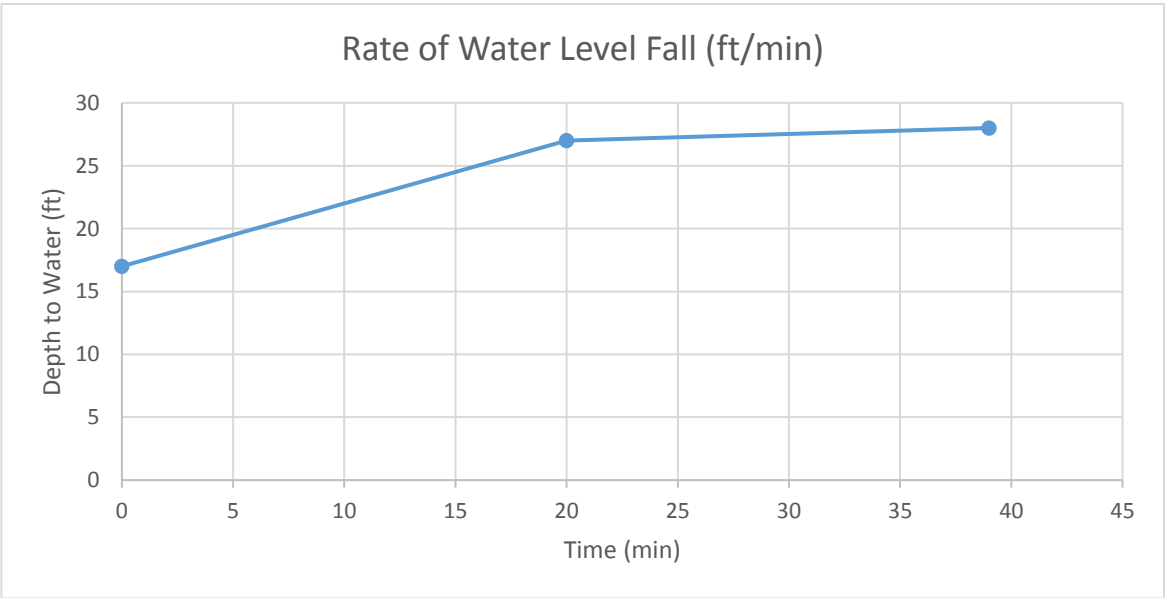
Rates for Falling Head Infiltration Tests

Project:	Gilham E.S.	PN 15-176	Date: Oct. 5, 2015	
Location: Infil - 1	Standpipe Diameter	= 6"	Time = 0 at addition of H20	
Elapsed Time (min)	Water Level BGS (in)	Rate of Fall (ft/min)	Rate (ft/Hr)	Average
0	27			
15	29	0.01	0.7	0.7
46	39.5	0.03	1.7	1.2
61	40	0.00	0.2	0.8



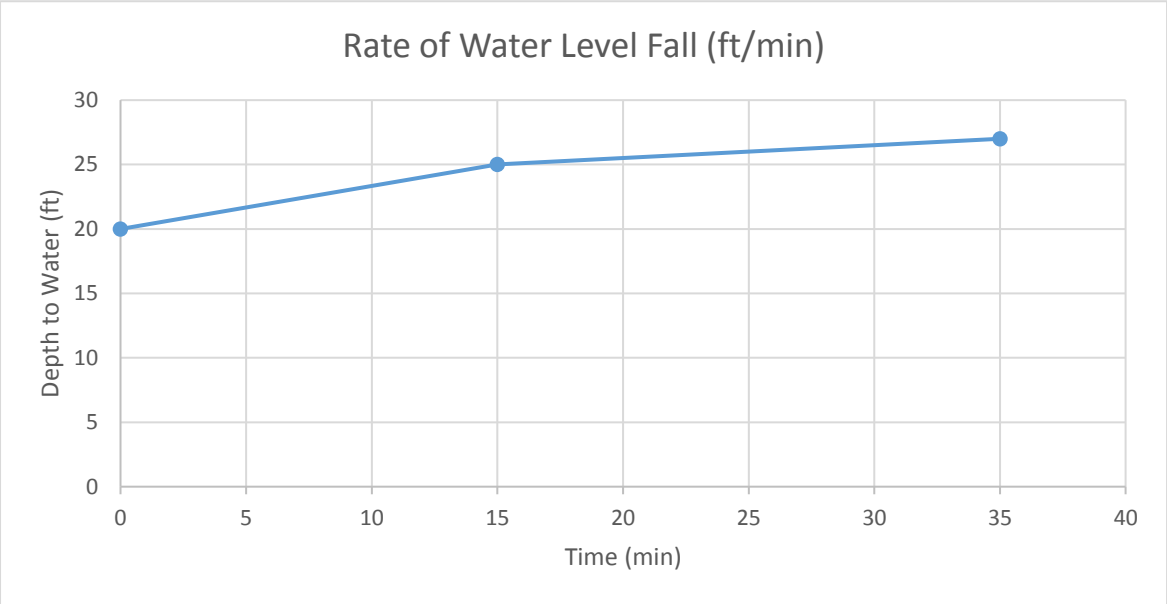
Trial 2

0	17			
20	27	0.04	2.5	2.5
39	28	0.00	0.3	1.4



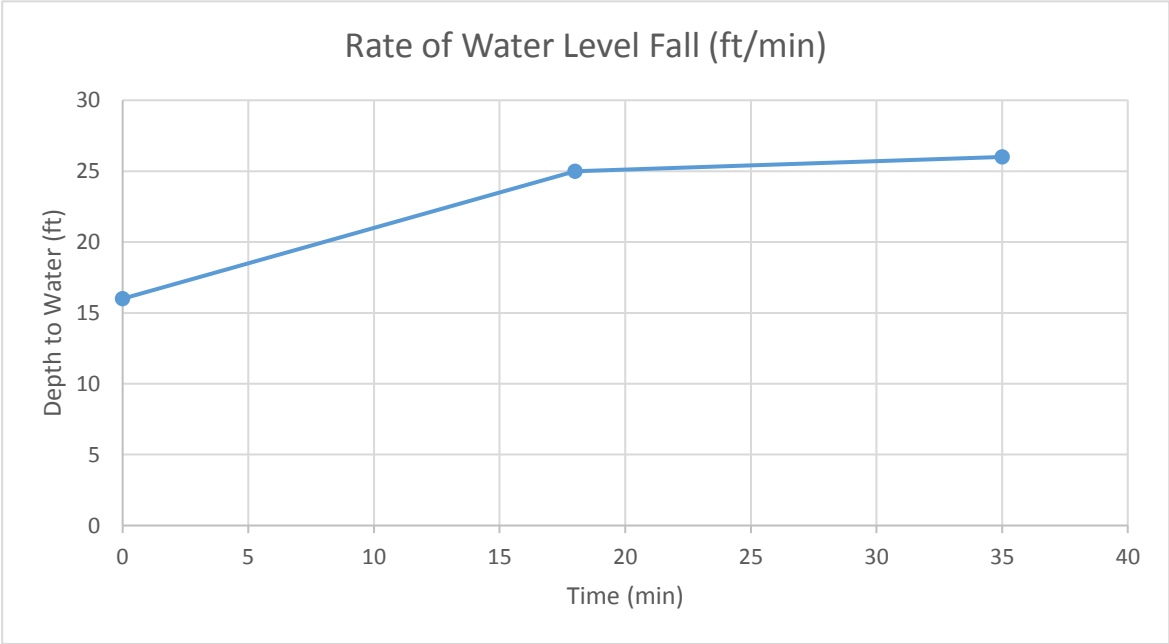
Trial 3

0	20			
15	25	0.03	1.7	1.7
35	27	0.01	0.5	1.1

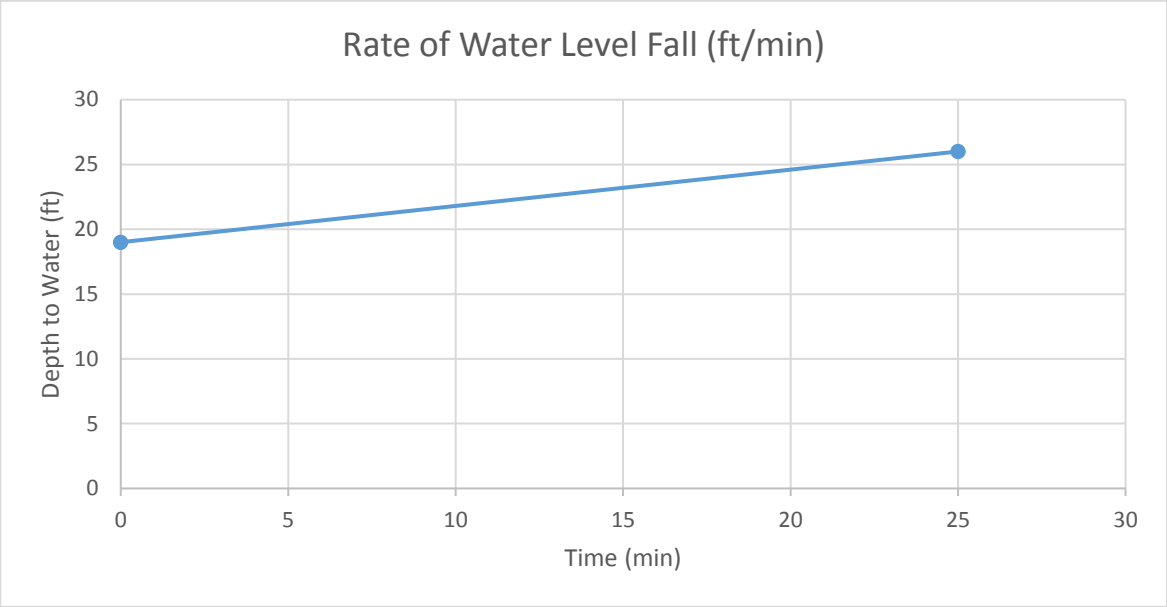


Trial 4

0	16			
18	25	0.04	2.5	2.5
35	26	0.00	0.3	1.4

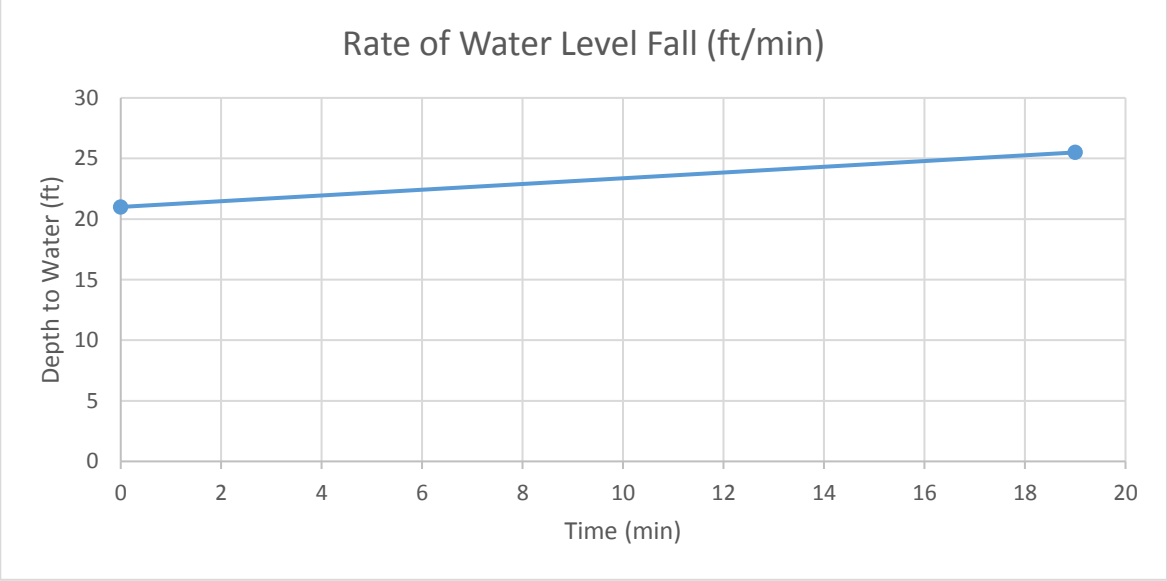


Location:	Infil - 2	6" diameter		
Elapsed Time (min)	Water Level BGS (in)	Rate of Fall (ft/min)	Rate (ft/Hr)	Average
0	19			
25	26	0.02	1.4	1.4



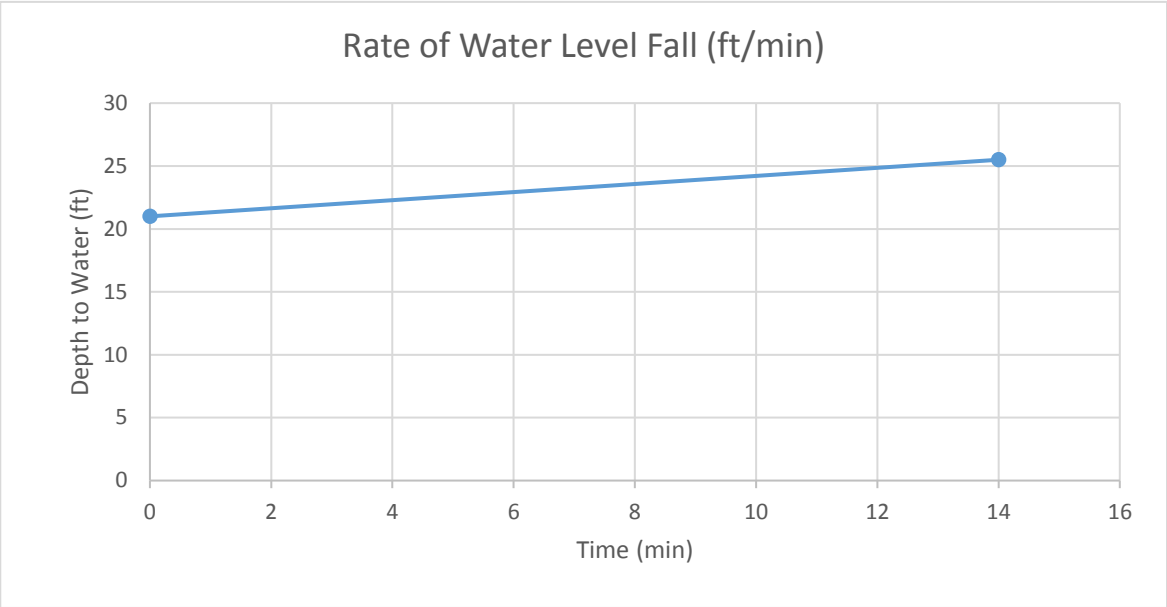
Trial 2

0	21			
19	25.5	0.02	1.2	1.2



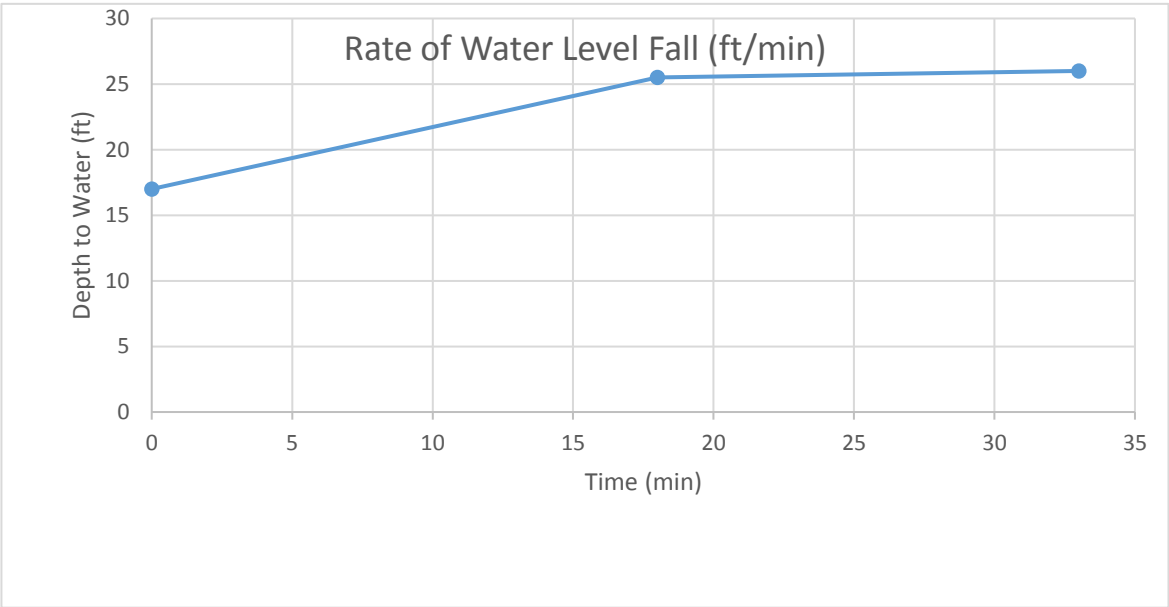
Trial 3

0	21			
14	25.5	0.03	1.6	1.6

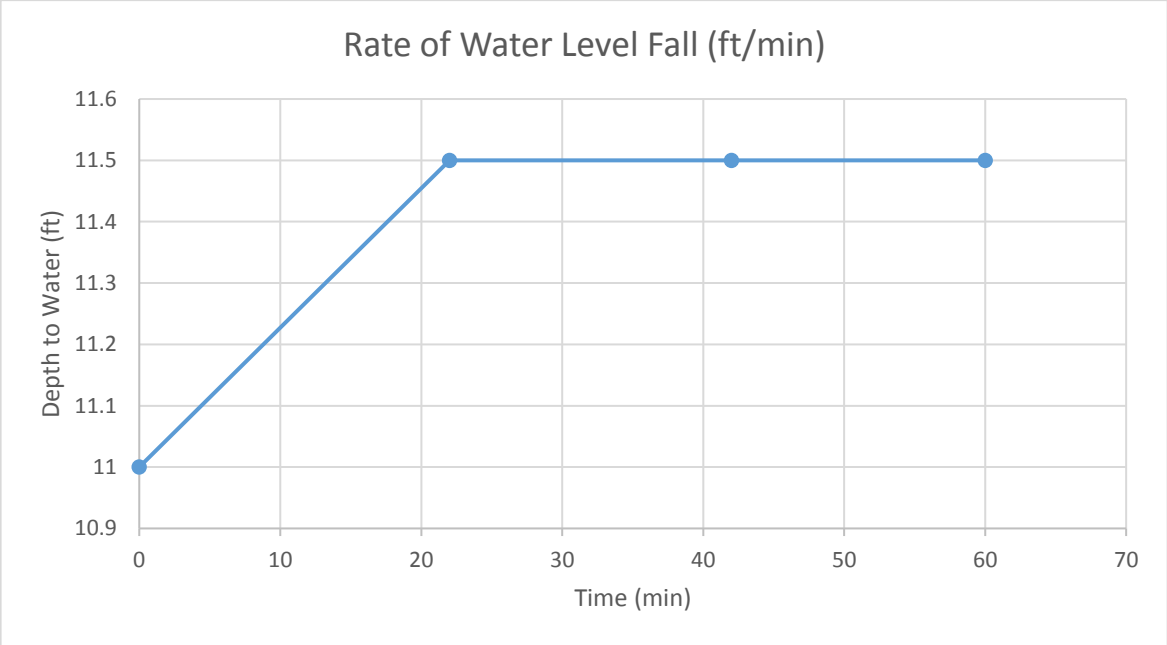


Trial 4

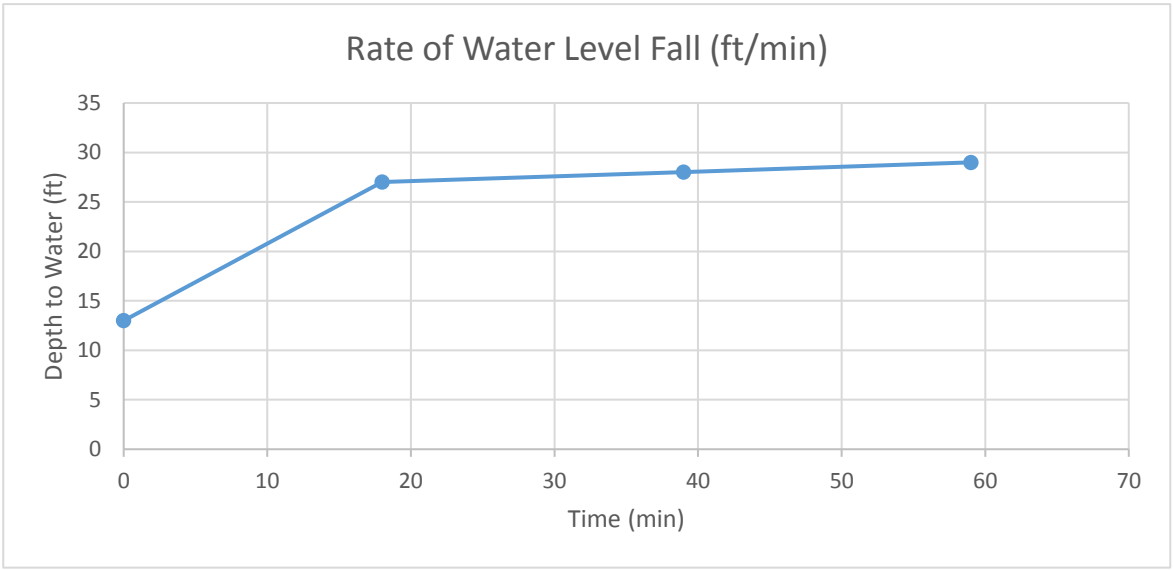
0	17			
18	25.5	0.04	2.4	2.4
33	26	0.00	0.2	1.3



Location:	Infil - 3	6" diameter		
Elapsed Time (min)	Water Level BGS (in)	Rate of Fall (ft/min)	Rate (ft/Hr)	Average
0	11			
22	11.5	0.00	0.1	0.1
42	11.5	0.00	0.0	0.0
60	11.5	0.00	0.0	0.0

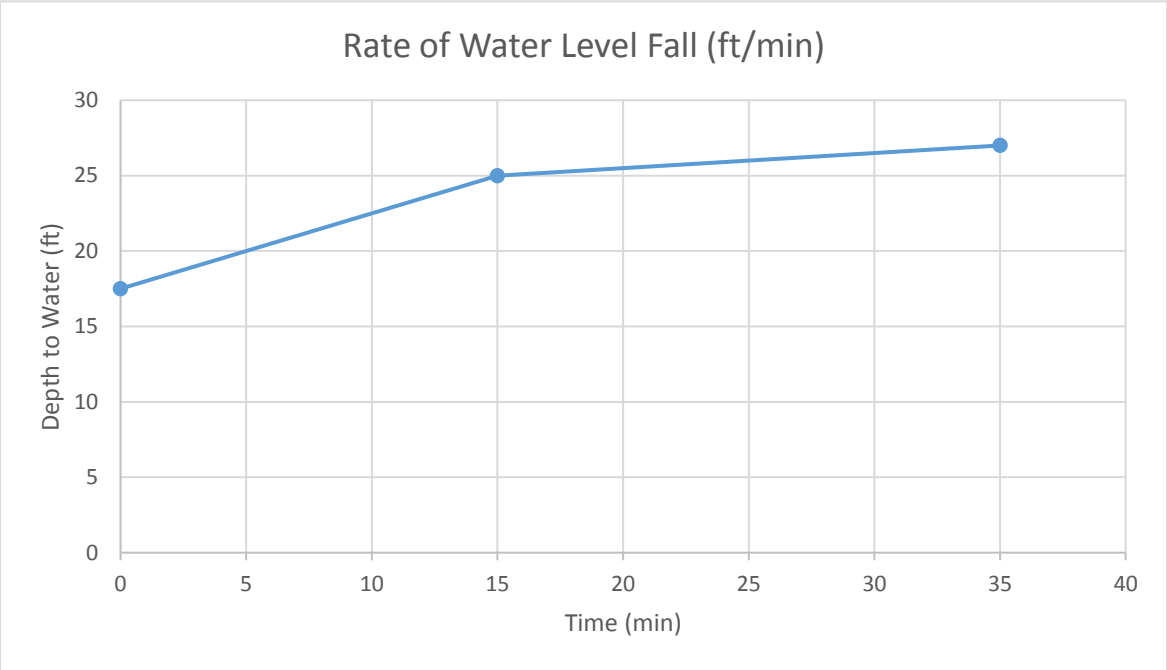


Location:	Infil - 4	6" diameter		
Elapsed Time (min)	Water Level BGS (in)	Rate of Fall (ft/min)	Rate (ft/Hr)	Average
0	13			
18	27	0.06	3.9	3.9
39	28	0.00	0.2	0.2
59	29	0.00	0.3	0.3



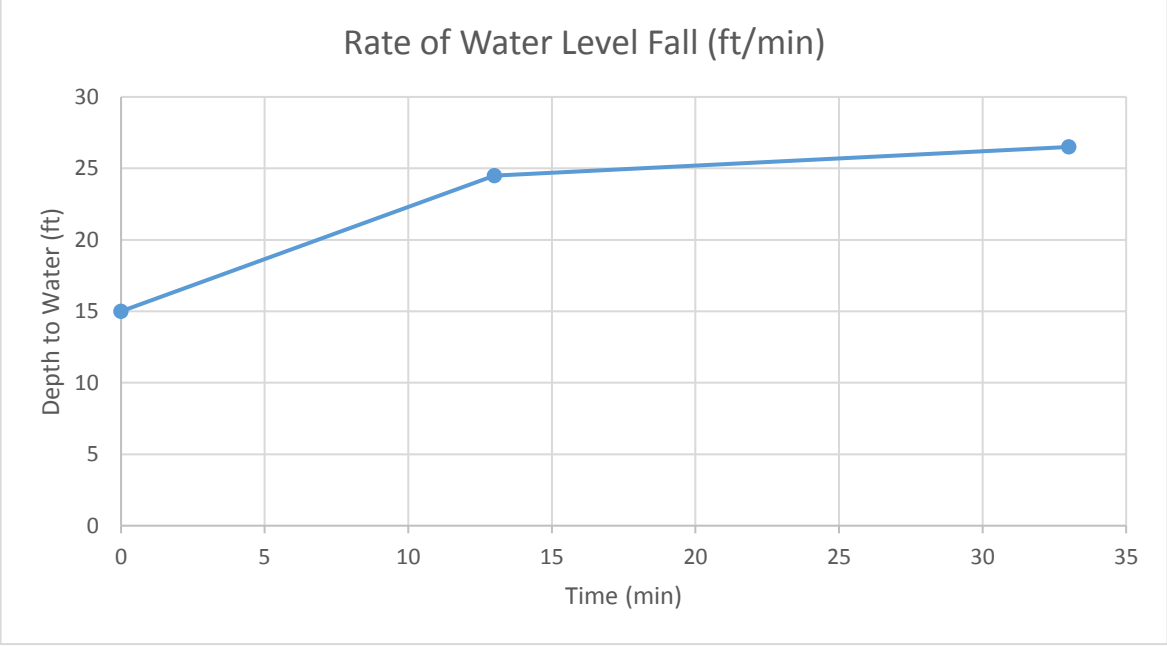
Trial 2

0	17.5			
15	25	0.04	2.5	2.5
35	27	0.01	0.5	1.5



Trial 3

0	15			
13	24.5	0.06	3.7	3.7
33	26.5	0.01	0.5	2.1



Soil Map—Lane County Area, Oregon
(Gilham Elementary School)

Map Scale: 1:4,980 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lane County Area, Oregon
Survey Area Data: Version 12, Sep 18, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 5, 2011—Jul 6, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Lane County Area, Oregon (OR637)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
5	Awbrig silty clay loam	11.5	11.4%
31	Coburg silty clay loam	15.7	15.6%
32	Coburg-Urban land complex	0.6	0.6%
34	Courtney gravelly silty clay loam	14.3	14.1%
75	Malabon silty clay loam	4.4	4.4%
76	Malabon-Urban land complex	0.0	0.0%
118	Salem gravelly silt loam	54.4	53.9%
Totals for Area of Interest		**100.9**	**100.0%**

Lane County Area, Oregon

34—Courtney gravelly silty clay loam

Map Unit Setting

National map unit symbol: 236c
Elevation: 90 to 1,000 feet
Mean annual precipitation: 30 to 60 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 160 to 235 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Courtney and similar soils: 85 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Courtney

Setting

Landform: Depressions on stream terraces, drainageways on stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Gravelly and clayey alluvium from mixed sources

Typical profile

H1 - 0 to 15 inches: gravelly silty clay loam
H2 - 15 to 28 inches: gravelly clay
H3 - 28 to 41 inches: very gravelly clay loam
H4 - 41 to 60 inches: very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 10 to 19 inches to abrupt textural change
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water storage in profile: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Other vegetative classification: Poorly Drained (G002XY006OR)

Minor Components

Awbrig
Percent of map unit: 4 percent
Landform: Terraces

Bashaw
Percent of map unit: 4 percent
Landform: Terraces

Natroy
Percent of map unit: 4 percent
Landform: Terraces

Data Source Information

Soil Survey Area: Lane County Area, Oregon
Survey Area Data: Version 12, Sep 18, 2015

Lane County Area, Oregon

118—Salem gravelly silt loam

Map Unit Setting

National map unit symbol: 2340
Elevation: 300 to 800 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Salem and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Salem

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Gravelly mixed alluvium

Typical profile

H1 - 0 to 7 inches: gravelly silt loam
H2 - 7 to 26 inches: gravelly clay loam
H3 - 26 to 60 inches: very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B

Other vegetative classification: Well drained < 15% Slopes
(G002XY002OR)

Data Source Information

Soil Survey Area: Lane County Area, Oregon
Survey Area Data: Version 12, Sep 18, 2015

APPENDIX B:

Recommended Earthwork Specifications

GEOTECHNICAL SPECIFICATIONS

General Earthwork

1. All areas where structural fills, fill slopes, structures, or roadways are to be constructed shall be stripped of organic topsoil and cleared of surface and subsurface deleterious material, including but limited to vegetation, roots, or other organic material, undocumented fill, construction debris, soft or unsuitable soils as directed by the Geotechnical Engineer of Record. These materials shall be removed from the site or stockpiled in a designated location for reuse in landscape areas if suitable for that purpose. Existing utilities and structures that are not to be used as part of the project design or by neighboring facilities, shall be removed or properly abandoned, and the associated debris removed from the site.

2. Upon completion of site stripping and clearing, the exposed soil and/or rock shall be observed by the Geotechnical Engineer of Record or a designated representative to assess the subgrade condition for the intended overlying use. Pits, depressions, or holes created by the removal of root wads, utilities, structures, or deleterious material shall be properly cleared of loose material, benched and backfilled with fill material approved by the Geotechnical Engineer of Record compacted to the project specifications.

3. In structural fill areas, the subgrade soil shall be scarified to a depth of 4-inches, if soil fill is used, moisture conditioned to within 2% of the materials optimum moisture for compaction, and blended with the first lift of fill material. The fill placement and compaction equipment shall be appropriate for fill material type, required degree of blending, and uncompacted lift thickness. Assuming proper equipment selection, the total uncompacted thickness of the scarified subgrade and first fill lift shall not exceed 8-inches, subsequent lifts of uncompacted fill shall not exceed 8-inches unless otherwise approved by the Geotechnical Engineer of Record. The uncompacted lift thickness shall be assessed based on the type of compaction equipment used and the results of initial compaction testing. Fine-grain soil fill is generally most effectively compacted using a kneading style compactor, such as a sheeps-foot roller, where as granular materials are more effectively compacted using a smooth, vibratory roller or impact style compactor.

4. All structural soil fill shall be well blended, moisture conditioned to within 2% of the material's optimum moisture content for compaction and compacted to at least 90% of the material's maximum dry density as determined by ASTM Method D-1557, or an equivalent method. Soil fill shall not contain more than 10% rock material and no solid material over 3-inches in diameter unless approved by the Geotechnical Engineer of Record. Rocks shall be evenly distributed throughout each lift of fill that they are contained within and shall not be clumped together in such a way that voids can occur.

5. All structural granular fill shall be well blended, moisture conditioned at or up to 3% above of the material's optimum moisture content for compaction and compacted to at least 95% of the material's maximum dry density as determined by ASTM Method D-1557 or an equivalent method. The granular fill shall not contain solid particles over 2-inches in diameter unless special density testing methods or proof-rolling is approved by the Geotechnical Engineer of Record. Granular fill is generally considered to be a crushed aggregate with a fracture surface of at least 70% and a maximum size not exceeding 1.5-inches in diameter, well-graded with less than 10%, by weight, passing the No. 200 Sieve.

6. Structural fill shall be field tested for compliance with project specifications for every 2-feet in vertical rise or 500 cy placed, whichever is less. In-place field density testing shall be performed by a competent individual, trained in the testing and placement of soil and aggregate fill placement, using either ASTM Method D-1556/4959/4944 (Sand Cone), D-6938 (Nuclear Densometer), or D-2937/4959/4944 (Drive Cylinder). Should the fill materials not be suitable for testing by the above methods, then observation of placement, compaction and proof-rolling with a loaded 10 cy dump-truck, or equivalent ground pressure equipment, by a trained individual may be used to assess and document the compliance with structural fill specifications.

Utility Excavations

1. Utility excavations are to be excavated to the design depth for bedding and placement and shall not be over-excavated. Trench widths shall only be of sufficient width to allow placement and proper construction of the utility and backfill of the trench.
2. Backfilling of a utility trench will be dependent on its location, use, depth, and utility line material type. Trenches that are required to meet structural fill specifications, such as those under or near buildings, or within pavement areas, shall have granular material strategically compacted to at least the spring-line of the utility conduit to mitigate pipeline movement and deformation. The initial lift thickness of backfill overlying the pipeline will be dependent on the pipeline material, type of backfill, and the compaction equipment, so as not to cause deflection or deformation of the pipeline. Trench backfill shall conform to the General Earthwork specifications for placement, compaction, and testing of structural fill.

Geotextiles

1. All geotextiles shall be resistant to ultraviolet degradation, and to biological and chemical environments normally found in soils. Geotextiles shall be stored so that they are not in direct sunlight or exposed to chemical products. The use of a geotextile shall be specified and shall meet the following specification for each use.

Subgrade/Aggregate Separation

Woven or nonwoven fabric conforming to the following physical properties:

▪ Minimum grab tensile strength	ASTM Method D-4632	180 lb
▪ Minimum puncture strength	ASTM Method D-4833	90 lb
▪ Elongation	ASTM Method D-4632	12%
▪ Maximum apparent opening size	ASTM Method D-4751	No. 40
▪ Minimum permittivity	ASTM Method D-4491	0.35 s^{-1}

Drainage Filtration

Woven fabric conforming to the following physical properties:

▪ Minimum grab tensile strength	ASTM Method D-4632	110 lb
▪ Minimum puncture strength	ASTM Method D-4833	40 lb
▪ Elongation	ASTM Method D-4632	30%
▪ Maximum apparent opening size	ASTM Method D-4751	300µm
▪ Minimum permittivity	ASTM Method D-4491	0.7 s^{-1}

Geogrid Base Reinforcement

Extruded biaxially or triaxially oriented polypropylene conforming to the following physical properties:

▪ Peak tensile strength lb/ft	ASTM Method D-6637	925
▪ Tensile strength at 2% strain lb/ft	ASTM Method D-6637	300
▪ Tensile strength at 5% strain lb/ft	ASTM Method D-6637	600
▪ Flexural Rigidity	ASTM Method D-1388	250,000 mg-cm
▪ Effective Opening Size rock size	ASTM Method D-4751	1.5x

DOCUMENT 00 41 13
BID FORM

BID FOR: Gilham Elementary School Renovation and Expansion Phase 01 CIP Number 410.193.003

Submitted to: Facilities Management
Eugene School District 4J
715 West Fourth Avenue
Eugene, Oregon 97402

Bid Deadline: 2:00 PM
08 March 2016

Submitted by: _____
(Company Name)

BASE BID
The undersigned proposes to furnish all material, equipment, and labor required for the complete project, and to perform all work in strict accordance with the Contract Documents for the lump sum prices indicated below with completion occurring on or prior to the dates indicated:

Bid: _____ $ _____
(Words) (Figures)

The undersigned agrees, if awarded the Contract, to substantially complete all Base Bid Package C work on or before the dates specified in Section 01 11 00.

ALTERNATE BIDS
The Undersigned proposes to ADD TO the Base Bid indicated above the items of work relating to the following Alternates as described in the Project Manual, Section 01 23 00.

ALTERNATE NO. 1:
NEW COMMUNITY SPACES

Bid: _____ $ _____
(Words) (Figures)
The undersigned agrees, if awarded the Contract, to substantially complete all Alternate No. 1 work on or before dates specified in Section 01 11 00.

ALTERNATE NO. 2:
RESTROOMS AT BUILDING B

Bid: _____ $ _____
(Words) (Figures)
The undersigned agrees, if awarded the Contract, to substantially complete all Alternate No. 2 work on or before dates specified in Section 01 11 00.

ALTERNATE NO. 3:
FLEX ROOMS AT BUILDING B

Bid: _____ $ _____
(Words) (Figures)
The undersigned agrees, if awarded the Contract, to substantially complete all Alternate No. 3 work on or before dates specified in Section 01 11 00.

ALTERNATE NO. 4:
LEARNING CENTER C122 REMODEL

Bid: _____ $ _____
(Words) (Figures)
The undersigned agrees, if awarded the Contract, to substantially complete all Alternate No. 4 work on or before dates specified in Section 01 11 00.

ALTERNATE NO. 5:
BUILDING D REMODEL

Bid: _____$ _____
(Words) (Figures)
The undersigned agrees, if awarded the Contract, to substantially complete all Alternate No. 5 work on or before dates specified in Section 01 11 00.

ALTERNATE NO. 6:
SITE WORK

Bid: _____$ _____
(Words) (Figures)
The undersigned agrees, if awarded the Contract, to substantially complete all Alternate No. 6 work on or before dates specified in Section 01 11 00.

ALTERNATE NO. 7:
READER BOARD

Bid: _____$ _____
(Words) (Figures)
The undersigned agrees, if awarded the Contract, to substantially complete all Alternate No. 7 work on or before dates specified in Section 01 11 00.

It is understood that the Base Bid may be adjusted for any alternates in determining the amount of the Contract. Any or all of such Alternates may be accepted or reinstated by the Owner at any time within 60 days from the date of the Contract Award by the Owner, at the respective amounts named herein.

BID SECURITY
Accompanying herewith is Bid Security, which is not less than ten percent (10%) of the total amount of the Base Bid plus additive alternates.

STIPULATIONS
The undersigned acknowledges the liquidated damages provision included in the Supplementary Conditions.

The undersigned agrees, if awarded the contract, to comply with the provisions of Oregon Revised Statutes 279C.800 through 279C.870 pertaining to the payment of prevailing rates of wage.

The undersigned agrees, if awarded the Contract, to execute and deliver to the Owner within ten (10) working days after receiving contract forms, a signed Agreement and a satisfactory Performance Bond and Payment Bond each in an amount equal to 100 percent (100%) of the Contract Sum.

For every Agreement of $100,000 or greater in value, all Contractors and Subcontractors shall have a public works bond in the amount of $30,000, filed with the Construction Contractors' Board (CCB), in compliance with ORS 279C.836, before starting work on the project unless exempt. Contractor agrees to provide a copy of the Contractor's BOLI Public Works bond with the signed Agreement as Specified in the Supplementary Conditions.

The undersigned agrees that the Bid Security accompanying this proposal is the measure of liquidated damages which the Owner will sustain by the failure of the undersigned to execute and deliver the above named agreement and bonds; and that if the undersigned defaults in executing that agreement within ten (10) days after forms are provided or providing the bonds, then the Bid Security shall become the property of the Owner; but if this proposal is not accepted within sixty (60) days of the time set for the opening of bids, or if the undersigned executes and delivers said agreement and bonds, the Bid Security shall be returned.

By submitting this Bid, the Bidder certifies that the Bidder:
a) has available the appropriate financial, material, equipment, facility and personnel resources and expertise, or the ability to obtain the resources and expertise, necessary to meet all contractual responsibilities;
b) has a satisfactory record of past performance;
c) has a satisfactory record of integrity, and is not disqualified under ORS 279C.440;
d) is qualified legally to contract with the Owner; and
e) will promptly supply all necessary information in connection with any inquiry the Owner may make concerning the

responsibility of the Bidder.
Prior to award of a Contract, the Bidder shall submit appropriate documentation to allow the Owner to determine whether or not the Bidder is "responsible" according to the above criteria.

The contractor agrees with the provisions of Oregon Revised Statutes 279C.505, which requires that the contractor shall demonstrate it has established a drug-testing program for employees and will require each subcontractor providing labor for the Project to do the same.

The undersigned has received addenda numbers _____ to _____ inclusive and has included their provisions in the above Bid amounts.

The undersigned has visited the site to become familiar with 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.

The undersigned certifies that the Bidder is a _____ Bidder under ORS. ("Resident" or "Non-resident", to be filled in by Bidder)

Names of Firm: _____

Street Address: _____
(City) (State) (Zip)

Telephone Number: _____ FAX Number: _____

Email Address: _____

Signed By: _____ Printed Name:_____
(Signature of Authorized Official. If bid is from a partnership, one of the partners must sign bid).

Date Signed: _____

Official Capacity: _____

If corporation, attest: _____ Date: _____
(Secretary of Corporation)

SEAL (If Corporate)

_____ Corporation
_____ Partnership
_____ Individual

Enclosed: Bid Security

NON-DISCRIMINATION REQUIREMENT

Contractor certifies that the Contractor has not discriminated against minorities, women or emerging small business enterprises in obtaining any required subcontracts.

The Contractor agrees not to discriminate against any client, employee, or applicant for employment or for services, because of race, color, religion, sex, national origin, physical or mental handicap, sexual orientation or age, unless based upon bona fide occupational qualifications, and that they are otherwise in compliance with all federal, state and local laws prohibiting discrimination, with regard to, but not limited to, the following: Employment upgrading, demotion or transfer; Recruitment or recruitment advertising; Layoffs or termination; Rates of pay or other forms of compensation; Selection for training; Rendition of services. It is further understood that any vendor who is in violation of this clause shall be barred forthwith from receiving awards of any purchase order from the School District, unless a satisfactory showing is made that discriminatory practices have terminated and that a recurrence of such acts is unlikely.

FIRM NAME: _____

ADDRESS: _____

TELEPHONE: _____

BY: _____
(Company or Firm Officer)

BY: _____
(Type or Print Name)

NON-COLLUSION AFFIDAVIT

STATE OF _____)

County of _____)

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

I state that:

(1) The price(s) and amount of this bid have been arrived at independently and without consultation, communication or agreement with any other contractor, bidder or potential bidder, except as disclosed on the attached appendix.

(2) That neither the price(s) nor the amount of this bid, and neither the approximate price(s) nor approximate amount of this bid, have been disclosed to any other firm or person who is a bidder or potential bidder, and they will not be disclosed before bid opening.

(3) No attempt has been made or will be made to induce any firm or person to refrain from bidding on this contract, or to submit a bid higher than this bid, or to submit any intentionally high or noncompetitive bid or other form of complementary bid.

(4) The bid of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or noncompetitive bid.

(5) _____, its affiliates, subsidiaries, officers, directors and
(Name of my Firm)
employees are not currently under investigation by any governmental agency and have not in the last four years been convicted of or found liable for any act prohibited by State or Federal law in any jurisdiction, involving conspiracy or collusion with respect to bidding on any public contract, except as described on the attached appendix.

I state that _____ understands and acknowledges that the above representations
(Name of my Firm)
are material and important, and will be relied on by School District 4J in awarding the contract(s) for which this bid is submitted. I understand and my firm understands that any misstatement in this affidavit is and shall be treated as fraudulent concealment from School District 4J of the true facts relating to the submission of bids for this contract.

_____
(Authorized Signature)

Sworn to and subscribed before me this _____ day of _____, 20

_____
(Notary Public for Oregon)

My Commission Expires: _____

END OF BID FORM

DOCUMENT 00 45 22
FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM

PROJECT: Gilham Elementary School Renovation and Expansion Phase 01
CIP NUMBER: 410.193.003

TO: Kathi Hernandez, Facilities Management Assistant
Eugene School District 4J
715 West Fourth Avenue
Eugene, Oregon 97402

BID SUBMISSION DEADLINE: Date: _____Time: _____

SUBMITTAL REQUIREMENTS
Subcontractor disclosure is required on all public improvement contracts greater than $100,000.

This form must be submitted at the location specified in the Invitation to Bid on the advertised bid closing date and within two working hours after the advertised bid closing time.

List below the name of each subcontractor that will be furnishing labor or labor and materials, and that is required to be disclosed, the category of work that the subcontractor will be performing, and the dollar value of the subcontract. Enter "NONE" if there are no subcontractors that need to be disclosed. (ATTACH ADDITIONAL SHEETS IF NEEDED.)

SUBCONTRACTOR	DOLLAR VALUE	CATEGORY OF WORK
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

The above listed first- tier subcontractor(s) are providing labor, or labor and material, with a Dollar Value equal to or greater than:

a) 5% of the total Contract Price, but at least $15,000. [If the Dollar Value is less than $15,000 do not list the subcontractor above.]
b) $350,000 regardless of the percentage of the total Contract Price

Failure to submit this form by the disclosure deadline will result in a non-responsive bid. A non-responsive bid will not be considered for award.

Form submitted by (Bidder Name): _____

Contact Name: _____ Phone: _____

Signature: _____

END OF DOCUMENT 00 45 22

DOCUMENT 00 52 13
FORM OF AGREEMENT

PART 1 – GENERAL

1.1 STANDARD FORM

The form of Agreement will be executed on AIA Form A 101, Standard Form of Agreement Between Owner and Contractor, 2007 edition, which is included by reference. The document, as edited by Owner, is available for review at http://www.4j.lane.edu/bids/.

END OF DOCUMENT 00 52 13

DOCUMENT 00 72 13
GENERAL CONDITIONS

PART 1 – GENERAL

1.1 STANDARD FORM

General Conditions of the Contract for Construction AIA Document A-201, 2007 edition, immediately following, are part of these specifications.

The Contractor and all Subcontractors shall read and be governed by them.

1.2 CONFLICTS

In the case of conflicts between the General Conditions and these Specifications, the Specifications govern.

END OF DOCUMENT 00 72 13

AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

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

THE OWNER:
(Name, legal status and address)

THE ARCHITECT:
(Name, legal status and address)

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.

TABLE OF ARTICLES

INDEX

(Topics and numbers in bold are section headings.)

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

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

§ 1.1.2 THE CONTRACT

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

§ 1.1.3 THE WORK

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

§ 1.1.4 THE PROJECT

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

§ 1.1.5 THE DRAWINGS

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

§ 1.1.6 THE SPECIFICATIONS

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

§ 1.1.7 INSTRUMENTS OF SERVICE

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

§ 1.1.8 INITIAL DECISION MAKER

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

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

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

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

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

§ 1.3 CAPITALIZATION

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

§ 1.4 INTERPRETATION

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

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

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

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

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

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

ARTICLE 2 OWNER

§ 2.1 GENERAL

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

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

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

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

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

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

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

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

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

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

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

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

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

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

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

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

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

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

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

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

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

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

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

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

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

§ 3.4 LABOR AND MATERIALS

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

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

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

§ 3.5 WARRANTY

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

§ 3.6 TAXES

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

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

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

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

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

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

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

§ 3.8 ALLOWANCES

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

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

§ 3.9 SUPERINTENDENT

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

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

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

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

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

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

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

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

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

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

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

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

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

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

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

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

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

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

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

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and

completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

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

§ 3.14 CUTTING AND PATCHING

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

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

§ 3.15 CLEANING UP

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

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

§ 3.16 ACCESS TO WORK

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

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

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

§ 3.18 INDEMNIFICATION

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

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

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

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

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

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

§ 4.2 ADMINISTRATION OF THE CONTRACT

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

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

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

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

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

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

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

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

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

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

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

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

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

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

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

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

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

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

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

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

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

§ 5.3 SUBCONTRACTUAL RELATIONS

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

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

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

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

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

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

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the

Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

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

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

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

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

§ 6.2 MUTUAL RESPONSIBILITY

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

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

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

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

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

§ 6.3 OWNER'S RIGHT TO CLEAN UP

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

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

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

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

§ 7.2 CHANGE ORDERS

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

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

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

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

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

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

- **.1** Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- **.2** Unit prices stated in the Contract Documents or subsequently agreed upon;
- **.3** Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- **.4** As provided in Section 7.3.7.

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

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

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

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount

for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

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

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

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

§ 7.4 MINOR CHANGES IN THE WORK

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

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

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

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

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

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

§ 8.2 PROGRESS AND COMPLETION

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

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

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

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

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

§ 9.2 SCHEDULE OF VALUES

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

§ 9.3 APPLICATIONS FOR PAYMENT

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

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

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

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

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

encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

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

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

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

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

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

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

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

§ 9.6 PROGRESS PAYMENTS

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

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

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

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

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

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

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

§ 9.7 FAILURE OF PAYMENT

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

§ 9.8 SUBSTANTIAL COMPLETION

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

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

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

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

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

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

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

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

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

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

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

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

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

- **.1** liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents; or
- **.3** terms of special warranties required by the Contract Documents.

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

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

§ 10.2 SAFETY OF PERSONS AND PROPERTY

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

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

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

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

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

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

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

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

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

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

§ 10.3 HAZARDOUS MATERIALS

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

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

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

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

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

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

§ 10.4 EMERGENCIES

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

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

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

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

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

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

§ 11.2 OWNER'S LIABILITY INSURANCE

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

§ 11.3 PROPERTY INSURANCE

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

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

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

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

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

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

§ 11.3.2 BOILER AND MACHINERY INSURANCE

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

§ 11.3.3 LOSS OF USE INSURANCE

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

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

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment

property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

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

§ 11.3.7 WAIVERS OF SUBROGATION

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

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

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

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

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

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

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

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

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

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

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

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

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

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

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

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

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

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

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

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

§ 13.3 WRITTEN NOTICE

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

§ 13.4 RIGHTS AND REMEDIES

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

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

§ 13.5 TESTS AND INSPECTIONS

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

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by

such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

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

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

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

§ 13.6 INTEREST

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

§ 13.7 TIME LIMITS ON CLAIMS

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

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

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

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

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

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

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

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

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

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

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

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

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

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

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

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

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

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

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

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

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

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

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

§ 15.1.2 NOTICE OF CLAIMS

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

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

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

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

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

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

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

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

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

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

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

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

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

§ 15.2 INITIAL DECISION

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

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

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

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

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

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

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

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

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

§ 15.3 MEDIATION

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

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

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

§ 15.4 ARBITRATION

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

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

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

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

§ 15.4.4 CONSOLIDATION OR JOINDER

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

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

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

DOCUMENT 00 73 00
SUPPLEMENTARY CONDITIONS
FOR GENERAL CONDITIONS FOR THE CONTRACT FOR CONSTRUCTION

PART 1 – GENERAL

The following supplements modify, change, delete from or add to AIA Document A201, General Conditions of the Contract for Construction 2007 Edition. Where any part of the AIA General Conditions is amended, voided, or superseded by the Supplementary Conditions, the unaltered provisions shall remain in effect.

1.1 ARTICLE 1 GENERAL PROVISIONS

A. BASIC DEFINITIONS

1. Add the following Subparagraphs:

1.1.9 ARCHITECT/ENGINEER

Where the term ARCHITECT is used in the Bidding documents, Contract documents, Addenda, Change Orders or other documents related to this contract it shall be defined as either "Architect" or "Engineer" depending upon which design professional has prepared the document in question. When the project has been designed and initiated under the direction of a licensed engineer, the term ENGINEER shall be substituted for the term "Architect" throughout all documents.

1.1.10 MISCELLANEOUS DEFINITIONS

.1 "Provide:" Furnish and install, or furnish labor and materials required for installation, ready for use and in accordance with the Contract Documents.

.2 "As shown:" As indicated, as detailed, as noted, or words of similar import refer to Contract Documents.

.3 "Selected:" As selected by the Architect.

.4 "Approved: "Approved by Architect.

.5 "For Approval: "For the Architect's approval.

B. CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

1. Add the following to Subparagraph 1.2.1:

1.2.1.1 In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities.

1. The Agreement.
2. Addenda, with those of later date having precedence over those of earlier date.
3. The Supplementary Conditions.
4. The General Conditions of the Contract for Construction.
5. Division 1 of the Specifications.
6. Drawings and Divisions 2- 49 of the Specifications.

In the case of conflicts or discrepancies between Drawings and Divisions 2- 49 of the Specifications or within either Document not clarified by Addendum, the Architect will determine which takes precedence in accordance with Subparagraph 4.2.11.

2. Add the following Subparagraphs:

1.2.4 If work is required in such a manner to make it impossible to produce first class work or should discrepancies appear among Contract Documents, request interpretation before proceeding with work. If Contractor fails to make such request, the Contractor will thereafter be expected to carry out work in satisfactory manner.

1.2.5 Reference to codes, standard specifications, or other standards means and intends latest edition

of such documents and/or adopted as of bid date. Where brand name products are specified and no installation instructions given herein, install product in accordance with the manufacturer's specifications and instructions, latest edition.

1.2.6 No provision of any reference standard specification, manual or code shall change the privileges or responsibilities of Owner, Architect, or Contractor, or any of their consultants, agents or employees from those set forth in the Contract Documents, nor shall it be effective to assign to Architect, or any of Architect's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the work or any duty or authority to undertake responsibility contrary to the provision of the Contract Documents.

1.2.7 Sections of Division 1, General Requirements govern the execution of all sections of the specifications.

1.2 ARTICLE 2 OWNER

A. 2.1 GENERAL

1. Add the following Subparagraph:

2.1.3 The Owner is the Eugene School District 4J, 200 North Monroe Street, Eugene, Oregon 97402, (541) 790-7417.

The Owner's representative is Larry Massey, 715 West Fourth Avenue, Eugene, OR 97402.

B. INFORMATION AND SERVICES REQUIRED OF THE OWNER

1. Delete Subparagraph 2.2.5 and substitute the following:

2.2.5 The Contractor will be furnished free of charge up to 2 copies of the Contract Documents. The Owner will furnish additional copies requested by the Contractor at the cost of reproduction, postage and handling.

1.3 ARTICLE 3 CONTRACTOR

A. 3.1 GENERAL

1. Delete the second sentence to Subparagraph 3.1.1, and add the following:

The Contractor and each subcontractor shall maintain for the duration of the Project a registration with the Oregon State Construction Contractor's Board.

2. Add the following Subparagraph 3.1.4

3.1.4 The Contractor is required to demonstrate that an employee drug testing program is in place.

3. Add the following Subparagraph 3.1.5

3.1.5 The Contractor certifies that the Contractor is not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in this Contract by any Federal department or agency. If requested by the Eugene 4J School District, the Contractor shall complete a Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion form. Any such form completed by the Contractor for this Contract shall be incorporated into this Contract by reference.

B. 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

1. Delete the last sentence to Subparagraph 3.2.4, and add the following:

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, unless the Contractor recognized such error, inconsistency, omission or difference and knowingly failed to report it to the Architect.

C. 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

1. Add the following Subparagraphs:

3.3.4 The Contractor shall review with all Subcontractors, construction means, methods and materials to be used to verify their compliance with all safety standards and laws and be responsible for compliance with same to insure safe, hazard free conditions for all persons visiting or working on the entire project.

3.3.5 The Contractor shall comply with the provisions of Oregon Revised Statutes and 4J Board Policy. Attention is directed to ORS 279A and 279C, Public Contracting Code.

D. 3.4 LABOR AND MATERIALS

1. Add the following Subparagraphs:

3.4.4 PAYMENT OF LABORERS AND MATERIALMEN, CONTRIBUTIONS TO INDUSTRIAL ACCIDENT FUND, LIENS AND WITHHOLDING TAXES: The Contractor shall: (1) Make payment promptly, as due, to all persons supplying to such contractor labor or material for the prosecution of the Work provided for in such contract. (2) Pay all contributions or amounts due the Industrial Accident Fund from such Contractor or subcontractor incurred in the performance of the contract. (3) Not permit any lien or claim to be filed or prosecuted against the state, county, school district, municipality, municipal corporation or subdivision thereof, on account of any labor or material furnished. (4) Pay to the Department of Revenue all sums withheld from employees pursuant to ORS 316.167.

3.4.5 HOURS OF LABOR: No person shall be employed for more than ten hours in any one day, or 40 hours in any one week, except in the cases of necessity, emergency, or where the public policy absolutely requires it, and in such cases the person so employed shall be paid at least time and a half of the regular pay for all time worked.

.1 For all overtime in excess of eight hours a day or 40 hours in any one week when the work week is five consecutive days, Monday through Friday; or

.2 For all overtime in excess of 10 hours a day or 40 hours in any one week when the work week is four consecutive days, Monday through Friday; and

.3 For all work performed on Saturday and on any legal holiday specified in ORS 279C.540.

.4 Worker claims for overtime, in order to be considered, must be filed with the Contractor within 90 days from the completion of the contract, in accordance with ORS 279C.545.

The Contractor shall give notice to employees who work on a public contract in writing, either at the time of hire or before commencement of work on the contract, or by posting a notice in a location frequented by employees, of the number of hours per day and days per week the employees may be required to work.

3.4.6 PAYMENT FOR MEDICAL CARE AND PROVIDING WORKERS' COMPENSATION: The Contractor shall promptly, as due, make payment to any person, co-partnership, association or corporation, furnishing medical, surgical and hospital care or other needed care and attention, incident to sickness or injury, to the employees of such Contractor, of all sums which the Contractor agrees to pay for such services and all moneys and sums which the Contractor collected or deducted from the wages of employees pursuant to any law, contract or agreement for the purpose of providing or paying for such service. All employers working under this contract are subject employers and must comply with ORS 656.017.

3.4.7 PREVAILING WAGE RATES**:** When the total price of the Project is $50,000 or more, each worker in each trade or occupation employed in the performance of this Contract either by the contractor, subcontractor or other person doing or contracting to do contracting for the whole or any part of the Work on the Contract shall be paid not less than the applicable state prevailing rate of wage. This provision applies to all contracts, regardless of the price of the individual contract, as long as the combined price of all contracts awarded on the Project is $50,000 or more.

a. The existing Oregon prevailing rate of wage in effect at the time the specifications are first advertised for bid solicitations is the applicable rate.

b. The Owner will pay the public works fee to Oregon Bureau of Labor and Industries.

c. Certification of rate or wage by Contractor or Subcontractor (ORS 279C.845):

.1 The contractor or the contractor's surety and every subcontractor or the subcontractor's surety shall file certified statements with the public agency in writing, on a form prescribed by the Commissioner of the Bureau of Labor and Industries, certifying the hourly rate of wage paid each worker whom the contractor or the subcontractor has employed upon the public works, and further certifying that no worker employed upon the public works has been paid less than the applicable state prevailing rate of wage or less than the minimum hourly rate of wage specified in the contract. The certificate and statement shall be verified by the oath of the contractor or the contractor's surety or subcontractor or the subcontractor's surety that the contractor or subcontractor has read the statement and certificate and knows the contents thereof and that the same is true to the contractor or subcontractor's knowledge. The certified statements shall set out accurately and completely the payroll records for the prior week, including the name and address of each worker, the worker's correct classification, rate of pay, daily and weekly number of hours worked, deductions made, and actual wages paid.

.2 If the Contractor does not file certified payroll as required (at least once per month) the Owner will withhold 25% of the amounts due the Contractor, in addition to any other required retainage.

.3 If a first-tier Subcontractor does not file certified payroll reports as required, the prime Contractor shall withhold 25% of amounts due the first-tier Subcontractor.

.4 Each certified statement required by subsection (1) of this section shall be delivered or mailed by the contractor or subcontractor to the public contracting agency. Certified statements shall be submitted to the public contracting agency once a month by the fifth business day of the following month, for each week workers are employed. Information submitted on certified statements may be used only to ensure compliance with the provisions of ORS 279C.800 to 279C.870.

.5 Each contractor or subcontractor shall preserve the certified statements for a period of three years from the date of completion of the contract.

.6 Certified statements received by a public agency are public records subject to the provisions of ORS 192.410 to 192.505. As such, they must be made available upon request.

3.4.8 PAYMENT OF CLAIMS BY PUBLIC OFFICERS: If the Contractor fails, neglects or refuses to make prompt payment of any claims for labor or services furnished to the Contractor or a subcontractor by any person in connection with this Contract as such claim becomes due, the Owner may pay such claim and charge the amount of the payment against funds due or to become due the Contractor by reason of this Contract.

3.4.9 PAYMENT FOR MEDICAL CARE AND PROVIDING WORKERS' COMPENSATION: The Contractor shall promptly, as due, make payment to any person, co-partnership, association or corporation, furnishing medical, surgical and hospital care or other needed care and attention, incident to sickness or injury, to the employees of such Contractor, of all sums which the Contractor agrees to pay for such services and all moneys and sums which the Contractor collected or deducted from the wages of employees pursuant to any law, contract or agreement for the purpose of providing or paying for such service.

3.4.10 Any person owed for labor or material by a subcontractor or Contractor may file a complaint with the Construction Contractors Board in accordance with ORS 279C.515(3).

E. 3.7 PERMITS, FEES AND NOTICES

1. Delete Subparagraph 3.7.1, and substitute the following:

3.7.1 The OWNER will pay the plan check fee, building permit fee, and systems development charges directly to the authority having jurisdiction. The Owner will pay the initial review and approval costs for deferred submittals, which are specifically required by the governing jurisdiction during the plan review process, directly to the authority having jurisdiction. Any deferred submittal costs due to incomplete submittals, or corrections required by the governing jurisdiction shall be the responsibility of the contractor.

The CONTRACTOR shall pay for all other permits, fees, licenses and inspections necessary for the

proper execution and completion of the Work which are customarily secured after execution of the Contract and which are legally required when bids are received or negotiations concluded. The Contractor shall pick up permits and call for inspections through final inspection, as required by the City Building Department.

F. 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

1. Add the following to Subparagraph 3.12.5:

   Submittals which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor may be returned by the Architect without action.

2. Add the following to Subparagraph 3.12.9:

   Shop drawings that are submitted to the Architect for review do not constitute "in writing" unless it is brought to the attention of the Architect, in written form, that specific changes are being suggested. In any event, changes to the contract documents by means of shop drawings become the responsibility of the person initiating such changes.

G. 3.18 INDEMNIFICATION

1. Delete Subparagraph 3.18.1, and substitute the following:

   13.18.1 To the fullest extent of the law, the Contractor will defend, indemnify, hold harmless and reimburse the Eugene School District 4J (including its officers, board members, agents, and employees) from all claims, demands, suits, actions, penalties, and damage expenses, for liability of any kind including attorney's fees. To the extent that death or bodily injury to persons or damage to property arises out of the fault of the Contractor, the Contractor's indemnity obligation exists only to the extent that the death or bodily injury to persons or damage to property arises out of the fault of the Contractor, or the fault of the Contractor's agents, representatives or subcontractors, contributed to or caused such damage, whether or not such incidents are contributed to or caused in any part by Eugene School District 4J.

1.4 ARTICLE 4 ARCHITECT

A. 4.1 GENERAL

1. Modify Paragraph 4.1.1

   a. In the first sentence delete "shall retain" and insert "may have retained" in it's place.

   b. Add sentence: "The term "Architect" means the Architect or the Architect's authorized representative."

2. Add the following to Subparagraph 4.1.2:

   Written consent of the Contractor shall only apply to those items which directly or indirectly affect the work of the Contractor.

3. Add the following Subparagraph:

   In the first sentence delete "shall" and insert "may" in its place.

4. Add the following Subparagraph:

   4.1.4 The Architect is defined as:

   GMA Architects
   860 West Park Street, Suite 300
   Eugene, OR 97401
   (541) 344-9157

B. 4.2 ADMINISTRATION OF THE CONTRACT

1. Add the following sentence to 4.2.1:

   The architect may be retained to administer the Contract through the specified period for correction of the Work described in Section 12.2

2. Add the following to Subparagraph 4.2.4:

   4.2.4.1 The Owner may communicate directly with the Contractor when necessary or appropriate. The Owner may give direction to the Contractor in matters related to access to the site, coordination with Owner's occupancy and use by the public, use of parking and staging areas, use of potentially hazardous products, drug and alcohol policy, no smoking policy, appropriate dress and behavior, safety requirements and safe work practices, where appropriate. The Owner will advise the Architect regarding any communication with or direction given to the Contractor.

   4.2.4.2 Representatives of the Owner, Contractor and Architect shall meet periodically at mutually agreed-upon intervals for the purpose of establishing procedures to facilitate cooperation, communication and timely responses among the participants. By participating in this arrangement, the parties do not intend to create additional contractual obligations or modify the legal relationships which may otherwise exist. Nothing in this agreement shall give the Architect the authority to make decisions or give direction without the Owner's concurrence.

3. Add the following to Subparagraph 4.2.9:

   4.2.9.1 The Architect will make one inspection for the determination of Substantial Completion and one for determination of Final Acceptance. Such inspections will be made only after receipt of written notification of readiness for such inspections from Contractor.

   4.2.9.2 Should additional inspections beyond those listed in 4.2.9.1 be required due to Contractor's failure to satisfactorily complete all work, the Contractor shall become responsible for all costs incurred by the Owner in conjunction with required re-inspections. A deductive Change Order shall be prepared using the following hourly rates as the basis for calculating the amounts to be deducted:

Architect/Engineer:	$100 per hour
District 4J Personnel:	$ 75 per hour

   4.2.9.3 The amount to be deducted from the Contract shall be calculated by multiplying the hours expended in additional inspections and documentation by the hourly rates listed in 4.2.9.2.

4. Add the following sentence to Subparagraph 4.2.11:

   The architect's response will be within 10 days of receipt of written requests from the Owner or Contractor.

5. Delete Subparagraph 4.2.13, and substitute the following:

   4.2.13 Decisions on matters related to aesthetic effect will be made collaboratively between the Owner and the Architect. The final decision shall be the Owner's, if consistent with the intent expressed in the Contract Documents.

6. Add the following sentence to Subparagraph 4.2.14

   The architect's response will be within 10 days of receipt of written requests from the Owner or Contractor.

1.5 ARTICLE 5 SUBCONTRACTORS

A. 5.3 SUBCONTRACTUAL RELATIONS

1. Add the following Subparagraphs:

   5.3.1 The Contractor shall include in each subcontract for property or services entered into by the Contractor and a subcontractor, including a material supplier, for the purpose of performing a construction contract:

   .1 A payment clause that obligates the Contractor to pay the subcontractor for satisfactory performance under its subcontract within 10 days out of such amounts as are paid to the Contractor by the owner under such contract; and

   .2 An interest penalty clause that obligates the Contractor to pay to the subcontractor an interest penalty on amounts due in the case of each payment not made in accordance with the payment clause included in the subcontract pursuant to paragraph .1 of this section for the period beginning on the day after the required payment date and ending on the date on which payment of the amount

due is made; computed at the rate specified in ORS 279C.580.

5.3.2 The Contractor shall include in each of its subcontracts, for the purpose of performance of such contract condition, a provision requiring the subcontractor to include a payment clause and an interest penalty clause conforming to the requirements of Subparagraph 5.3.1 in each of its subcontracts and to require each of its subcontractors to include such clauses in their subcontracts with each lower-tier subcontractor or supplier.

1.6 ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

No modifications.

1.7 ARTICLE 7 CHANGES IN THE WORK

A. 7.1 GENERAL

1. Paragraph 7.1.2, delete the following: “an order for minor changes in the Work can be issued by the Architect alone”.

2. Add the following Subparagraph 7.1.4 to Paragraph 7.1:

7.1.4 The combined overhead and profit included in the total cost or credit to the Owner of a change in the Work shall not exceed that stated in 7.1.4.4 below. In no case shall the Contractor’s or Subcontractors individual overhead and profit request exceed the following schedule:

.1 For the Contractor, for Work performed by the Contractor’s own forces, 15 percent of the cost.

.2 For the Contractor, for Work performed by the Contractor’s Subcontractors, 10 percent of the amount due the Subcontractors.

.3 For each Subcontractor involved, for Work performed by that Subcontractor’s own forces, 10 percent of the cost.

.4 The **Base Cost** to which overhead and profit is to be applied shall be determined in accordance with Subparagraph 7.3.7., articles .1, .2, .3, .4, and .5. To this **Base Cost** is added the applicable overhead and profit. In no case shall the combined overhead and profit (including all Contractor and Subcontractor(s) overhead and profit) exceed 25 percent of this **Base Cost**.

.5 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including those applicable costs from paragraph 7.3.7, .1 - .5, and Subcontractor and Contractor overhead and profit as applicable.

.6 Cost of preparing change order shall not be included in cost of Change Order.

3. Add the following Subparagraph 7.1.5 to Paragraph 7.1:

7.1.5 A Change Order providing a net CREDIT to the Owner shall include a credit for overhead and profit based on the following schedule:

.1 For the Contractor, 5 percent of the Cost to be credited.

.2 For each Subcontractor, 5 percent of the Cost to be credited.

.3 For each Sub-subcontractor, 5 percent of the Cost to be credited.

.4 All other provisions of Subparagraph 7.1.4 shall apply to Credit Change Orders.

B. 7.3 CONSTRUCTION CHANGE DIRECTIVES

1. Add the following to Subparagraph 7.3.1:

For the purposes of this Agreement, The Owner’s “CHANGE REQUEST/PROCEED ORDER” may be substituted for and used interchangeably with “CONSTRUCTION CHANGE DIRECTIVE”.

2. Modify Subparagraph 7.3.7 as follows:

In the first sentence, delete the words "a reasonable amount." and substitute "an amount for overhead

and profit in accordance with Paragraph 7.1.4 or 7.1.5."

3. Delete Subparagraph 7.3.7.1 and substitute the following:

   7.3.7.1 The maximum allowable hourly wage rate for Changes to the Work shall be the appropriate Base Wage Rate plus Fringe Rate as listed for each occupation in the Prevailing Wage Rate for Public Works Contracts in Oregon manual issued by the Oregon Bureau of Industries; multiplied by 1.25. An amount for Overhead and Profit may be added in accordance with Paragraph 7.1.4 or 7.1.5. A Contractor's "shop rates" shall not exceed the cost of the "field rates," as calculated in this subsection.

4. Delete 7.3.7.3, and substitute the following:

   7.3.7.3 Rental costs of machinery and equipment, exclusive of hand tools and motor vehicles, when rented from the Contractor or others;

5. Change the first sentence of Subparagraph 7.3.8 to read as follows:

   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, including overhead and profit according to the schedule in Subparagraph 7.1.5 above.

6. Change the first sentence of Subparagraph 7.3.9 to read as follows:

   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 the Application for Payment accompanied by an executed Change Order indicating the parties' agreement with part or all of such costs.

1.8 ARTICLE 8 TIME

A. 8.2 PROGRESS AND COMPLETION

1. Add the following Subparagraph 8.2.4

   8.2.4 The Contractor agrees that said work shall be executed regularly, diligently, at such a rate of progress as will insure Substantial Completion thereof within the time specified. It is expressly understood and agreed by and between the Contractor and the Owner that the time for the completion of the work described herein is reasonable taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

1.9 ARTICLE 9 PAYMENT AND COMPLETION

A. 9.2 SCHEDULE OF VALUES

1. Revise the first sentence of Subparagraph 9.2 to read as follows:

   ".... the Contractor shall submit to the Architect and the Owner,....."

2. Add the following sentence to Paragraph 9.2:

   Submit on AIA Document A703, latest edition.

B. 9.3 APPLICATIONS FOR PAYMENT

1. Add the following sentence to Subparagraph 9.3.1:

   The form of Application for Payment shall be a notarized AIA Document G702, Application and Certification for Payment, supported by AIA Document G703, Continuation Sheet.

2. Delete Clause 9.3.1.1, and substitute the following:

   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, accompanied by an executed Change Order.

C. 9.5 DECISIONS TO WITHHOLD CERTIFICATION

1. Delete Subparagraph 9.5.3.

D. 9.6 PROGRESS PAYMENTS

1. Add the following Clause to Subparagraph 9.6.1:

   9.6.1.1 After the Architect has issued a certificate for payment and it has been approved by the Owner, the Owner will pay the Contractor 95 percent (95%) of the total value of material and labor incorporated into the project as indicated on the Application for Payment less the aggregate of previous payments. Progress schedule update shall accompany each payment request.

   9.6.1.2 Payment will be made within fifteen (15) days of approval of the Application for Payment by School District 4J ("Progress Payment Due Date").

   9.6.1.3 The first Application for Payment and each subsequent Application for Payment will not be considered complete unless it is accompanied by the certified payroll for the contractor and all subcontractors requesting payment.

2. Add the following Subparagraph to Paragraph 9.6:

   9.6.8 In lieu of cash retainage to be held by the Owner, the Contractor may select one of the following options:

   .1 The Contractor may deposit bonds or securities with the Owner or in any bank or trust company to be held for the benefit of the Owner. In such event, the Owner shall reduce the retainage in an equal amount to the value of the bonds and securities.

   .2 Upon written request of the Contractor, the Owner will deposit any amounts withheld as retainage in an interest-bearing account in a bank, savings bank, trust company or savings association for the benefit of the Owner. Interest earned shall accrue to the Contractor.

   .3 If the Owner incurs additional costs as a result of the exercise of any of the options for retainage described herein, the Owner may recover such costs from the Contractor by reduction of final payment.

E. 9.8 SUBSTANTIAL COMPLETION

1. Delete Subparagraph 9.8.1 and substitute the following:

   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 fully occupy and fully utilize the Work for its intended use with only minor corrective work remaining which can be accomplished without disruption of the occupants.

2. Delete the last two sentences to Subparagraph 9.8.5 and add the following:

   9.8.5 Upon Substantial Completion of the Work, the Contractor may submit an application for payment in accordance with Subparagraph 9.3.1 in an amount sufficient to increase the total payments to ninety-five percent (95%) of the Contract Sum, less such amounts as the Architect determines for incomplete Work or unsettled claims.

F. 9.10 FINAL COMPLETION AND FINAL PAYMENT

1. Modify Item (2) in Subparagraph 9.10.2 to read:

   (2) A certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a …..

2. Add the following Subparagraph to Paragraph 9.10:

   9.10.6 The Contractor shall not permit any lien or claim to be filed or prosecuted against the Owner on account of any labor or material furnished in connection with the Work.

G. Add the following Paragraphs to Article 9:

1. 9.11 LIQUIDATED DAMAGES

   9.11.1 The Owner will suffer financial loss if the Work is not Substantially Complete, as defined in Article 9.8.1 above, on the dates specified in Section 01 11 00. The Contractor and the Contractor's

surety shall be liable for and shall pay the Owner the sum hereinafter stipulated as fixed, agreed, and liquidated damages for each calendar day of delay until the date established in the Certificate of Substantial Completion.

Liquidated damages apply to the Substantial Completion dates identified in Section 01 11 00 Summary of Work. Damages are additive in the event of overlapping delayed completion dates.

The agreed amount of liquidated damages is $1,000 per each calendar day. The amount of liquidated damages may be reduced in cases of partial occupancy, at the sole discretion of the Owner.

2. 9.12 AGENCY PAYMENT FOR UNPAID LABOR OR SUPPLIES

9.12.1 Contract incomplete. If the Contract is still in force, the Agency may, in accordance with ORS 279C.515, pay a valid claim to the Entity furnishing the labor or services, and charge the amount against payments due or to become due to the Contractor under the Contract. If an Agency chooses to make such a payment as provided in 279C.515, the Contractor and the Contractor's surety shall not be relieved from liability for unpaid claims.

9.12.2. Contract completed. If the Contract has been completed and all funds disbursed to the prime Contractor, all claims shall be referred to the Contractor's surety for resolution. The Agency shall not make payments to subcontractors or suppliers for Work already paid for by the Agency.

1.10 ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

A. 10.1 SAFETY PRECAUTIONS AND PROGRAMS

1. Add the following sentence to Article 10.1

Where asbestos abatement is part of the Work, the Contractor or appropriate subcontractor shall be licensed by the Department of Environmental Quality to perform "asbestos abatement work", OAR 340-248-0120, Adopted January 25, 1990, and meet requirements of AHERA, as specified in Federal Register 40CFR, Part 763.

B. 10.3 HAZARDOUS MATERIALS

1. Delete Subparagraph 10.3.3.

1.11 ARTICLE 11 INSURANCE AND BONDS

A. 11.1 CONTRACTOR'S LIABILITY INSURANCE

1. Modify the second sentence of Subparagraph 11.1.2 as follows:

a. Delete the following: "….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 coverage as specified in the Contract Documents."

2. Add the following Clause to Subparagraph 11.1.2:

.1. The Contractor shall provide and maintain in force for the duration of this agreement, the following:

.1 General Insurance:

The Contractor shall maintain in force for the duration of this agreement a Umbrella Insurance Policy with the limits not less than $5,000,000, a Commercial General Liability, Automobile Liability (owned, non-owned and hired) Insurance policy(s) written on an occurrence basis with limits not less than $1,000,000 per occurrence and $2,000,000 in the aggregated naming the District, its employees, officials and agents as an additional insured as respects to work or services performed under this agreement. This insurance will be primary to any insurance the District may carry on its own. If the District requires Professional Liability coverage, the terms, conditions, and limits must be approved by the District's Risk Manager. (eff. 4/2/13)

.2 Professional Liability:

To the extent that the Contractor accepts deferred design or design/build responsibilities, the Contractor shall purchase and maintain professional liability/errors and omissions insurance, or

cause that those subcontractors providing design services do so in the amount of $1,000,000 each claim/per project aggregate.

.3 Workers' Compensation:

Contractor shall provide and maintain workers' compensation coverage for its employees, officers, agents, or partners, as required by applicable workers' compensation laws.

.4 Evidence of Coverage:

Evidence of the above coverages issued by a company satisfactory to the District shall be provided to the District by way of a certificate of insurance before any work or services commence. A 30-day notice of cancellation or material change in coverage clause shall be included. It is the Contractor's obligation to provide the 30 days notice if not done so by the Contractor's insurance company(s). Failure to maintain the proper insurance shall be grounds for immediate termination of this Agreement.

.5 Subcontractors:

The Contractor shall require all subcontractors to provide and maintain general liability, auto liability, professional liability (as applicable) and Workers' Compensation insurance with coverage's equivalent to those required of the General Contractor in this Agreement. The Contractor shall require certificates of insurance from all subcontractors as evidence of coverage.

.6 Exceptions or Waivers:

Any exception or waiver of these requirements shall be subject to review and written approval from the Eugene School District Risk Manager.

3. Delete the second sentence of Subparagraph 11.1.3

4. Add the following sentences to Subparagraph 11.1.3:

The Contractor shall provide written notification to the Owner of the cancellation or expiration of any insurance required by Section 11.1. The Contractor shall provide such written notice within five (5) business days of the date the Contractor is first aware of the cancellation of expiration, or is first aware that the cancellation or expiration is threatened or otherwise may occur, whichever comes first.

B. 11.3 PROPERTY INSURANCE

1. Modify the first sentence of Subparagraph 11.3.1 as follows:

   a. Delete "Unless otherwise provided, the Owner" and substitute "The Contractor".

   b. Modify the last sentence by adding "Architect," after the word "Owner".

2. Add the following to Clause 11.3.1.1:

The form of policy for this coverage shall be Completed Value. If the Owner is damaged by the failure of the Contractor to maintain such insurance, then the Contractor shall bear all reasonable costs properly attributed thereto.

3. Delete Clause 11.3.1.2.

4. Modify Clause 11.3.1.3 by substituting "Contractor" for "Owner".

5. Delete Clause 11.3.1.4.

6. Modify the first sentence of Subparagraph 11.3.2 to read: "The Owner, at the Owner's option, may purchase...".

7. Delete Subparagraph 11.3.4.

8. Delete Subparagraph 11.3.6, and substitute the following:

11.3.6 Evidence of the above coverages issued by a company satisfactory to the District shall be provided to the District by way of a certificate of insurance before any work or services commence. The Contractor shall provide written notification to the Owner of the cancellation or expiration of any

insurance required by Section 11.3. The Contractor shall provide such written notice within five (5) business days of the date the Contractor is first aware of the cancellation or expiration, or is first aware that the cancellation or expiration is threatened or otherwise may occur, whichever comes first. Failure to maintain the proper insurance shall be grounds for immediate termination of this Agreement.

9. Modify 11.3.7 by substituting "Contractor" for "Owner" at the end of the first sentence.

10. Modify the first sentence of Subparagraph 11.3.8 to read as follows:

    11.3.8 A loss insured under the Contractor's property insurance shall be adjusted by the Contractor as fiduciary and made payable to the Contractor and Owner, as their interests may appear, subject to requirements of any applicable mortgagee clause.

11. Delete Subparagraph 11.3.9.

12. Modify the first sentence of Subparagraph 11.3.10 by substituting "Contractor" for "Owner" the first two times it occurs. Modify the last sentence by substituting "Contractor" for "Owner" the second time it occurs.

13. Add the following Subparagraph:

    11.3.11 EQUIPMENT AND MATERIAL:

    The Contractor shall be responsible for any loss, damage, or destruction of Contractor's own property, equipment, and materials used in conjunction with the Work.

C. 11.4 PERFORMANCE BOND AND PAYMENT BOND

1. Delete 11.4.1 and 11.4.2 and substitute the following:

    11.4.1 Unless otherwise stated in the solicitation document, prior to execution of the Agreement, the Bidder shall furnish separate bonds that in all respects conform to the requirements of ORS 279C.380 covering the faithful performance of the Contract, and the payment of all obligations arising thereunder, each in an amount equal to one hundred percent (100%) of the Contract sum. The duration of the performance bond shall match the length of the project warranty.

    11.4.2 The surety issuing such bonds shall be duly authorized and licensed to issue bonds in the State of Oregon. The bonds shall be executed by an Attorney-in-fact, principal or other authorized representative for the surety company, showing the Oregon agent for service, and bears the seal of the surety company. Where the bond is executed by a person outside the state of Oregon, his authority to execute bond shall be shown.

    11.4.3 Bonds are to be obtained through a company that is on the US Government Treasury list for approved sureties and/or approved by the Owner's Risk Manager.

    11.4.4 Bonds shall be submitted on AIA Document A312, latest edition.

    11.4.5 The cost of furnishing such bonds shall be included in the bid.

    11.4.6 The Contractor shall deliver the required bonds to the Owner with the signed Agreement to:

    Larry Massey
    Facilities Management Office
    Eugene Public School District 4J
    715 West Fourth
    Eugene, Oregon 97402

    11.4.7 The Contractor shall require the Attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of their power of attorney.

D. Add the following Paragraphs to Article 11:

1. 11.5 PUBLIC WORKS BOND:

    11.5.1 Pursuant to ORS 279C.836, for any contract awarded where the contract price is $100,000 or greater, the Contractor and every subcontractor shall have a Public Works bond, in the amount of $30,000 filed with the Construction Contractors Board (CCB) before starting work on the project unless

exempt. This bond is in addition to performance bond and payment bond requirements. **A copy of the Contractor's State of Oregon Statutory Public Works Bond shall be provided with the executed contract documents.**

11.5.2 Contractor shall include in every subcontract a provision requiring their Subcontractors to have a public works bond filed with the CCB before starting work on the project, unless exempt. Contractors shall verify that all of their subcontractors have filed a public works bond with the CCB.

1.12 ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

A. 12.2 AFTER SUBSTANTIAL COMPLETION

1. Change the following to Clause 12.2.2.1:

In the first sentence change the wording from: "In addition to the Contractor's obligations under Section 3.5, if, within one year……" to: "In accordance with Oregon Revised Statutes 701.304, in addition to the Contractor's obligations under Section 3.5, if, within two years….."

2. Add the following sentence to Clause 12.2.2.1:

The correction period relating to faulty products and workmanship will begin on the date appearing on the Certificate of Substantial Completion, or if a Certificate of Substantial Completion is not issued, on the date appearing on the Final Certificate of Payment to the Contractor, whichever is earlier. The Owner's use of the project will not alter the warranty period herein defined.

3. Change the following to Clause 12.2.2.2:

In the first sentence change the wording from: "The one year period…" to: The two year period…"

4. Add the following sentence to Clause 12.2.2.2:

The correction periods specified are an extension of the two-year correction period called for in the General Conditions and are in addition to any guaranty bond called for elsewhere.

5. Change the following to Subparagraph 12.2.2.3:

In the first sentence change the wording from: "The one year period…" to: The two year period…"

6. Change the following to Subparagraph 12.2.5

In the second sentence change the wording from: "Establishment of the one year period…" to: "Establishment of the two year period…"

1.13 ARTICLE 13 MISCELLANEOUS PROVISIONS

A. 13.1 GOVERNING LAW

1. Change Paragraph 13.1 to read as follows:

13.1 The Contract shall be governed by the law of the place where the Project is located.

B. Add the following Subparagraph 13.1.1:

13.1.1 Contractor shall be in compliance with the Oregon Department of Revenue tax certification rules including OAR 150-305.385 (6)-A, (6)-B, (6)-C and (7).

C. Revise Subparagraph 13.2.1 as follows:

Delete last two sentences, and replace with:

Contractor shall not assign, sell, dispose of, or transfer rights, nor delegate duties under the contract, either in whole or in part, without the Contracting Agency's prior written consent. Unless otherwise agreed by the Contracting Agency in writing, such consent shall not relieve the Contractor of any obligations under the contract. Any assignee or transferee shall be considered the agent of the Contractor and be bound to abide by all provisions of the contract. If the Contracting Agency consents in writing to an assignment, sale, disposal or transfer of the Contractor's rights or delegation of Contractor's duties, the Contractor and its surety, if any, shall remain liable to the Contracting Agency for complete performance of the contract as if no such

assignment, sale, disposal, transfer or delegation had occurred unless the Contracting Agency otherwise agrees in writing, in accordance with ORS 279A.065.

D. Delete Subparagraph 13.2.2

E. Add the following Paragraphs to Article 13:

1. 13.8 ENVIRONMENTAL AND NATURAL RESOURCES LAWS AND RULES

13.8.1 The Contractor and subcontractors shall comply with federal, state, and local ordinances and regulations dealing with prevention of pollution and preservation of natural resources that affect Work of this project.

13.8.2 Pursuant to ORS 279C.525, If the Contractor is delayed or must undertake additional work by reason of existing regulation or ordinances of agencies not cited in the Contract Documents or due to the enactment of new or the amendment of existing statutes, ordinances, or regulations relating to the prevention of environmental pollution and the preservation of natural resources occurring after the Bid Date, the Owner will grant a time extension and issue a change order setting forth the additional work that must be undertaken. The change order shall not invalidate the contract and there shall be, in addition to a reasonable extension of the Contract time, a reasonable adjustment in the Contract price to compensate the successful bidder for all costs and expenses incurred, including overhead and profits, as a result of such delay or additional work.

2. 13.9 FOREIGN CONTRACTORS

In the event this Contract is awarded to a Contractor not domiciled in or registered to do business in the State of Oregon and the contract price exceeds $10,000, the Contractor shall promptly report to the Department of Revenue the total price, terms of payment, length of contract, and such other information as the Department of Revenue may require before final payment can be received on the public contract. The Owner will satisfy itself that the requirement of this subsection has been complied with before it issues a Final Payment.

3. 13.10 EQUAL OPPORTUNITY

13.10.1 The Contractor shall maintain policies of employment as follows:

13.10.1.1 The Contractor and the Contractor's subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex, national origin, physical or mental handicap, sexual orientation or age, unless based upon bona fide occupational qualifications; and that they are otherwise in compliance with all federal, state and local laws prohibiting discrimination. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. It is further understood that any vendor who is in violation of this clause shall be barred forthwith from receiving awards of any purchase order from the School District, unless a satisfactory showing is made that discriminatory practices have terminated and that a recurrence of such acts is unlikely. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of nondiscrimination.

13.10.1.2 The Contractor and the Contractor's subcontractors shall, in all solicitations or advertisements for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or national origin.

4. 13.11 DRUG-TESTING PROGRAM

13.11.1 The contractor agrees with the provisions of Oregon Revised Statutes 279C.505, which requires that the contractor shall demonstrate it has established a drug-testing program for employees and will require each subcontractor providing labor for the Project to do the same.

1.14 ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

No modifications.

1.15 ARTICLE 15 CLAIMS AND DISPUTES

A. 15 CLAIMS AND DISPUTES

1. Add the following to Clause 15.1.5.2

Abnormal weather conditions for the purposes of this agreement are defined as conditions more extreme than any conditions experienced within the general vicinity of the site for each project for a comparable period at any time within the past ten years.

2. Delete Subparagraph 15.1.6.

B. 15.2 INITIAL DECISION

1. Modify Subparagraph 15.2.1 as follows:

In the third sentence, change “30 days” to read “10 days” and add the following: The Initial Decision Maker shall review all submitted claims and render decisions as soon as possible.

2. Modify Clause 15.2.6.1 as follows:

In the first sentence, change the “30 days and “60 days” to read “10 days” and “30 days” respectively.

C. 15.3 MEDIATION

1. Delete Paragraph 15.3 MEDIATION, and substitute the following:

15.3 MEDIATION AND ARBITRATION

15.3.1 Parties shall attempt to resolve all disputes at the lowest possible level. Both parties to this Agreement agree to provide other resources and personnel to negotiate and find resolution to disputes that cannot be resolved at the Project Manager level. As a next step, claims, disputes or other matters in question between the parties to this Agreement arising out of or relating to this Agreement or breach thereof shall be determined by mediation, arbitration or litigation. Disputes shall be initially submitted to mediation by a mediator chosen by the parties. The cost of mediation shall be borne equally by the parties. If the parties are unable to agree upon a mediator within five days or if mediation fails to resolve the dispute, either party may request that the dispute be submitted to arbitration before a single arbitrator agreed to by the parties in an additional five days. If both parties agree to arbitration but are unable to agree upon an arbitrator, each party shall select an arbitrator, the arbitrators so chosen shall select a third, and the decision of a majority of the arbitrators shall be final, binding the parties, and any judgment may be entered thereon. Unless the parties mutually agree otherwise, any arbitration proceeding shall be conducted in accordance with the currently in effect Construction Industry Arbitration Rules of the American Arbitration Association.

Notwithstanding the above, the Owner may, at the Owner’s sole discretion, elect to resolve disputes in excess of $50,000 by litigation, if mediation is not successful.

15.3.2 In the event of arbitration or litigation arising out of the execution of this Agreement, the prevailing party shall be entitled to recover from the adverse party, reasonable attorney fees and costs for the arbitration proceedings, trial court or any appellate proceeding, in the amount determined by the arbitrator or the court, as appropriate.

For the purposes of the above provisions referring to attorney fees and related costs, the prevailing party in an arbitration proceeding or trial shall be a claimant who receives an award or damages in excess of the adverse party’s pretrial or prehearing offer made at least 10 days before trial or hearing. If the claimant receives an award of damages no greater than the adverse party’s pretrial or prehearing offer, the adverse party shall be deemed to be the prevailing party. In the event both sides are awarded damages, the prevailing party shall be the party who recovers the net award, provided the recovery exceeds the adverse party’s pretrial or prehearing offer. If the claimant net recovery is no greater than the adverse party’s pretrial or prehearing offer, the adverse party shall be deemed the prevailing party.

D. 15.4 ARBITRATION

1. Delete Paragraph 15.4 ARBITRATION.

END OF DOCUMENT 00 73 00

DOCUMENT 00 73 43
PREVAILING WAGE RATES

PART 1 – GENERAL

A. The Prevailing Wage Rates dated 01 January 2016, including any subsequent corrections or amendments issued by the Oregon Bureau of Labor and Industries, are included as a portion of the Contract Documents by reference. Copies are available for review at the office of Facilities Management, School District 4J, and can be viewed on line at www.boli.state.or.us. Click on Prevailing Wages, then PWR Rate Publications, and then Prevailing Wage Rates for Public Works Contracts in Oregon (subject only to state law).

END OF DOCUMENT 00 73 43

SECTION 01 11 00
SUMMARY OF WORK

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.

B. Salvage and waste management.

C. Contractor's use of premises, construction staging area and no smoking requirements.

D. Schedule of work.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: Project consists of Phase 01 work including new entry, community spaces, restrooms, flexible small group spaces, multi-purpose classroom, interior renovation, and site work – with alternates as noted per Section 012300 Alternates.

1. Project Location: 3307 Honeywood Street, Eugene, Oregon 97408
2. Owner: Eugene School District 4J, 715 West Fourth Avenue, Eugene, OR 97402.

B. Architect Identification: The Contract Documents, dated 11 February 2016, were prepared for Project by:
GMA Architects
860 West Park Street, Suite 300
Eugene, Oregon 97401
Phone: 541.344.9157
Website: http://www.gma-arch.com

C. Project Manager: Larry Massey has been appointed by Owner to serve as Project Coordinator.

1.3 CONTRACT

A. Project will be constructed under a general construction contract.

1. AIA Document A101-2007, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a stipulated sum.

1.4 WORK SEQUENCE

A. Do not commence Work until after execution of Agreement and receipt of Notice-to-Proceed from Owner.

B. Perform work in order to achieve Substantial Completion by 22 August or 14 October 2016, as clarified under Item 1.4.D below and on Drawings.

C. Achieve Final Completion within seven (7) days following the date of Substantial Completion.

D. Schedule following items into Construction Schedule Section 01 32 16 – Construction Progress Schedules and complete by the following dates:

1. Notice to Proceed: Following School Board Decision 16 March 2016
2. Earliest possible Start date for Construction at Selective areas identified in Drawings: 23 March 2016.
3. Start date for Construction at remaining areas: 23 June 2016
4. Substantial Completion date at Critical-Use areas: 22 August 2016
5. Substantial Completion date at Non-Critical-Use areas: 14 October 2016

E. Refer to Drawings for identification of Critical and Non-Critical-Use Areas.

1.5 USE OF PREMISES

A. Work Area Access: Building areas adjoining work areas may be occupied during work. Access to the work area will be available on a week-day basis from approximately 7:00 am to 4:00 pm. Coordinate all other work hour schedules with Owner so as not to interfere with Owner's use of the building.

B. Limit use of the premises to construction activities in areas indicated; allow for Owner occupancy and use by the public, subject to approval by a District Safety Specialist.

C. Site Access: Maintain drives and building entrances and exits clear and protected at all times to Owner's, employees, and public access and for use by emergency personnel. Do not use these areas for parking or storage. Schedule deliveries to minimize space and time requirements for storage of materials at site.

D. Parking: Contractor may use existing parking areas as indicated on Drawings.

E. Contractor Staging Areas: Limit staging to areas indicated on Drawings.

F. Construction Operations: Limited to areas indicated on Drawings.

1.6 WORK UNDER SEPERATE CONTRACTS

A. Separate Contract: Owner will award a separate contract for performance of certain construction operations at Project site, including Hazardous Materials Removal, Network cabling, HVAC Controls, and selective Floor Covering. Those operations will be conducted simultaneously with work under this Contract and shall be coordinated by Contractor.

B. Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

C. OFOI Products:
1. Office Equipment
2. Short Throw Projectors
3. Building Information Digital Monitors and mounts.
4. Telephone system and phones
5. Wireless Controller and access points
6. UPSs-MDF / IDF
7. Router
8. Network Switches, Fiber, Ports
9. Furnishings

1.7 PRODUCTS ORDERED IN ADVANCE

A. General: Owner has negotiated Purchase Orders with suppliers of material and equipment to be incorporated into the Work. Owner has assigned these Purchase Orders to Contractor. Costs for receiving, handling, storage if required, and installation of material and equipment are included in the Contract Sum.

1. Contractor's responsibilities are the same as if Contractor had negotiated Purchase Orders, including responsibility to renegotiate purchase and to execute final Purchase-Order agreements.
2. The Schedule of Products Ordered in Advance is included at the end of this Section.

1.8 OWNER-FURNISHED PRODUCTS (OFCI)

A. Owner will furnish the following: soap dispensers, toilet paper dispensers, paper towel dispensers, sanitary napkin disposal, toilet seat cover dispenser. The Work includes providing support systems to receive Owner's equipment and plumbing, mechanical, and electrical connections.

1. Owner will arrange for and deliver Shop Drawings, Product Data, and Samples to Contractor.
2. Owner will arrange and pay for delivery of Owner-furnished items according to Contractor's Construction Schedule.
3. After delivery, Owner will inspect delivered items for damage. Contractor shall be present for and assist in Owner's inspection.
4. If Owner-furnished items are damaged, defective, or missing, Owner will arrange for replacement.
5. Contractor shall review Shop Drawings, Product Data, and Samples and return them to Architect noting discrepancies or anticipated problems in use of product.
6. Contractor is responsible for receiving, unloading, and handling Owner-furnished items at Project site.
7. Contractor is responsible for protecting Owner-furnished items from damage during storage and handling, including damage from exposure to the elements.
8. If Owner-furnished items are damaged as a result of Contractor's operations, Contractor shall repair to like new condition or replace them.

B. OFCI Products:
1. Soap Dispenser – Gojo 5150
2. Paper Towel Dispenser – Georgia Pacific 59489
3. Toilet Paper Dispenser – Georgia Pacific 56784
4. Sanitary Napkin Disposal – Coastwide NSNDIW
5. Toilet Seat Cover – Bobrick B-221

1.9 MISCELLANEOUS PROVISIONS

A. DRUG AND ALCOHOL POLICY
1. The possession, use, or distribution of illicit drugs and alcohol on school premises is prohibited. Prescription medications brought to the project site shall be in the original container bearing the name of the drug, the name of the physician and the prescribed dosage.

B. USE OF TOBACCO PRODUCTS

1. Smoking and the other use of tobacco products is prohibited on all school district property pursuant to OAR 581-021-0110.

C. SAFETY REQUIREMENTS

1. Safety must not be sacrificed for the sake of productivity or expedience. Safety of students, staff, and the public is critical. Take all reasonable precautions to prevent endangerment or injury. Advise and coordinate operations with the school office.
2. All contractors who perform work on District property, and their employees, are expected to know the District's expectations for safe work and to adhere to those expectations.
3. Contractors are to adhere to the regulations of Oregon OSHA for all projects within the School District.

D. GENERAL SAFE WORK PRACTICES

1. Students, public and school staff shall not be put at risk by the activities of contractors or their employees.
2. Safe vehicle operation rules are to be followed at all times. These include positioning vehicles to minimize the necessity of backing and providing a "spotter", someone who will make sure that people do not run into the path of a vehicle when driving on a playground or field that is occupied by students.
3. Tools shall never be left out when an unsecured work area is vacated.
4. Ladders and scaffolding will be taken down when an unsecured work area is vacated.
5. Open holes and other tripping hazards shall be fenced or barricaded when an unsecured work area is vacated.
6. Operations resulting in vapors, emissions or flying objects shall be conducted in such a way as to prevent exposure to any unprotected parties or property.
7. "Secured Work Area" is defined as an area having a perimeter cyclone fence at least 6 feet in height, with gates which close and lock so that no casual entrance is possible by unauthorized adults or children.
8. Contractor to follow all OR-OSHA rules for Confined Spaces, where applicable.

E. COMMUNICATIONS REGARDING UNSAFE PRACTICES

1. Upon perceiving a problem, the District will immediately communicate the concern to the Contractor or Contractor's representative on the work site.
2. If agreement on correction of unsafe conditions cannot be reached, the concerns of the District shall prevail and safety concerns shall be addressed in accordance with the District requirements.

F. ELECTRICAL PANELS - LOCKOUT/TAGOUT

1. Contractor shall implement a Lockout/Tag-out program for his employees who take equipment out of service or place equipment back into service. Contractor shall review the District’s Energy Control Program prior to commencing work. Rules applying to this procedure are Oregon Occupational Safety and Health Code OAR 437, Division 2, Subdivision J, General Environmental Controls Lockout/Tag-out (1919.147), or latest edition.

G. ARC FLASH – ELECTRICAL SAFETY

1. Contractor shall comply with NFPA 70E (Electrical Safety in the Workplace), current edition. Contractor shall comply with Oregon OSHA 1910.137 (Personal Protective Equipment). The Contractor shall review with the School District Project Manager the 'Eugene School District Electrical Safety Program' before any work commences. The

Contractor shall comply with all 'Arc Flash' and 'Electrical Safety' protocols referenced in any and all NFPA, OSHA, OROSHA, NEC, NESC, UL, IBC, IFC and ANSI documents (current editions).

H. POTENTIALLY HAZARDOUS PRODUCTS

1. The District attempts to maintain a safe and healthy environment for students and staff. The Contractor is therefore required to follow District guidelines controlling the use of potentially hazardous products and to use these products in a safe manner. Guidelines include the use of materials (adhesives, coatings, carpeting, etc.) which are known to emit little or no airborne pollutants.
2. MSDS information is required for all potentially hazardous products. The Project Manager and a District Safety Specialist will review these and determine what, if any, mitigation procedures will be required.
3. Contractor is to maintain and post copies of all MSDS information at the project site and adhere to the required controls.
4. Contractor is to ensure that work area by students and teachers is restricted. The District will provide signage appropriate for this purpose. The Contractor is to construct and maintain appropriate barriers. This shall include provision of physical separation barriers between “construction” and “occupied” spaces.
5. Contractor to adopt means of maintaining the construction space in negative air pressure in relation to occupied spaces.
6. Where there is a new or existing ventilation system in an affected space, the system shall be adjusted to provide the maximum amount of outside air possible with the system.
7. Efforts shall be made to install and operate new ventilation systems as soon in the construction process as practical.

I. ASBESTOS CONTAINING MATERIALS WARNING

1. Asbestos containing materials are known to exist in areas of the Work. The Contractor shall not, in any way, disturb materials which are known to contain asbestos, assumed to contain asbestos, or otherwise have not been tested and confirmed to be asbestos free.
2. Where access to concealed spaces is required, or it is necessary to disturb building materials such as for drilling of holes, cutting, etc., notify the Owner so that proper investigation and/or removal procedures are followed.
3. Prior to commencing Work, the Contractor shall meet with the District Safety Specialist and review the Owner’s Asbestos Management Plan for the locations of asbestos-containing materials and/or materials assumed to contain asbestos. After reviewing the Owner’s Asbestos Management Plan, the Contractor is required to sign Form 01 11 00A, Asbestos-containing Materials Notification Statement, provided at the end of this Section.
4. Contractor must not install any asbestos-containing materials when performing the Work of this project. At the completion of the Work, Contractor will be required to furnish a statement stating that no asbestos-containing materials were installed during the course of the Work. Refer to Sample Form 01 11 00B at the end of this Section.

J. FULL TIME SUPERINTENDENT DISCLOSURE STATEMENT

1. Prior to or in conjunction with the Preconstruction Conference, the Contractor shall submit the disclosure statement which identifies the Full Time Superintendent for this Project. The form for this statement, Form 01 11 00C, is provided at the end of this Section.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

PART 4 - SCHEDULE OF PRODUCTS ORDERED IN ADVANCE

PART 5 - ASBESTOS FORMS

Form 01 11 00A

ASBESTOS-CONTAINING MATERIALS NOTIFICATION STATEMENT FOR CONTRACTORS

This form must be completed and signed by the Contractor prior to beginning work in any Eugene School District 4J building.

The presence of known and assumed asbestos containing materials is documented in the AHERA Management Plan for each building. Copies of the AHERA Management Plan are available in the main office of each building and in the Facilities Management Office at 715 West Fourth Avenue, Eugene, Oregon. The District Asbestos Specialist must be informed of the Contractor's activities in each building prior to the start of work so that the Contractor can be informed on how to use the AHERA Management Plan and to determine if any asbestos-containing materials are likely to be impacted by the work of the Contractor.

The Contractor is responsible for notifying all employees and subcontractors of the presence of asbestos in the building. The Contractor shall not disturb known or assumed asbestos-containing materials. If the Contractor discovers suspected asbestos-containing materials that have not been identified, the Contractor must stop any work impacting the suspected materials and notify the District Asbestos Specialist so that the material can be sampled. Any asbestos-containing materials that must be removed to allow the Contractor to complete the Contractor's work will be removed by the District under separate contract. If the Contractor disturbs asbestos-containing materials, the Contractor will be responsible for the cost of the cleanup and decontamination.

_____, Representing _____,
(Print Name of Representative) (Business Name)

I have been notified of the location of the AHERA Management Plan and agree to avoid impacting all known or assumed asbestos-containing materials in the performance of the Work.

_____ _____
Signature of Representative Date

_____ _____
Work Site CIP #

Form 01 11 00B

The Environmental Protection Agency (AHERA) rules require the School District obtain a signed statement from the Site Superintendent that, to the best of his/her knowledge, no asbestos-containing building materials were installed during the Work. Therefore, the following statement must be submitted on the Contractors letterhead prior to Project Closeout.

SAMPLE FORM

(To be submitted on the Contractor's letterhead)

ASBESTOS-CONTAINING MATERIALS STATEMENT

EUGENE SCHOOL DISTRICT 4J

Gilham Elementary School Renovation & Expansion Phase 01

CIP: 410.193.003

We the undersigned, (Name of Company), hereby warrant that to the best of our knowledge all materials furnished for the above referenced project contain 0% asbestos.

_____

(Name of Construction Company)

_____

(Signature and Date)

_____

Printed Name

_____

Job Title

END OF SECTION 01 11 00

Form 01 11 00 C

FULL TIME SUPERINTENDENT DISCLOSURE STATEMENT

Prior to or in conjunction with the Preconstruction Conference, the Contractor shall submit this disclosure statement which identifies the Full Time Superintendent for this Project.

Project Title: Gilham Elementary School Renovation & Expansion Phase 01
Eugene School District 4J
Eugene, Oregon
CIP No. 410.193.003

CONTRACTOR INFORMATION

Company Name: _____

Company Address: _____

City, State, Zip: _____

List below the name, address, telephone, cellular phone FAX numbers and e-mail address (if available) for the full time Superintendent for this Project:

Superintendent's Name: _____

Address: _____
(if different from Contractor's)
_____

Phone: _____ Fax: _____
Cell: _____ e-mail _____

The undersigned acknowledges that this project requires and will provide a full-time superintendent throughout this project.

Signature: _____
Authorized Signature

Printed Name: _____

Title: _____

Signature Notarized by:

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

Notary Public: _____
Signature

My commission expires: _____

SECTION 01 23 00

ALTERNATES

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 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 Owner decides to accept a corresponding change either in the amount of construction to be completed, the time to complete, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Modify 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. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

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

D. 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 - New Community Spaces
   1. Base Bid: No work.
   2. Alternate Bid: Add work required for Construction of Community Room B128, Storage Room B128A, Small Group Learning Room B129, Office Room B130, and associated Demolition. Refer to Drawings.

B. Alternate No.2 - Restrooms at Building B
   1. Base Bid: No work.
   2. Alternate Bid: Add work required for Construction of Restroom B119A, Restroom B116A, and associated demolition. Refer to Drawings

C. Alternate No.3 - Flex Rooms at Building B
   1. Base Bid: No work.
   2. Alternate Bid: Add work required for Construction of Flex Room B105A, Flex Room B114A, and associated demolition. Refer to Drawings

D. Alternate No.4 - Learning Center C122 Remodel
   1. Base Bid: No work.
   2. Alternate Bid: Add work required for Renovation of Learning Center Room C122 and associated demolition. Refer to Drawings.

E. Alternate No.5 – Building D Remodel
   1. Base Bid: Ceiling demolition at Commons D105, new ceiling assembly and lighting at Commons D105, and new fire protection system throughout. Refer to Drawings.
   2. Alternate Bid: Add work required for Renovation of Building D Classrooms and Commons, and associated demolition. Refer to Drawings.

F. Alternate No.6 – Site work
   1. Base Bid: Site Improvements as noted on Drawings.
   2. Alternate Bid: Add work for New Construction of Parking and Drop-off Area Alterations, New Chain Link Fencing, pedestrian pathways connecting southwest corner of property to front sidewalk at automobile parking area, and associated demolition. Refer to Drawings.

G. Alternate No.7 – Reader board
   1. Base Bid: Conduit and fiber to new sign location from IDF Room and electrical power to new sign location. Refer to Drawings.
   2. Alternate Bid: New Reader board and structural support. Refer to Drawings

END OF SECTION 01 23 00

SECTION 01 25 00

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 0 Document 00 52 13 " Form of Agreement" for monetary values of established Unit Prices and Alternates.
2. Division 0 Document 00 72 13 "General Conditions" for additional requirements for Changes in the Work, Contract Sum, and Contract Time.
3. Division 1 Section 00 11 13 "Supplementary Conditions" for allowable percentages for Contractors' Overhead and Profit.
4. Division 1 Section 01 22 00 "Unit Prices" for administrative requirements for using unit prices.
5. Division 1 Section 01 33 00 "Submittal Procedures" for Schedule of Values requirements.
6. Division 1 Section 01 60 00 "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.
7. Division 1 Section 01 78 39 "Project Record Documents" documentation requirements.

1.3 MINOR CHANGES IN THE WORK

A. Architect, with the concurrence of the Owner, will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1.4 CHANGE REQUEST/PROCEED ORDER (CONSTRUCTION CHANGE DIRECTIVE)

A. Architect or Owner may issue a Change Request/Proceed Order on form included at end of Part 3.

1. Change Request 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.
2. Proceed Order, when signed by the Owner, instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Proceed Order.

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

C. Authorization Required: When a Change Request is approved and signed by the Owner, it becomes a Proceed Order authorizing the change requested. Do not proceed with any change without the Owner's signature on the Change Request/Proceed Order.

D. Owner-Initiated Change Requests: Architect will issue a Change Request, which will include 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. Change Requests issued by Architect 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 Change Request after receipt of Change Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a complete cost breakdown including 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, supervision, overhead, and profit 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.

E. Contractor-Initiated Requests: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to the Architect.

1. Changes requested by the Contractor will be authorized only by signature of the Owner on the prescribed. Do not proceed with any changes without this authorization.
2. 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.
3. 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.
4. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
5. Include costs of labor, supervision, overhead, and profit directly attributable to the change.
6. 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.
7. Comply with requirements in Division 1 Section 01 60 00 "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

F. Change Request Form: Use forms provided by Owner. Sample copies are included at end of Section 3.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Change Request, and at intervals to be determined, Architect will collect Change Requests and issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

CHANGE REQUEST/PROCEED ORDER

2011-2018 Capital Improvement Program
Eugene School District 4J

……..

CHANGE REQUEST NOTICE

Change Request No.: _____

Project No.:_____ Contract No.:_____ Date:_____

Project Title:_____

Contractor:_____

1. **REQUEST INFORMATION**
   Estimated $_____ Time_____ Days_____ Initiated by _____
   Reason for change: _____
   _____

2. **DESCRIPTION**
   Describe changes: _____
   _____
   Describe affected work: _____
   List plan and spec sections: _____
   Describe impacted activities: _____
   Comment: _____

3. **DATES**
   Need for change first known _____ By whom _____
   Contractor first notified _____ How _____
   Owner first notified _____
   Date approved or rejected _____ By whom _____

4. **RECOMMENDATION (cost and time)** _____

……

PROCEED ORDER

PROCEED ORDER NO.: _____ Date: _____

1. **PAYMENT/COST**
   Actual amount of change $_____ The contract time will be:
   Contractor amount $_____ ( ) increased ( ) decreased by _____ days
   Subcontractor amount $_____ ( ) will remain unchanged
   Type of payment (LS/T&M) _____

2. **MISCELLANEOUS**
   Subcontractors involved: _____
   Major materials: _____
   The cost is not to exceed $_____ Date: _____

3 **CHANGE REQUEST ACCEPTED BY:**
   Contractor: _____ Date: _____
   Architect: _____ Date: _____
   4J CIP Project Manager: _____ Date: _____
   4J CIP Program Manager: _____ Date: _____
   4J Facilities Director: _____ Date: _____

Without the signature of Facilities Director, or the acting Director, this Proceed Order is neither accepted or authorized, except by written authorization of other specific delegation.

END OF SECTION 01 25 00

SECTION 01 29 00

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 01 25 00 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
2. Division 1 Section 01 27 00 "Unit Prices" for administrative requirements governing use of unit prices.
3. Division 1 Section 01 32 00 "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.
4. Division 1 Section 01 77 00 “Closeout Procedures” for final Application for Payment.

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.

2. Submit the Schedule of Values to Architect and Owner at earliest possible date but no later than seven days before the date scheduled for submittal of initial Application for Payment.

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. Name of Architect.
c. Architect's project number.
d. Contractor's name and address.
e. Date of submittal.

2. Submit draft of AIA Document G703 Continuation Sheets.

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. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. 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.

9. 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.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect 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 Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.

C. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders issued before last day of construction period covered by application.
3. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours.

D. 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 (draft submitted previously).
3. Contractor's Construction Schedule (preliminary if not final).
4. Products list.
5. Schedule of unit prices.
6. Submittals Schedule (based Architect's list or required submittals).
7. List of Contractor's staff assignments.
8. Initial progress report.
9. Report of preconstruction conference.

E. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

F. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout procedures (See itemized list in Section 01 77 00 "Closeout Procedures").
2. Updated final statement, accounting for final changes to the Contract Sum.
3. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
4. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
5. AIA Document G707, "Consent of Surety to Final Payment."
6. Evidence that claims have been settled.
7. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

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 includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. Administrative and supervisory personnel.
   2. Project meetings.

B. Related Sections include the following:
   1. Division 1 Section 01 32 00 "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
   2. Division 1 Section 01 73 00 "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
   3. Division 1 Section 01 77 00 "Closeout Procedures" for coordinating Contract closeout.

1.3 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 with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.
   4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

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.

   1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts

and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. 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.

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.

1.4 SUBMITTALS

A. Key Personnel Names: Within 15 days of Notice-to-Proceed, 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 pager, cell, and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1.5 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. Schedule meeting dates and times with Owner and Architect.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Architect will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, within three days of receiving them from the Architect.

B. Preconstruction Conference: Owner’s Project Manager will schedule a preconstruction conference before starting construction, no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Owner’s Project Manager, Architect, and their consultants, as required; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Discuss items of significance that could affect progress, including the following (see sample agenda at the end of Part 3):

    a. Introduction of persons present.
    b. Tentative construction schedule.
    c. Phasing.
    d. Critical work sequencing and long-lead items.
    e. Designation of key personnel and their duties.
    f. Procedures for processing field decisions and Change Orders.
    g. Procedures for requests for interpretations (RFIs).
    h. Procedures for testing and inspecting.
    i. Procedures for processing Applications for Payment.
    j. Distribution of the Contract Documents.
    k. Communications.
    l. Role of District's Project Manager.
    m. Submittal procedures, including MSDS information.
    n. Energy design requirements.
    o. Preparation of Record Documents.
    p. Use of the premises and existing building.
    q. Work hours and restrictions.
    r. Owner's occupancy requirements.
    s. Responsibility for temporary facilities and controls.
    t. Construction waste management and recycling.
    u. Parking availability.
    v. Office, work, and storage areas.
    w. Equipment deliveries and priorities.
    x. Safety and first aid.
    y. Security.
    z. Progress cleaning.

3. Minutes: Architect will record and distribute meeting minutes.
4. Statements made by the Contracting Agency's representative at the pre-construction conference are not binding upon the Contracting Agency unless confirmed by Written Addendum.

C. Preinstallation Conferences: When required by individual specification sections, 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 Architect and Owner's Project Manager a minimum of four days prior to scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract documents.
    b. Related requests for interpretations (RFIs).
    c. Related Change Orders.
    d. Purchases.
    e. Deliveries.

f. Submittals.
g. Possible conflicts.
h. Compatibility problems.
i. Time schedules.
j. Weather limitations.
k. Manufacturer's written recommendations.
l. Warranty requirements.
m. Compatibility of materials.
n. Acceptability of substrates.
o. Space and access limitations.
p. Regulations of authorities having jurisdiction.
q. Testing and inspecting requirements.
r. Installation procedures.
s. Coordination with other work.
t. Required performance results.
u. Protection of adjacent work.

3. Contractor to record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Distribute minutes of the meeting to each party present and to parties who should have been present, within three working days.
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 weekly intervals. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to the Owner's Project Manager and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. 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.

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) Work hours.
10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Status of correction of deficient items.
14) Field observations.
15) Requests for interpretations (RFIs).
16) Status of proposal requests.
17) Pending changes.
18) Status of Change Orders.
19) Pending claims and disputes.
20) Documentation of information for payment requests.

3. Minutes: Architect will record and distribute to Contractor the meeting minutes.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

PRECONSTRUCTION CONFERENCE AGENDA (SAMPLE)

Eugene School District 4J
[Enter Project Name]

[Date]

AGENDA

1. ( ) Introduction of Persons Present
   - ( ) District 4J
   - ( ) Consultants
   - ( ) Contractor (including job foreman)
   - ( ) Subcontractors

2. ( ) Availability of Contract Documents

3. ( ) Building Permit Status
   - ( ) Plan check and Building Permit paid by District
   - ( ) Pick up Permit at City of Eugene by Contractor
   - ( ) Location of site stored approved contract documents
   - ( ) Utility permits
   - ( ) LRAPA Permit

4. ( ) Prevailing Wage Requirements
   - ( ) Submittal schedule
   - ( ) Conformance with requirements

5. ( ) Communications
   - ( ) Notification of problems

6. ( ) Role of District's representative
   - ( ) Limits of authority
   - ( ) Visitation schedules

7. ( ) Work Description and Schedule
   - ( ) General work description
   - ( ) Proposed start date: _____
   - ( ) Proposed completion date: _____
   - ( ) Proposed project schedule and phasing
   - ( ) Progress schedule updates
   - ( ) Methods to be employed to maintain schedule
   - ( ) Work requiring Shop Drawings or submittals shall not commence until review is complete.

8. ( ) Submittals Required per Contract Documents
   - ( ) MSDS Information
   - ( ) Written proof of Asbestos Worker Certification
   - ( ) Name, Experience and Qualifications of Asbestos Supervisor
   - ( ) Copy of Contractor's Asbestos Abatement License
   - ( ) Other information as required by Section 01 31 00.

( ) Schedule of values
( ) List of subcontractors including name of contact person, telephone number, and address

9. ( ) Construction
   ( ) Working hours
   ( ) Use of premises/set up locations
   ( ) Protection of existing facilities
   ( ) Traffic and protection
   ( ) Excavation and clean-up
   ( ) Weather restrictions
   ( ) Deviation from details and/or specifications

10. ( ) Correction of Defects
   ( ) Daily and/or as observed

11. ( ) Weekly On-Site Progress Meetings
   ( ) Establish day and time: Day _____Time _____
   ( ) Provide updated project schedules
   ( ) Discuss project progress, problems, etc.
   ( ) Review applications for payment
   ( ) Required attendance
   ( ) Observation report distribution

12. ( ) Change Order Requests and Change Order Procedures
   ( ) Written Change Order requests required
   ( ) Supporting back-up will be required for all Change Orders
   ( ) Mark-up limitations on Change Orders
      ( ) Contractor - 15 percent
      ( ) Subcontractors - 10 percent
   ( ) Progressive requests and Change Orders
   ( ) Processing time required

13. ( ) Applications for Payment
   ( ) Use AIA documents G702 and G703 latest edition
   ( ) Provide 5 signed and notarized copies
   ( ) Wage certifications to be attached

14. ( ) Safety and Emergency Procedures

15. ( ) Clean-up Daily
   ( ) Project completion

16. ( ) Project Closeout
   ( ) Inspections for
      ( ) Air Clearance
      ( ) AHERA Close Out Requirements
      ( ) Substantial completion
         ( ) Contractor provided list of items to be completed
         ( ) Inspection with job foreman
      ( ) Final Acceptance
         ( ) Written notice from Contractor that all work is done and ready for inspection

    ( ) Inspection with job foreman
( ) Responsibility for cost of additional inspections
( ) Submittals for Closeout
    ( ) Final application for payment
    ( ) Final set of wage certifications
    ( ) Release of liens from all Subcontractors and general Contractor

17. ( ) Tour of Project Sites to Examine and Document Existing Conditions

18. ( ) Additional Comments

The undersigned acknowledges that the items listed above were discussed during this preconstruction conference and are fully understood.

Date:

A/E Firm:

Contractor:

Subcontractors:

END OF SECTION 01 31 00

SECTION 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

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 includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Preliminary Construction Schedule.
2. Contractor's Construction Schedule.
3. Submittals Schedule.

B. Related Sections include the following:

1. Division 1 Section 01 29 00 "Payment Procedures" for submitting the Schedule of Values.
2. Division 1 Section 01 31 00 "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
3. Division 1 Section 01 33 00 "Submittal Procedures" for submitting schedules and reports.
4. Division 1 Section 01 40 00 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 SUBMITTALS

A. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format.

1. Scheduled date for first submittal.
2. Specification Section number and title.
3. Submittal category (action or informational).
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Architect's final release or approval.

B. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.

1.4 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.

1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
2. Initial Submittal: List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.

B. Activities: Treat each floor or separate area as a separately numbered activity for each principal element of the Work

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.

D. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 1 Section 01 11 00 "Summary of Work." Delivery dates indicated stipulate the earliest possible delivery date.

E. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 1 Section 01 11 00 "Summary of Work." Delivery dates indicated stipulate the earliest possible delivery date.

F. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion**.**

G. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.

2.3 CONTRACTOR’S CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit preliminary horizontal bar-chart-type construction schedule within 10 days of date established for the Notice to Proceed.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate Actual Completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect Owner’s Project Manager, 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 01 32 00

SECTION 01 33 00

SUBMITTAL 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 includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, Information Submittals, Delegated Design and other submittals.

B. Related Sections include the following:

1. Division 1 Section 01 29 00 "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
2. Division 1 Section 01 31 00 "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
3. Division 1 Section 01 32 00 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
4. Division 1 Section 01 40 00 "Quality Requirements" for submitting test and inspection reports and for mockup requirements, if any.
5. Division 1 Section 01 77 00 "Closeout Procedures" for submitting warranties.
6. Division 1 Section 01 78 23 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
7. Division 1 Section 01 78 39 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
8. Divisions 2 through 49 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect's responsive action.

B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

B. Submittals Schedule: Comply with requirements in Division 1 Section 01 32 00 "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect'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 14 calendar days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect 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.

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 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.

E. Deviations: Highlight, 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. Architect will return submittals, without review, if received from sources other than Contractor without prior consent.

1. Transmittal Form: Provide locations on form for the following information:

a. Project name.
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. Submittal and transmittal distribution record.
k. Remarks.
l. Signature of transmitter.

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 Without Exceptions" or “Reviewed With Exceptions Noted.”

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 Without Exceptions" or “Reviewed With Exceptions Noted” taken by Architect.

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. Compliance with specified referenced standards.
    j. Testing by recognized testing agency.
    k. Application of testing agency labels and seals.
    l. Notation of coordination requirements.
    m. MSDS information, where applicable.

4. Submit Product Data before or concurrent with Samples.
5. Number of Copies: Submit the number required by the Contractor plus four (4) copies of Product Data, unless otherwise indicated. Architect will return two copies to Contractor and one to Owner. Mark up and retain one returned copy as a Project Record Document.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Dimensions.
    b. Identification of products.
    c. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
    d. Schedules.

e. Design calculations.
f. Compliance with specified standards.
g. Notation of coordination requirements.
h. Notation of dimensions established by field measurement.
i. Relationship to adjoining construction clearly indicated.
j. Seal and signature of professional engineer if specified.

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 but no larger than 24 by 36 inches.
3. Number of Copies: Submit four opaque copies of each submittal, unless copies are required for operation and maintenance manuals. Submit five copies where copies are required for operation and maintenance manuals. Architect will retain two **c**opies, including one for the Owner's Project Manager; remainder will be returned. Mark up and retain one returned copy as a Project Record Drawing.

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..

c. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect 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.

3. Test and Inspection Reports: Comply with requirements specified in Division 1 Section 01 40 00 "Quality Requirements."

B. Coordination Drawings: Comply with requirements specified in Division 1 Section 01 31 00 "Project Management and Coordination."

C. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section 01 32 00 "Construction Progress Documentation."

D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

H. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

I. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

J. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

K. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

L. Schedule of Tests and Inspections: Comply with requirements specified in Division 1 Section 01 40 00 "Quality Requirements."

M. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

N. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed

before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

O. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

P. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section 01 78 23 "Operation and Maintenance Data."

Q. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

R. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.

S. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

T. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect.

2.3 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

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 Architect.

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 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. Reviewed Without Exception
2. Reviewed With Exceptions Noted
3. Revise and Resubmit

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect 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 01 33 00

SECTION 01 40 00

QUALITY REQUIREMENTS

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 includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections include the following:

1. Division 1 Section 01 32 00 "Construction Progress Documentation" for developing a schedule of required tests and inspections.
2. Divisions 2 through 49 Sections for specific test and inspection requirements.

1.3 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.5 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made by Owner.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor**,** and the Contract Sum will be adjusted by Change Order.

B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.

3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 1 Section 01 33 00 "Submittal Procedures."

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.6 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of the Owner, described as follows:

<List Special Inspections Here>

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROL

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 includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Sections include the following:

1. Division 1 Section 01 11 00 "Summary of Work" for limitations on utility interruptions and other work restrictions.
2. Division 1 Section 01 33 00 "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
3. Division 1 Section 01 77 00 "Execution Requirements" for progress cleaning requirements.
4. Divisions 2 through 49 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.3 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.4 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

1.5 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.6 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.

1.7 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall 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. Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts**,** with 1-5/8-inch-OD top rails.

B. Portable Chain-Link Fencing: Minimum 2-inch, 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top and bottom rails. Provide concrete bases for supporting posts.

C. Lumber and Plywood: Comply with requirements in Division 6

D. Gypsum Board: Minimum 1/2 inch thick by 48 inches wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of construction personnel. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-square tack board.
3. Drinking water and private toilet.
4. Coffee machine and supplies.
5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
6. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
7. Four (4) linear feet of desk area for Architect’s use, with access to power, internet, and printer capable of printing on sheet sizes up to 11x17 inches.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

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.

B. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

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: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

OR

D. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

F. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

H. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.

I. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

OR

J. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Connect temporary service to Owner's existing power source, as directed by Owner.

K. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Install lighting for Project identification sign.

L. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install two telephone line(s) for each field office.

1. At each telephone, post a list of important telephone numbers.

    a. Police and fire departments.
    b. Ambulance service.
    c. Contractor's home office.
    d. Architect's office.
    e. Engineers' offices.
    f. Owner's office.
    g. Principal subcontractors' field and home offices.

2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas **as** indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Arrange for temporary parking areas for construction personnel.

E. 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 nor endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

F. Project Identification and Temporary Signs: Provide Project identification and other signs as indicated on Drawings. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.

1. Provide temporary, directional signs for construction personnel and visitors.
2. Maintain and touchup signs so they are legible at all times.

G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 1 Section 01 77 00 "Execution Requirements" for progress cleaning requirements.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Division 1 Section 01 11 00 "Summary of Work."

B. Temporary Erosion and Sedimentation Control: Comply with requirements specified in Division 2 Section "Site Clearing", and requirements of authority having jurisdiction.

C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Tree and Plant Protection: Comply with requirements specified in Division 2 Section "Tree Protection and Trimming."

E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.

G. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

I. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

J. Temporary Partitions: 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 gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
2. Insulate partitions to provide noise protection to occupied areas.
3. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
4. Protect air-handling equipment.
5. Weather strip openings.
6. Provide walk-off mats at each entrance through temporary partition.

K. 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.

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 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. 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.

END OF SECTION 01 50 00

SECTION 01 60 00
PRODUCT REQUIREMENTS

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 includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

B. Related Sections include the following:

1. Division 1 Section 01 23 00 "Alternates" for products selected under an alternate.
2. Division 1 Section 01 77 00 "Closeout Procedures" for submitting warranties for Contract closeout.
3. Divisions 2 through 49 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.4 SUBMITTALS

A. Substitution Requests: Instructions to Bidders specify time restrictions for submitting requests for Substitutions during the bidding period, in compliance with this Section.

B. After execution of Agreement, the Owner may, at the Owner’s option, consider formal requests from the Contractor for substitution of products for those specified. One or more of the following conditions must be documented:

1. Compliance with final interpretation of code requirements or insurance regulations which require that the use of a substituted Product.
2. Unavailability of a specified Product through no fault of the Contractor.
3. Inability of specified Product to perform properly of fit in designated place.
4. Manufacturer’s or Fabricator’s refusal or inability to certify or guarantee performance of a specified Product in the application intended.

C. A Substitution Request constitutes a representation that the Bidder/Contractor:

1. Has investigated the proposed Product and determined that it meets or exceeds the quality level of the specified Product.
2. Will provide the same warranty for the Substituted Product as for the specified Product.
3. Will coordinate installation and make changes to the Work which may be required for the Work to be completed with no additional cost to the Owner.
4. Waives claims for additional costs or time extension which may subsequently become apparent.
5. Will reimburse the Owner for review or redesign services associated with re-approval by authorities.

D. Substitutions will not be considered when they are indicated or implied on Shop Drawings or Product Data Submittals, without separate request on the form provided, or when acceptance will require revision to the Contract Documents.

E. Submit three copies of each request for consideration. Limit each request to one proposed Substitution. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use form provided at end of Section.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

    a. Statement indicating why specified material or product cannot be provided.
    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. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
    d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    e. Provide MSDS information to confirm that the product is no more harmful that the products specified.
    f. Samples, where applicable or requested.
    g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
    h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    i. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
    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 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 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. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

a. Form of Acceptance: Change Order.
b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.

7. Protect stored products from damage and liquids from freezing.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.
9. Provide bonded and insured off-site storage and protection when site does not permit on-site storage and protection.

1.7 PRODUCT WARRANTIES

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

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Submittal Time: Comply with requirements in Division 1 Section 01 77 00 "Closeout Procedures."

PART 2 - PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

SUBSTITUTION REQUEST FORM

TO: GMA Architects
860 West Park St. Suite 300
Eugene, OR 97401

PROJECT: Gilham Elementary School Renovation and Expansion Phase 01
CIP # 410.193.003
Eugene School District 4J

SPECIFIED ITEM: _____ _____ _____
Section No. Paragraph Description

The Undersigned requests consideration of the following substitution:

_____

The Undersigned states that the following paragraphs are true, except where noted otherwise:

1. The function, appearance and quality of the proposed substitution are equivalent or superior to the specified item;
2. The proposed substitution does not affect dimensions shown on the Drawings;
3. The Undersigned will pay for changes to the building design, including engineering and design services, detailing and construction costs caused by the requested substitution;
4. The proposed substitution will have no adverse effect on other trades, the construction schedule, or specified warranty requirements;
5. Maintenance and service parts will be locally available for the proposed substitution;
6. The Undersigned has attached data concerning the proposed substitution, including: Manufacturers product description, specifications, drawings, photographs, performance and test data, adequate for evaluation of the request, with applicable portions of the data clearly indicated. Attachments also include description of changes to Contract Documents which the proposed substitution will require for its proper installation.

Submitted by: _____ Signature: _____ Firm: _____ Address:_____ _____ Date: _____ Tel: _____ Fax: _____ Attachments: _____	For use by Architect: ☐ Approved ☐ Approved as noted. ☐ Not Approved ☐ Received too late By: _____ Date: _____ _____ For use by 4J Project Manager: ☐ Approved ☐ Approved as noted. ☐ Not Approved ☐ Received too late By: _____ Date: _____

END OF SECTION 01 60 00

SECTION 01 73 00
EXECUTION REQUIREMENTS

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 includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. General installation of products.
4. Coordination of Owner-installed products.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.
8. Correction of the Work.

B. Related Sections include the following:

1. Division 1 Section 01 31 00 "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
2. Division 1 Section 01 33 00 "Submittal Procedures" for submitting surveys.
3. Division 1 Section 01 77 00 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 SUBMITTALS

A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

B. Final Property Survey: Submit 2 copies showing the Work performed and record survey data.

1.4 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: 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 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; and underground electrical services.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

C. Acceptance of Conditions: 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. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

a. Description of the Work.
b. List of detrimental conditions, including substrates.
c. List of unacceptable installation tolerances.
d. Recommended corrections.

2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. 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 that is 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, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

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 and Owner's Project Manager promptly.
   1. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, 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 and Owner's Project Manager.

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

   1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
   2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
   3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

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 seven feet in spaces without a suspended ceiling.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated. Bring any conflicts to the Architect for review.

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. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

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.

G. 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 where possible. Obtain Architect and Owner’s Project Manager approval for all questionable conditions.

H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction forces.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.

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 forces at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction forces if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold materials more than 7 days during normal weather or 3 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 applicable regulations.

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 safety and 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: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

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 assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section 01 40 00 "Quality Requirements."

3.9 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. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 00

SECTION 01 73 29

CUTTING AND PATCHING

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 includes procedural requirements for cutting and patching.

B. Related Sections include the following:

1. Division 1 Section 10 31 00 – "Project Management and Coordination" for pre-construction and pre-installation conferences.
2. Division 2 Section "Selective Demolition" for demolition of selected portions of the building.
3. Divisions 2 through 49 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

A. Cutting and Patching Proposal: Submit a written request describing procedures prior to the time cutting and patching will be performed, requesting approval to proceed, for cutting or alteration which affects:
1. Structural integrity of any element of Project.
2. Integrity of weather-exposed or moisture-resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of site-exposed elements.
5. Work of Owner or separate contractor.

B. Include the following information:
1. Identification of Project and CIP number
2. Location and description of the affected Work.
3. Necessity for cutting or alteration.
4. Description of proposed Work and Products to be used.
5. Alternatives to cutting and patching.
6. Effect on work of Owner or separate contractor.
7. Written permission of affected separate contractor, if any.
8. Date and time work will be executed.

1.5 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
   1. 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.
   2. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related 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**.**

B. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces 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.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials 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 match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

   1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
   2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. 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.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

3.3 PERFORMANCE

A. 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. 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 as small as possible, neatly to 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 or 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 Division 2 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.

C. 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 possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate 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 eliminate 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, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

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.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01 73 29

SECTION 01 77 00

CLOSEOUT 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 includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Warranties.
3. Final cleaning.

B. Related Sections include the following:

1. Division 1 Section 01 29 00 "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
2. Division 1 Section 01 73 00 "Execution Requirements" for progress cleaning of Project site.
3. Division 1 Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.
4. Division 1 Section 01 78 39 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
5. Divisions 2 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.

9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect and Owner's Project Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit the following completed forms, items and documents:
    a. Eugene School District 4J CIP Project Closeout Checklist (Standard template included at end of Section).
    b. AIA Document G706 Contractor's Affidavit of Payment of Debts and Claims.
    c. AIA Document G706A Contractor's Affidavit of Release of Liens.
    d. AIA Document G707 Consent of Surety Company to Final Payment.
    e. Operation and Maintenance Manuals
    f. Warranties and Bonds. Submit original documents, including Contractor's General Warranty,
    g. Record Documents.
    h. Keys.
    i. Testing and Start-Up records.
    j. Affidavit of Prevailing Wages paid.
    k. Complete list of Contractor and all Subcontractors with address, phone numbers, and work
    l. Asbestos-Containing Materials Statement (Form 01100B).

m. Proof of final acceptance and compliance from governing authorities having jurisdiction.
n. Certificate of insurance evidencing continuation of liability coverage including coverage for completed operations until the expiration of the specified warranty periods.

5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect and Owner's Project Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

2. Cost of additional re-inspections by Architect and Owner's Project manager will be deducted from Final Payment to the Contractor.

1.5 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Partial Occupancy: Submit properly executed warranties within 10 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

    a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    e. Remove snow and ice to provide safe access to building.
    f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    h. Sweep concrete floors broom clean in unoccupied spaces.
    i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
    j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
    k. Remove labels that are not permanent.
    l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

m. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
n. Replace parts subject to unusual operating conditions.
o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
q. Clean ducts, blowers, and coils if units were operated without filters during construction.
r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
s. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 77 00

PROJECT CLOSEOUT CHECK LIST
EUGENE SCHOOL DISTRICT 4J
Capital Improvement Program

PROJECT: Gilham Elementary School Renovation & Expansion Phase 01

PROJECT NO: CIP# 410.193.00

Project Manager: Larry Massey

Contractor:

Architect: GMA Architects

PROCEDURE:

A. The Architect and/or Project Manager shall review the project for substantial completion. Substantial completion is defined as when the construction is sufficiently completed, in accordance with the contract documents, as modified by any change orders agreed to by the parties so that the Owner can occupy or utilize the project or specified area of the project for the use for which it was intended.

B. Prior to the release of retain age funds, the Project Manager shall complete the following items that shall be received by, or demonstrated to, the Owner prior to FINAL COMPLETION of the project.

1. Certificate of Substantial Completion - DATE: □
2. Operation & Maintenance Manuals for All Equipment □
3. In-Service Training on Equipment □
4. As-Built Drawings and Records; provide drawings on CD □
5. Spare Parts & Materials and Inventory Record □
6. Keys □
7. Original Warranty Literature Including the Contractor's General Warranty □
8. Testing and Start-up Records of New or Modified Equipment □
9. Affidavit of Prevailing Wages Paid □
10. AlA Document G706: Contractor's Affidavit of Payment of Debts & Claims □
11. AlA Document G706A: Contractor's Affidavit of Release of Liens □
12. AlA Document G707: Consent of Surety Company to Final Payment □
13. Complete list of General and Sub-Contractors with Addresses and Work Responsibilities □
14. Asbestos-Containing Material Statement □
15. Proof of Signoff for Building Permit □

The Owner has 30 days from the date of the letter of Final Acceptance to release all outstanding payments to the contractor, which should be limited to the 5% retainage.

The Contractor shall submit a final statement of accounting reflecting adjustments to contract sum; total contract sum as adjusted, previous payments, remaining sum due.

Date:

Release Final Payment:

Approved by:

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

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 includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Maintenance manuals for the care and maintenance of products, material, finishes, systems, and equipment.

B. Related Sections include the following:

1. Division 1 Section 01 33 00 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Division 1 Section 01 77 00 "Closeout Procedures" for submitting operation and maintenance manuals.
3. Division 1 Section 01 78 39 "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
4. Divisions 2 through 49 Sections for specific operation and maintenance manual requirements for the Work 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 draft copies of each manual at least 15 working days before requesting inspection for Final Completion. Include a complete operation and maintenance directory. Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.

B. Final Submittal: Submit one copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.

1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

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. List of all subcontractors and material suppliers, including names, addresses and phone numbers.
5. 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 same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

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.
3. Manual 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. Name and address of Owner.
4. Date of submittal.
5. Name, address, and telephone number of Contractor.
6. Name and address of Architect.

7. 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 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, 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 a Table of Contents for each volume with a list of products and major components of equipment included in the section on the face of 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 media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch 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 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 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. Piped system diagrams.
9. Precautions against improper use.
10. 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. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 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.
4. Material and chemical composition.
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.
6. Contact information.

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.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment 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. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard printed maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training videotape, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.

2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. 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. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. 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.

E. 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.

F. 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 01 78 39 "Project Record Documents."

G. Comply with Division 1 Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

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 includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Sections include the following:
1. Division 1 Section 01 77 00 "Closeout Procedures" for general closeout procedures.
2. Division 1 Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Divisions 2 through 49 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit copies of Record Drawings as follows:
   a. Final Submittal: Submit one set of marked-up Record Prints (not “Job Shack” set).

B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one copy of each Product Data submittal.

1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an understandable drawing technique.
c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Depths of foundations below first floor.
d. Locations and depths of underground utilities.
e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Duct size and routing.
i. Locations of concealed internal utilities.
j. Changes made by Change Order.
k. Changes made following Architect's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Record Transparencies: Organize into unbound sets matching Record Prints. Place transparencies in durable tube-type drawing containers with end caps. Mark end cap of each container with identification. If container does not include a complete set, identify Drawings included.
3. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect and Owner’s Project Manager.
e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's and Owner’s Project Manager’s reference during normal working hours.

END OF SECTION 01 78 39

SECTION 02 41 00

DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Selective demolition of building elements for alteration purposes as shown on Drawings and specified herein.

B. Related Requirements:
   1. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.
   2. Section 01 10 00 - Summary: Description of items to be salvaged or removed for re-use by Contractor.
   3. Section 01 73 00 - Execution Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

1.2 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

1.3 DEFINITIONS

A. General: Certain words and phrases used throughout the Contract Documents are abbreviated or are used with definitions unique to the Contract Documents. Such abbreviations, words and phrases shall have the following definitions where used in these Contract Documents.

B. “Remove” or “Demolish”: Remove and legally dispose of items except those indicate do to be reinstalled, salvaged, or to remain the Owner’s property.

C. “Remove and Salvage”: Items indicated to be removed and salvaged remain the Owner’s property. Remove, clean, and pack or crate items or protect against damage. Identify contents of containers and deliver to Owner’s designated storage areas.

D. “Remove and Reinstall”: Remove items indicated; clean, service and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated.

E. “Existing to Remain”: Protect construction indicated to remain against damage and soiling. When permitted by the Architect, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.

1.4 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

1.5 SUBMITTALS

A. See Section 01 33 00 for submittal procedures.

B. Site Plan: Showing:
   1. Areas for temporary construction and field offices.
   2. Areas for temporary and permanent placement of removed materials.

C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
   1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
   2. Identify demolition firm and submit qualifications.
   3. Include a summary of safety procedures.

D. Recycling and Adaptive Reuse Program: Means and methods for limiting dumping of demolition debris into landfills. Submit as part of Construction Waste Management Plan.

E. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.6 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Company specializing in the type of work required.
   1. Minimum of 5 years of documented experience in sequential demolition procedures limiting damage to only those portions of structures requiring demolition.

B. Use of Explosives: Not permitted.

C. Hazardous Material Procedures and Discovery: Conform to related Division 02 Sections.

1.7 REGULATORY REQUIREMENTS

A. Conform to Regulatory Requirements specified Section 01 40 00.

B. Obtain required permits from governing authorities before proceeding. Obtain permits before closing or obstructing roadways, sidewalks, hydrants, and fire lanes.

C. Conform to applicable code, health departments, and local and state agencies for demolition of structures, dust control, runoff control, and disposal of debris.

D. Conform to local governing jurisdiction requirements regarding noise control.

1.8 PRE-DEMOLITION CONFERENCE

A. Attendance: Contractor, Owner, Architect, Structural Engineer, Mechanical Engineer, Electrical Engineer, demolition subcontractor, and those requested to attend.

B. Meeting Time: Minimum 1 week prior to prior to beginning Work of this Section and Work of related Sections affecting Work of this Section.

C. Location: Project Site.

D. Agenda:
   1. Sequencing and procedures for complete building demolition, selective building and site salvaging, site demolition, and utility demolition procedures.
   2. Means to limit spread of dust, water, debris, and other pollution.
   3. Means to protect and maintain surrounding structures and sitework not included in demolition work.
   4. Protection of trees.
   5. Maintenance of structural integrity of existing structures during demolition operations.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Dust Control, and Runoff Control:
   1. Conform to Section 01 50 00.
   2. Conform to requirements of local jurisdiction.
   3. Limit dust to lowest practicable level.
   4. Sprinkle demolition work with water to minimize dust. Provide hoses and water connections for this purpose.
   5. Proceed in manner to prevent flooding, contaminated runoff, or icing.
   6. Maintain street drains and sewers open and free of debris and damage from Work of this Contract.

B. Traffic Control:
   1. Conduct operations with minimum interference with public and private roads, streets, alleys, sidewalks, and adjacent facilities.
   2. Provide alternate routes around closed or obstructed traffic ways.
   3. Conform to Section 01 11 00.

C. Do not close or obstruct public access without permission from authorities having jurisdiction.
   1. Obtain permission from adjacent property owners when demolition activities and equipment may infringe upon or limit access to their properties.
   2. Maintain site access.

D. Maintain recycling adaptive reuse program for salvaging construction debris to reduce dumping of construction debris into landfills. Where cost effective, sort construction debris into separate bins and employ recycling as means to reduce dumping of refuse into landfills.

1.10 COORDINATION

A. Conform to Section 01 31 00 for coordination with Work of other Sections.

B. Before beginning Work, schedule activities in accordance with demolition procedures and sequence of operations submitted to and accepted by Owner and Architect.

C. Arrange for and verify termination of utility services encountered.
   1. Do not shut off or cap utilities without prior notice to Owner and utility companies.
   2. Notify affected utility companies before starting Work, and conform to their requirements.

PART 2 PRODUCTS

2.1 SALVAGE AND WASTE MANAGEMENT

A. Items for Owner's use have been removed by Owner from buildings and grounds, except as noted in Drawings.

B. Salvage Items for use in construction as noted in Drawings.

C. Remaining unused demolition from building and site is Contractor's property. Remove from site and dispose of in legal manner.

D. Remove unused site stored salvaged material prior to Substantial Completion of Project, except where otherwise instructed by Owner or Architect.

PART 3 EXECUTION

3.1 EXAMINATION

A. Inspect and verify existing conditions and become familiar with extent of work.

B. Examine site to determine proper access within limitations of contract. Conduct operations as so not to interfere with adjacent public streets, driveways, walks, and buildings.

C. Coordinate disconnection, removal, or capping of electric utilities with Owner.

3.2 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   3. Provide and maintain temporary barriers and security devices.
   4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   5. Do not close or obstruct roadways or sidewalks without permit.
   6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
   7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Protect existing structures and other elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

3.3 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as shown.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Remove indicated materials, appurtenances, and equipment in orderly as required to accomplish new work.
   1. Cut surfaces to minimize amount of new material required.
   2. Cut concrete to provide proper bonding to new work.

C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications: Remove existing systems and equipment as indicated.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components. Do not allow construction dust or debris to enter or otherwise Interfere with existing systems.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. Verify that abandoned services serve only abandoned facilities before removal.
   4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.

D. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair or replace adjacent construction and finishes damaged during demolition and removal work.

3.4 SELECTIVE BUILDING SALVAGING

A. Location as indicated on Drawings.

3.5 COMPLETE BUILDING DEMOLITION

A. Completely demolish and remove entire buildings designated for demolition in accordance with demolition procedures submitted to and accepted by Owner and Architect.

B. Remove below grade construction such as foundation walls and footings below grade.

C. Break up and remove concrete slabs on grade, except portions indicated to be salvaged and used in new construction.

3.6 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.
   1. Dispose of demolition material prior to Substantial Completion of each phase of the Project.

B. Remove from site all materials not to be reused on site; do not burn or bury.

C. Leave site in clean condition, ready for subsequent work.

D. Maintain hauling routes clean and free from demolition work.

E. Clean up spillage and wind-blown debris from public and private lands.

F. Do not store, burn, or bury materials on site.

G. Do not crush concrete materials on site.

3.7 CLEANING

A. Upon completion, clean entire area of demolition for continuation of work.

3.8 ADJUSTING

A. Repair, replace, or reimburse Owner for damage to existing structures and finishes, trees and plant materials, utilities, and other items not indicated to be demolished under this work.

END OF SECTION 02 41 00

SECTION 03 10 00

CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
   2. Openings for other work.
   3. Form accessories.
   4. Form stripping.

B. Related Requirements:
   1. Section 03 20 00 - Concrete Reinforcing.
   2. Section 03 30 00 - Cast-In-Place Concrete.
   3. Section 05 12 00 - Structural Steel Framing: Placement of embedded steel anchors and plates in cast-in-place concrete.
   4. Section 07 92 00 - Joint Sealers
   5. Division 22 - Plumbing
   6. Division 26 - Electrical

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. American Concrete Institute (ACI):
   1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.
   2. ACI 301 - Specifications for Structural Concrete; American Concrete Institute International; 2010 (Errata 2012).
   3. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute; 2011.
   4. ACI 347 - Guide to Formwork for Concrete; American Concrete Institute; 2004.

C. American Society for Testing and Materials (ASTM) International:
   1. ASME A17.1 - Safety Code for Elevators and Escalators; The American Society of Mechanical Engineers; 2013.

1.3 DESIGN REQUIREMENTS

A. Formwork Design, Structural Stability, and Sufficiency: Conform to ACI 318 Chapter 6, and ACI 347R.
   1. Design, engineer, and construct formwork, shoring, reshoring, and bracing to withstand construction loads, continuous loads, and lateral pressure.

2. Design formwork to withstand pressure resulting from placement and vibration, while maintaining specified tolerances.
3. Design for special vertical and horizontal loads conforming to ACI 347R Section 2.2.

B. Exposed to View Concrete: Conform to ACI 301 Chapter 6 and ACI 347R for Architectural Concrete, except non-public utility areas.

1.4 SUBMITTALS

A. Product Data: Provide data on void form materials and installation requirements.

B. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.
1. Exposed Concrete Surfaces: Show the general construction of forms including jointing, formed joints or reveals, form tie locations, and pattern of form placement, and other items that affect the exposed concrete visually.
2. Formwork Facing Materials: Data on form facing materials proposed for smooth-form finish.
3. Show vertical and horizontal special loads: Conform to ACI 347, Section 2.2. Include camber diagrams.
4. For Architectural concrete at exposed finished surfaces, include means to prevent leakage of concrete from forms.

C. Delegated Design Data: As required by authorities having jurisdiction.

1.5 QUALITY ASSURANCE

A. Designer Qualifications: Design formwork under direct supervision of a Professional Structural Engineer experienced in design of concrete formwork and licensed in the State in which the Project is located.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store prefabricated forms off ground in ventilated and protected manner to prevent deterioration from moisture.

1.7 PROJECT CONDITIONS

A. Foundation Concrete in Neat Excavations: As accepted by Architect where following conditions are met.
1. Excavations of foundation trench walls are determined as stable by Geotechnical Engineer.
2. Excavations are clean, neatly excavated, and accurately located.
3. Excavation expose bearing soils as approved by Geotechnical Engineer.
4. Foundation is over-excavated and additional concrete placed beyond detailed design profiles and dimensions.

1.8 COORDINATION

A. Coordinate with Section 03 30 00 and 03 21 00 for placement of rebar and concrete.

B. Embedded Items: Where items, such as embedded plates, reglets, anchors, fastenings, conduit, piping, and other items are supplied by other trades and specified elsewhere in the Contract Documents, coordinate and obtain approval of their placement in the forms prior to placing any concrete.

1.9 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 FORMWORK - GENERAL

A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.

B. Design and construct to provide resultant concrete that conforms to design with respect to shape, lines, and dimensions.

C. Chamfer outside corners of beams, joists, columns, and walls.

D. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.

E. Comply with relevant portions of ACI 347, ACI 301, and ACI 318.

2.2 WOOD FORM MATERIALS

A. Exterior and Interior Concealed Work: APA, PS-1 B-B Plyform Structural I, Exterior, 4 by 8 foot panels, minimum 5/8 inch thick.

B. Exterior and Interior Exposed Work: APA, PS-1 High Density Overlay (HDO) Plyform, Structural I & II, Exterior, High Density 60-60 surfacing material APA PS1 and Form V345, 4 foot by 8 foot panels, minimum 3/4 inch thick and as sufficient to support concrete at rate poured.

2.3 REMOVABLE PREFABRICATED FORMS

A. Preformed Steel Forms: Minimum 16 gauge matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces. Accepted in lieu of wood forms.

B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

2.4 FORMWORK ACCESSORIES

A. Form Ties - Exposed Concrete Locations:

1. Fiberglass Ties: Glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
2. Color: Gray.

B. Form Ties - Concealed Concrete Locations:
1. Snap Ties: Burke Penta-Tie specified for type and quality.
   a. 1 inch diameter by 1 inch deep snap-tie with flattened break-offs and plastic cone.
   b. High strength, non-corrosive, non-staining finish.
   c. One inch minimum break-back below concrete surface.
   d. Wire snap-ties strength and length as required for conditions of installation.
   e. Water seals to inhibit flow of water along tie shaft and to block against leakage.
   f. Products
      1) Meadow Burke, Penta-Tie
      2) Dayton/Richmond
2. Concrete Plugs: Meadow Burke BA Snaplug, specified for type and quality.
   a. Cones: Burke BA Standard or accepted plastic cones standard with form tie manufacturer's system.
   b. Reveal Type: At exposed Architectural Concrete.
   c. Flush Type: At concealed concrete.
   d. Plug Adhesive: Waterproof neoprene adhesive, as instructed by manufacturer.
   e. Products:
      1) Burke, Snaplug Bonder
3. Flush Filling and Sacking of Cone Holes: Architectural Concrete surface achieved by filling cone holes with stiff sand/cement mix, accepted in lieu of plugs.

C. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied. Use of diesel as form release agent is prohibited.

D. Filler Strips for Chamfered Corners: Rigid plastic type; 1/2 x 1/2 inch size; maximum possible lengths.

E. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

F. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 05 12 00.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.2 EARTH FORMS

A. Earth forms are not permitted.

3.3 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

D. Align joints and make watertight. Keep form joints to a minimum.

E. Obtain approval before framing openings in structural members that are not indicated on drawings.

F. Coordinate this section with other sections of work that require attachment of components to formwork.

3.4 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for items to be embedded in passing through concrete work.

B. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.

C. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.

D. Install waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement. Heat seal joints so they are watertight.

E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.6 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

3.7 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 117, unless otherwise indicated.

B. Construct and align formwork for elevator hoistway in accordance with ASME A17.1.

3.8 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00.

3.9 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

END OF SECTION 03 10 00

SECTION 03 20 00

CONCRETE REINFORCING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Reinforcing steel for cast-in-place concrete.
   2. Supports and accessories for steel reinforcement.

B. Related Requirements:
   1. Section 03 10 00 - Concrete Forming and Accessories.
   2. Section 03 30 00 - Cast-In-Place Concrete.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at time of Bid.

B. ACI 301 - Specifications for Structural Concrete; American Concrete Institute International; 2010 (Errata 2012).

C. ACI 318 - Building Code Requirements For Structural Concrete and Commentary; American Concrete Institute International; 2011.

D. ACI SP-66 - ACI Detailing Manual; American Concrete Institute International; 2004.

E. American Society for Testing and Materials (ASTM) International:
   1. ASTM A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2007.
   2. ASTM A184/A184M - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement; 2006 (Reapproved 2011).
   3. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.
   4. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2015.
   5. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement; 2014.

F. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; American Welding Society; 2011.

G. CRSI (DA4) - Manual of Standard Practice; Concrete Reinforcing Steel Institute; 2009.

H. CRSI (P1) - Placing Reinforcing Bars; Concrete Reinforcing Steel Institute; 2011.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
   1. Prepare shop drawings under seal of a Professional Structural Engineer experienced in design of work of this type and licensed in the State in which the Project is located.

C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.

D. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.4 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301.
   1. Maintain one copy of each document on project site.

B. Provide Architect with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.

C. Welders' Certificates: Submit certifications for welders employed on the project, verifying AWS qualification within the previous 12 months.

1.5 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 REINFORCEMENT

A. Reinforcing Steel: Type, size and location as indicated on the Structural Drawings

B. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
   3. Provide stainless steel components for placement within 1-1/2 inches of weathering surfaces.

2.2 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.

B. Welding of reinforcement is not permitted.

C. Locate reinforcing splices not indicated on drawings at point of minimum stress.

PART 3 EXECUTION

3.1 PLACEMENT

A. Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Place, support and secure reinforcement against displacement. Do not deviate from required position.

C. Do not displace, puncture or damage vapor barrier.

D. Accommodate placement of formed openings.

E. Conform to Structural Drawings and applicable code for concrete cover over reinforcement.

3.2 FIELD QUALITY CONTROL

A. An independent testing agency, as specified in Section 01 40 00, will inspect installed reinforcement for conformance to contract documents before concrete placement.

3.3 DEFECTIVE WORK

A. General: The following reinforcing steel work will be considered defective and shall be removed and replaced by the Contractor at no additional cost to the Owner:
   1. Bars with kinks or bends not shown on drawings.
   2. Bars injured due to bending or straightening.
   3. Bars heated for bending.
   4. Reinforcement not placed in accordance with the drawings and/or specifications.

END OF SECTION 03 20 00

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Floors and slabs on grade.
   2. Foundation walls.
   3. Concrete reinforcement.
   4. Architectural exposed concrete.
   5. Cast-in-place concrete for building slabs, footings, foundations, walls, and structural components.
   6. Joint devices associated with concrete work.
   7. Miscellaneous concrete elements, including equipment pads, light pole bases, flagpole bases, thrust blocks, and manholes.
   8. Concrete curing.

B. Related Requirements:
   1. Section 03 10 00 - Concrete Forming and Accessories: Forms and accessories for formwork.
   2. Section 07 92 00 - Joint Sealants: Products and installation for sealants for saw cut joints and isolation joints in slabs.
   3. Section 09 30 00 - Tiling
   4. Section 09 65 00 - Resilient Flooring
   5. Section 09 68 00 - Carpeting

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at time of Bid.

B. American Concrete Institute (ACI):
   1. ACI SP-16-89, "Field Reference Manual."
   2. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 2002).
   3. ACI 301 - Specifications for Structural Concrete; American Concrete Institute International; 2010 (Errata 2012).
   4. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International; 2004 (Errata 2007).
   5. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.
   6. ACI 305R - Hot Weather Concreting; American Concrete Institute International; 2010.
   7. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 2010.
   8. ACI 308R - Guide to Curing Concrete; American Concrete Institute International; 2001 (Reapproved 2008).
   9. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2011.

C. American Society for Testing and Materials (ASTM) International:
   1. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.
   2. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2014.
   3. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2014.
   4. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.
   5. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.
   6. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.
   7. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2012.
   8. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2013.
   9. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.
   10. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2013.
   11. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).
   12. ASTM E1155 - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers; 1996 (Reapproved 2008).

1.3 DEFINITIONS

A. Cast-in-Place Concrete: Formed concrete that is concealed or locations where appearance is not critical.

B. Architectural Exposed Concrete: Formed concrete that is exposed to view on surfaces of completed structure or building and that requires special concrete materials, formwork, placement, or finishes to obtain specified architectural appearance.

C. 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.

D. Slump: The measurement of the vertical difference in height of the resulting concrete pile and the original 12 inch tall cone after the slump cone is filled then lifted.

E. Slump Flow: The measurement of the resulting horizontal diameter of the concrete pile after the slump cone is filled then lifted. This method measures the unconfined flow of the mixture.

1.4 PERFORMANCE / DESIGN CRITERIA

A. Do not change brands and sources of cement, aggregates, admixtures, and additives during course of construction, except as accepted by Architect.

B. Supply mix design from same batch plant, using same source for mix ingredients, as submitted for supporting test data.

C. Performance Mix Design:
   1. As basis for acceptance, submit new mix design from batch plant indicating that shrinkage, cracking, strength, and other properties are compatible with original mix design.
   2. Prepare mix design for each type and strength of concrete by either laboratory trial batch, verified by independent testing laboratory, or field experience methods as prescribed by ACI 301 and as noted on Structural Drawings.
   3. Prepare mix design information for concrete batch weights with bulk-specific gravity determinations for aggregates based on saturated surface dry (SSD) condition. Include mix information sufficient to verify through absolute volume calculations:
      a. Concrete Yield.
      b. Cement Factor.
      c. Water/Cement Ratio.
      d. Mortar to Voids Ratio.
   4. When adjustment to mix design becomes necessary due to job conditions, weather, test results, changes in material properties, or other circumstances, resubmit new mix design for acceptance by Architect and Structural Engineer.

D. Proportioning and Mixing: Conform to requirements of IBC, including Chapter 19.

E. Design Strength:
   1. Interior Concrete Slab on Grade: As indicated by Structural Drawings.
   2. Exterior Site Work Concrete: Assume 4,000 psi 28 day strength, except as otherwise specified by Civil Site Paving and Grading Notes or General Structural Notes.
   3. Building Structural Concrete Other Than Slabs: Assume 4,000 psi 28 day strength, except as otherwise specified or shown on Drawings by General Structural Notes.
   4. Other Than Slabs: As specified by Structural Drawings, except not less than 3,000 psi 28 day strength.

F. Water/Cement Ratio for Interior Slabs: See Structural General Notes for W/C ratios, based on total cementitious material, including fly ash, slag and other pozzolan materials.
   1. Water Content for Slabs: Maximum 235 pounds per cubic yard.
   2. Total Combined Cement and Fly Ash Content for Slabs: As indicated on Structural Drawing.
   3. All Slabs on Grade and Slabs on Metal Deck: Treat with surface evaporation retarder immediately following concrete setup.
   4. Building Structural Concrete Other than Slabs: As indicated on Structural Drawings.
   5. Exterior Site Work Concrete: As specified by Civil Site Paving and Grading Drawings.

G. Length Change: As tested to ASTM C157. Where no test data available, add shrinkage reducing admixture, conforming to manufacturer's instructions for all Slabs on Grade and Slabs on Metal Deck. Length Change minimum shall be:
   1. Slabs: Maximum 0.035 percent shrinkage in 28 days.
   2. Walls, Columns, and Beams: Maximum 0.04 percent shrinkage in 28 days.
   3. Footings: No requirements.

H. Fly Ash:

1. Add to batch plant concrete mix as Portland cement replacement. Submit back-up data for mix design.
2. Maximum loss on ignition to be 1%. Use fly ash from one single source for the whole project.
3. Fly ash content as a percentage of total weight of cementitious material:
   a. Concrete Slabs and Pavements: Maximum 15 percent.
   b. Concrete slabs scheduled for polished concrete finish: Maximum 15 percent.
   c. Other than Slabs: Maximum 25 percent.

I. Integrally Colored Concrete Admixture:
1. Add to concrete mix at batch plant for exterior integrally colored paving.
2. Add in pre-packaged quantities, adjusted to concrete mix design by manufacturer to obtain accepted color.
3. Verify use of superplasticizers, water-reducing admixtures, fly ash, and other concrete additives with manufacturer before mixing with integrally colored concrete admixture.

J. Superplasticizers: Add high range, mid-range, and low range water-reducing admixtures to batch plant mix as means to develop sufficient slump and workability, as instructed by manufacturer to conform to maximum water content of this Section.

K. Air-Entraining Agent at Exterior Concrete: Conform with ASTM C260
1. Achieve 5 percent entrained air, plus or minus 1-1/2 percent to batch plant concrete mix, for exterior concrete exposed to earth, weather, or freezing temperatures after curing.
2. Do not add to interior slabs, except as accepted by Architect and Structural Engineer.

L. Fiber Reinforcement at concrete slabs, as otherwise indicated by Structural Drawings:
1. Add approximately 0.1 percent by volume to concrete mix (approximately 1-1/2 pounds of fiber reinforcement per cubic yard of concrete) and as instructed by manufacturer.
2. Add at batch plant for concrete slab-on-grade, concrete topping slabs, and composite slabs on steel decking.
3. Do not install fibermesh at exposed or polished topping slabs.

M. Integral Water-Repellent Admixture: Add to batch plant concrete mix for concrete slabs and topping slabs to seal and prevent capillary water penetration.

N. Concrete Slump: Optimize through performance mix design by batch plant to suit placement conditions, as accepted for each mix design by Architect and Structural Engineer.

1.5 SUBMITTALS

A. Mix Designs: Sign by batch plant quality control engineer or responsible agent for each design. Include for each mix design:
1. Method and test data used to establish mix proportions.
   a. Include supporting test records for field experience method or trial batch method for each mix design.
   b. Include date of test and batch plant location.
2. Concrete compressive strengths.
3. Water/cement ratios, corresponding cement content, and water content.

4. Linear shrinkage. Mix designs with no test data may substitute shrinkage reducing admixture in proportions conforming to manufacturer's instructions.
5. Admixtures and additives.
6. Fiber reinforcement.
7. Slump or slump flow.
8. Hot and cold weather designs.
9. Air entrainment for each design.
10. Ingredients, proportions, and source of materials.
11. Location and intended use.

B. Product Data: Submit manufacturers data on manufactured products showing compliance with specified requirements and installation instructions.
   1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.
   2. Admixtures and additives.
   3. Fiber reinforcing.
   4. Bonding agents.
   5. Screeding products and equipment.
   6. Hardener densifiers, dry shake.
   7. Curing materials.
   8. Contraction joints, isolation joints, construction Joints and cold joints.

C. Samples for Pigment Color Selection: Submit manufacturer's complete sample chip set, including pigment number and required dosage rate for each color.

D. Samples: Submit two, 12 inch long samples of waterstops and construction joint devices.

E. Contractor Qualifications as specified in this Section.

1.6 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

B. Follow recommendations of ACI 305R when concreting during hot weather.

C. Follow recommendations of ACI 306R when concreting during cold weather.

D. Concrete Producer Qualifications:
   1. Company specializing in manufacturing ready-mixed concrete products conforming to ASTM C94.
   2. Producer Member of the National Ready Mixed Concrete Association (NRMCA).

E. Installer Qualifications:
   1. Company specializing in work of this Section.
   2. Able to show minimum 3 year documented experience in successful commercial quality work of comparable scope and quality when requested by Architect.

F. Applicators for Semi-Rigid Epoxy and Polyurea Joint Sealers, Elastomeric Joint Sealants, Hardener Densifier, Dry Shake Color Hardeners, and Other Specialized Systems:
   1. Trained and authorized by manufacturer as qualified prior to Bid Date.

G. Concrete Mix Design:
   1. Do not change brands and sources of cement, aggregates, admixtures, and additives during course of construction, except as accepted by Architect and Structural Engineer.
   2. Supply mix design from same batch plant, using same source for mix ingredients, as submitted for supporting test data.
   3. As basis for acceptance, submit new mix design from batch plant indicating that shrinkage, cracking, strength, and other properties are compatible with original mix design.

H. Architecturally Exposed Concrete: Conform to ACI 301, Section 6 and ACI 303R for Architectural Concrete at exterior and interior exposed to view formed concrete surfaces, except at non-public utility spaces such as mechanical and electrical spaces.

I. Moisture Content and Alkalinity Testing for Concrete Slab:
   1. Take measures to control concrete mix design water content, placement, curing, and other procedures as necessary to achieve acceptable moisture and alkalinity content within time period scheduled for installation of finish flooring systems specified under other Sections.
   2. Conduct testing as specified under PART 3 of this Section under Field Quality Control testing for concrete slabs. Do not begin testing until after building envelope is fully enclosed and ambient temperature and humidity approximate final interior conditions.
   3. Following initial curing period, take necessary measures to control temperature and humidity levels and to remove moisture through ventilation to outside of building as specified by Section 01 50 00. Do not use propane heaters or other moisture generating heating equipment.

1.7 REGULATORY REQUIREMENTS

A. Testing and Special Inspections: Conduct testing under provisions of Section 01 40 00 and the General Structural Notes.
   1. Conform to provisions of IBC Chapter 17, reference standards specified by ACI 318 and procedures specified by ACI 301.
   2. Conduct during placement of concrete with specified 28 day strength greater than 2500 psi following procedures conforming to ASTM C31, ASTM C39, and ASTM C143, and as specified Section 01 45 23.

B. Batch Tickets: Retain record of concrete delivered and placed on site.
   1. Include exact mix proportions, slumps, test strength, date, time, location of placement, weather conditions at time of placement, and source of concrete.
   2. Submit copies to Architect/Structural Engineer, Special Inspector, and Building Code Official.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Conform to provisions of Section 01 66 00 and manufacturer's instructions.

B. Mixing and Delivery: Conform to ASTM C94.

C. Sampling at Delivery: Conform to ASTM C172. Cure 4 inch by 8 inch cylinders to provisions of ASTM C31 and compression test compressive strength of cylinders to ASTM C39 and as specified Section 01 45 23.

D. Batch Tickets: Accompany with each load, fully executed, and signed. Log in with inspector at time of entry. Conform to Source Quality Control requirements specified by this Section.
   1. Information: Conform to ASTM C94, Option A or C. Include additional batch ticket information to that required by ASTM C94.
      a. Concrete mix design.
      b. Water content and water withheld at batch plant.
      c. Time to nearest minute that batch was dispatched from plant, when it arrived at site, and when unloading began and was finished.
      d. Ambient air temperature and concrete internal temperature of at time of arrival.
      e. Written record of water and other additives added to design mix following time that mix truck has left batch plant.
   2. Truck load not accompanied with batch tickets will be rejected.

E. Reject concrete that has reached internal temperature of 89 degree F or above and when temperature has risen 5 degrees in 10 minutes, indicating that concrete is setting up prior to discharge.

F. Store products in accordance to ACI 301. Do not use admixtures that have been in storage at project site for more than 6 months or which have subject to freezing, except as accepted by Architect and Structural Engineer based on test results.

1.9 FIELD CONDITIONS

A. Environmental Conditions: Conform to ACI 301, 5.3.2 for placement of concrete weather considerations.

B. Protect concrete during falling rain, sleet, or snow.
   1. Remove or repair concrete finish deformed by weather at contractor's expense when directed by Owner.

1.10 COORDINATION

A. Conform to Section 01 31 00 for coordination with work of other Sections.

B. Section 01 40 00 for concrete testing and inspections.

C. Section 03 35 43 for concrete tolerances, and surface conditions suitable for subsequent polished concrete finish.

D. Section 03 35 430 for integrally colored, polished, densified, and aggregate seeded finishes and specified slab tolerances and conditions requiring work and coordination by this Section.

E. Section 07 26 16 for placement over underslab vapor retarder.

F. Division 09 for Finish Flooring:
   1. Coordinate with carpeting, resilient flooring, sheet flooring, and other finish flooring systems to prevent moisture conditions, bond breaking curing agents, and alkaline levels at interior concrete slabs incompatible with manufacturers' Warranty provisions.
   2. Curing Compounds: Where permitted, verify compatibility with flooring adhesives for finish flooring specified under work of other Sections or remove completely prior to installation of finish flooring systems conforming to provisions of this Section.

1.11 WARRANTY

A. See Section 01 77 00 - Closeout Procedures, for additional warranty requirements.

1.12 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 FORMWORK

A. Comply with requirements of Section 03 10 00.

2.2 REINFORCEMENT

A. Comply with requirements of Section 03 20 00.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150, Type I - Normal Portland type.
   1. Interior: Type I and Type II. Do not use air entrained concrete at interior slabs.
   2. Exterior: Type I with specified air entrainment admixture, preferred to Type IA and Type IIA air-entrained concrete. Type IIIA accepted for cold weather construction.
   3. Other: As specified by Structural Drawings.

B. Fine and Coarse Aggregates: ASTM C33.
   1. Coarse Aggregate Class Designation: As indicated by Table 3 for Type or Location of concrete for Moderate Weathering Region, including 5M for exterior Architectural Concrete.
   2. Size: Do not exceed 3/4 distance between reinforcing steel or 1/3 thickness of concrete slabs and toppings.
      a. Slabs and Structural Concrete: Maximum 3/4 inch aggregate.
      b. Footing: Maximum 1-1/4 inch aggregate.
   3. Free of deleterious substances that may cause expansion of concrete or react with alkalis in concrete.

C. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of Portland cement, as indicated in Mix Design specifications on Structural Drawings.

D. Fly Ash: ASTM C618, Class F.

E. Slag: ASTM C989 Grade 120, ground, granulated blast-furnace slag.

F. Color Additives: Pure, concentrated mineral pigments specifically intended for mixing into concrete and complying with ASTM C979.
   1. Concentration: Base dosage rates on weight of Portland cement, fly ash, silica fume, and other cementitious materials but not aggregate or sand.
   2. Packaging: If pigments are to be added to mix at site, furnish pigments in premeasured disintegrating bags to minimize job site waste.
   3. Color(s): As selected from manufacturer's standard.
   4. Products:
      a. Butterfield Color, www.butterfieldcolor.com.
      b. Davis Colors, www.daviscolors.com.
      c. Solomon Colors; Solomon ColorFlo Liquid Colors: www.solomoncolors.com.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

G. Water: Clean and not detrimental to concrete.

H. Fiber Reinforcement for Plastic Shrinkage Crack and Drying Shrinkage Crack Control:
   1. ASTM C 1116, Type III, macro multifilament polypropylene fibers for plastic shrinkage and plastic settlement crack control.
   2. Interior Exposed Slabs: 100 percent virgin multifilament polypropylene strand fibers, mix ratio graded by multiple lengths, and thickness, designed not to be visible at concrete surface. Not accepted as replacement for welded wire fabric or other steel crack control reinforcement.
      a. Manufacturers/Products:
         1) Forta, Econo-Mono.
         2) Grace, MicroFiber.
         3) Propex, Fibermesh 150.
      b. Substitutions: See Section 01 60 00.
   3. Interior Slab Under Finish Flooring Systems: 100 percent virgin fibrillated polypropylene fibers mix ratio graded by multiple lengths and thickness. Accepted as crack control reinforcement, except at composite slabs.
      a. Manufacturers/Products:
         1) Forta, Econo-Net.
         2) Grace, Fibers.
         3) Proplex, Fibermesh 300.
      b. Substitutions: See Section 01 60 00.

2.4 ADMIXTURES

A. Chemical Admixture:
   1. Provide products from single manufacturer, or supply manufacturer certification that admixtures are compatible in combination with cement and aggregates.
   2. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
   3. Retarding Admixture: ASTM C 494/C 494M, Type B.
   4. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.

5. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
7. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

B. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement. Do not use calcium chloride admixtures.

C. Air Entrainment Admixture: ASTM C260/C260M.

2.5 ACCESSORY MATERIALS

A. Underslab Vapor Barrier: As indicated in Section 07 26 16.

B. Non-Shrink Cementitious Grout: As indicated in Structural Drawings.

C. Non-Shrink Epoxy Grout: As indicated in Structural Drawings.

2.6 BONDING AND JOINTING PRODUCTS

A. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.

B. Epoxy Bonding System:
1. Complying with ASTM C881/C881M and of Type required for specific application.

C. Anchor Systems:
1. Two-Component Adhesive Anchor Systems: Shear and tensile bond strength greater than hardened concrete strength conforming to ASTM C 882 and compatible for use with damp concrete.
    a. See Structural Drawings.
    b. Post-installed anchors products require current ICC-ES reports showing conformance.
    c. Refer to ICC-ES for additional reports.

D. Waterstop: As specified in Section 03 10 00.

E. Reglets: Formed steel sheet, galvanized, with temporary filler to prevent concrete intrusion during placement. Not less than 0.022 inch thick.
1. Size: As indicated on drawings.

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.

G. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.
1. Material: ASTM D1751, cellulose fiber.

H. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with minimum 1 inch diameter holes for conduit or rebars to pass through at 6 inches on center; ribbed steel stakes for setting.

I. Sealant and Primer: As specified in Section 07 92 00.

2.7 CURING MATERIALS

A. Accepted Curing Methods:
1. ACI 302.1R Section 9.2 using wet curing, wet covering, moisture retaining coverings, or polyethylene film or waterproof paper curing methods, using materials specified by Section 5.9.
2. ACI 308, Section 2.2 - Water Curing or 2.3 - Sealing Materials using wet film curing methods.
3. Liquid Curing and sealing compounds:
   a. Accepted for exterior slabs only.
   b. Not accepted for interior slabs.
   c. Not accepted for slabs scheduled for polished concrete floor finish, slab to receive hardener/densifier, slab to receive staining and other treatments requiring absorption into concrete slab.

B. Moisture-Retaining Sheet: ASTM C171.
1. White-burlap-polyethylene sheet, weighing not less than 10 oz/per linear yd, 40 inches wide.
   a. Manufacturers/Products:
      1) Reef Industries Transguard Reusable Wet Cure Covers, www.reefindustries.com.
      2) Or approved.
2. Waterproof Paper (Reinforced Kraft Curing Paper): Two sheets of reinforced kraft paper cemented together with bituminous adhesive with one white reflective surface, non-staining, moisture retentive.
   a. Manufacturers/Products:
      1) Fortifiber, Orange Label Sisalkraft 280, www.fortifiber.com.
      2) Or approved.

C. Water: Potable, not detrimental to concrete.

2.8 SAW CUT CONTROL JOINTS EQUIPMENT

A. Depth of Cut: Minimum 1 inch deep and ¼ inch wide of concrete slab, except as otherwise shown on Drawings.

B. Width of Cut: Approximately 0.120 inch (1/8 inch).

2.9 SCREEDS

A. Laser Screeding: Preferred and accepted in lieu of base screeds specified by this Section.

B. Ground Set Screed Stakes: Not accepted for interior slabs. Do not penetrate underslab vapor retarder sheeting underlying concrete slabs with screed stakes.

C. Base Set Screed Posts: Non-stake screeds accepted. Following specified for type and quality and as accepted by Architect.
   1. Fabricated, removable, 1/4 inch by 12 inch by 12 inch steel base plate with welded steel or all-thread steel screed post.

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 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 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 at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIX DESIGN

A. Mixed Design: As indicated in Structural Drawings.

B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

2.12 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

2.13 SOURCE QUALITY CONTROL

A. Conform to provisions and limitations ACI 340R and ASTM C94.

B. Batching and Mixing: Conform to ASTM C94, Option A for exact proportioning of mix design.

C. Admixtures: Add to within accuracy of 3 percent.

1. Add separately and verify compatibility in design mix, conforming to manufacturer's instructions.
2. Reject concrete that shows signs of segregation due to use of admixtures.

D. Accelerating and Set Retarding Admixtures:
   1. Accepted for long hauls for extending transportation time, cold weather, and hot weather conditions conforming to hot and cold weather placement requirements.

E. Reject concrete that has reached internal temperature of 89 degrees F or above and when temperature has risen 5 degrees F in 10 minutes, indicated that concrete is setting up prior to discharge.

F. Mix Water: When feasible, add mix water required for mix design at batch plant.

G. Accelerating and Set Retarding Admixtures:
   1. Accepted for long hauls for extending transportation time, cold weather, and hot weather conditions conforming to hot and cold weather placement requirements.
   2. Measure concrete temperature and confirm that temperature has not exceeded 89 degrees F or risen 5 degrees F in 10 minutes before acceptance at site.

H. Batching of Dry Materials and Adding Mix Water at Site:
   1. Accepted for long hauls and for extending transportation time as an alternate procedure to adding accelerating and set retarding admixtures.
   2. Add mix water under pressure at both front and back of mixing drum.
   3. Mix at mixing speed for 70 to 100 revolutions before discharging.

I. Adding Mix Water at Project Site: Accepted as needed increase slump of concrete within first 15 minutes after truck arrives at site, under the following conditions:
   1. Quantity of water does not exceed specified slump and maximum water/cement ratio and conforms to batch plant mix designer's written instructions.
   2. Special inspector is present to monitor quantity of water added in comparison to that added at batch plant and make written record of that for each truck load delivered.
   3. Drum is turned an additional 30 revolutions or more as necessary to uniformly mix water into concrete.
   4. Water is not added to concrete batch after:
      a. Taking test cylinders, except where new cylinders are taken at Contractor's expense.
      b. Adding high-range water reducing admixtures to concrete mix.

J. Do not use calcium chloride containing products.

2.14 FINISHES

A. Polished Concrete Finishing: Refer to Section 03 35 43.

B. Slab Tooling Finishes: Refer to Part 3 of this Section.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

B. Verify under slab vapor retarder is undamaged and conforming to Section 07 26 16.

C. Verify that anchors, seats, plates, reinforcement, and other items cast into concrete are accurately located, securely in place, and approved before concrete placement.

3.2 PREPARATION

A. Verify that forms are clean and free of rust before applying release agent.

B. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

C. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
   1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
   2. Use latex bonding agent only for non-load-bearing applications.

D. Where new concrete with integral waterproofing is to be bonded to previously placed concrete, prepare surfaces to be treated in accordance with waterproofing manufacturer's instructions. Saturate cold joint surface with clean water, and remove excess water before application of coat of waterproofing admixture slurry. Apply slurry coat uniformly with semi-stiff bristle brush at rate recommended by waterproofing manufacturer.

E. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

F. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

G. Waterstop: Locate at cold joints.

H. Weather Conditions:
   1. Prepare in advance for conditions where ambient temperature necessitates hot or cold weather concrete placements.
   2. Do not begin placement when sun, heat, wind, or other limitations may prevent proper consolidation, finishing, and curing.
   3. Do not place concrete when rain, sleet, or snow are falling, except where adequate means are taken to cover and protect concrete placements. Do not allow rain water to increase mixing water or to damage concrete surface finish during or following placement.

4. Take measures to prevent rapid evaporation of surface bleed water due to high evaporation conditions, including high winds and low humidity.

3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Place concrete for floor slabs in accordance with ACI 302.1R.

C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

D. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

E. Place Concrete continuously between construction and expansion/contraction (control) joints.

F. Place each lift while previous lift is still plastic.

G. Vibrate to obtain thorough consolidation, and complete filling of forms.

H. Consolidate concrete, except slabs on grade, in forms by mechanical vibration as specified and in accordance with ACI 309, except as applicable for self-consolidating concrete (SCC).

I. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.4 COLD WEATHER CONDITIONS

A. Conform to ACI 306R and ACI 306.1.

B. Do not place concrete on ice, snow, frost, or frozen substrates including subgrades, formwork, reinforcement, and embedded items.

C. Temperature of Concrete: Maintain for 7 days between 50 degrees F and 90 degrees F curing temperature.

D. Take measures to protect concrete from freezing when mean daily temperature is below 40 degrees F during first 5 days after placement.

E. In severe weather, at end of 5 days, gradually decrease temperature to ambient over 24 hour period.

F. Use of Heaters:
   1. Do not use propane or other moisture and carbon-dioxide producing heaters
   2. Maintain uniform temperature throughout heated areas.
   3. Prevent rapid drying of new concrete. Elevate heaters and protect floor slabs around heaters with damp sand.

G. Insulation:
   1. Accepted to retain heat in newly placed concrete.
   2. Conform to ACI 306R and ACI 306.1 for type and amount satisfactory for given conditions.
   3. Protect corners and edges of concrete placement.

3.5 HOT OR WINDY WEATHER CONDITIONS

A. Conform to ACI 305.1, Recommended Practice for Hot Weather Concreting.

B. Under conditions of wind, low relative humidity, temperatures exceeding 85 degrees F, and conditions resulting in insufficient bleed water at concrete surface, spray-apply monomolecular surface evaporation retarder immediately before, during, and after finishing as required to prevent plastic shrinkage cracking.

C. Temperature of Fresh Concrete: 90 degrees F maximum at time of placement.
   1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees F, using chilled mixing water, chopped ice, or other accepted means to control temperature provided water contributed conforms to water/cement ratio of mix design.
   2. When temperature of steel reinforcement, embedments, or forms exceeds 120 degrees F, fog with water immediately prior to placing concrete. Remove standing water before placing concrete.
   3. Dampen subgrade maintaining uniform moisture, free of puddles and dry areas.
   4. Use water-reducing retarding admixture when required by high temperatures, low humidity, and other adverse placing conditions, as accepted by Architect/Structural Engineer.

D. Following placement, moist cure for 24 hours whenever ambient temperature exceeds 85 degrees F. After 24 hours, concrete may be cured by conventional method.

E. During finishing, whenever ambient temperature exceeds 85 degrees F, fog water spray to prevent plastic shrinkage.

3.6 EMBEDDED ITEMS

A. Locate and embed expansion joints, joint fillers, waterstops, anchor bolts, embedded plates, dovetail anchor slots, piping, conduit, radiant heating tubes, and other items required for work for this and other Sections.

B. Use templates, setting diagrams, and drawings, conforming to manufacturer instructions.

C. Fill voids in sleeves, inserts, and anchor slots with temporarily, easily removable material to prevent entry of concrete.

D. Do not embed aluminum except where protected from contact with concrete.

3.7 CONSTRUCTION, ISOLATION, AND CONTRACTION JOINTS

A. Conform to ACI 302.IR. Locate where shown on Drawings and accepted shop drawings. Verify locations with Architect before proceeding.

B. Locate to least impair structural integrity. Locate joints perpendicular to primary reinforcing steel.
   1. Remove laitance and defective concrete. Wash surface.
   2. Apply bonding agent against hardened concrete.

C. Bonded Construction Joints (Cold Joints) between Successive Concrete Placements: Locate joints to least impair structural integrity, perpendicular to primary reinforcing steel.
   1. Dowel between slabs, as shown on Drawings
   2. Remove laitance and defective concrete. Wash surface.
   3. Apply bonding agent against hardened concrete.
   4. Dampen concrete surface. Remove excess water from formwork.
   5. Install expanding joint strip or saw cut contraction joints over construction joints between individual slab placements.

D. Isolation Joints:
   1. Establish complete separation through floor slabs at junctions with other building elements and points of restraint including walls, columns, equipment foundations, and stairways, except elements requiring lateral restraint from slab.
   2. Fill to complete depth of joint with preformed joint filler, leaving 1/2 depth of joint width clearance below top of slab for installation of backer rod and sealant.

E. Saw Cut Contraction Joints: Saw cut interior and exterior slabs using soft cut method over green concrete as soon as slab will support foot traffic and before slab begins to experience shrinkage cracking, conforming to ACI 302.1R Chapter 3.
   1. Space saw-cuts at 2 to 3 foot spacing for each 1 inch depth of concrete slab and as accepted by Architect.
   2. Saw-cut joints minimum 1 inch deep and not less than 1/4 depth of concrete slab, except as otherwise shown on Drawings.
   3. Saw-cut joints at 45 degree angle from corner of diamond shaped slab panels.
   4. Exactly meet corners of cut outs to prevent cracking from corners.
   5. Locate contraction joints over structurally supporting beams.
   6. Maximum length to width ratio of panels in floor slabs is 1.5 to 1, although 1 to 1 is preferred.
   7. Maximum length to width ration of panels in exterior pavement is 1.25 to 1, although 1 to 1 is preferred.
   8. Do not form T-shaped or L-shaped saw-cut joints in panels.
   9. Make joints continuous. Do not offset or stagger.
   10. Space contraction joints equal distance between contraction joints at column lines, over construction joints, supporting structural beams, and change of substrate.
   11. Burnish edges of joints while concrete is still green.
   12. Do not saw cut slab on metal deck except as specifically shown on Structural Drawings.

F. Cold Joints and Penetrations: Conform to provisions of Section 03 11 00. Install expanding joint strip as instructed by manufacturer.

G. 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.

H. Projections through Prepared Openings: Fill voids with non-shrink grout containing waterproof concrete as instructed by manufacturer.

3.8 SLAB JOINTING

A. Locate joints as indicated on the drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.

3.9 SEPARATE FLOOR TOPPINGS

A. Prior to placing floor topping, roughen substrate concrete surface and remove deleterious material. Broom and vacuum clean.

B. Place required dividers, edge strips, reinforcing, and other items to be cast in.

C. Apply bonding agent to substrate in accordance with manufacturer's instructions.

D. Apply sand and cement slurry coat on base course, immediately prior to placing toppings.

E. Place concrete floor toppings to required lines and levels.
   1. Place topping in checkerboard panels not to exceed 20 ft in either direction.

F. Screed toppings level, maintaining surface flatness of maximum 1:1000.

3.10 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values:

Location	Floor Profile Quality Classification	Minimum Overall Flatness F(F)	Minimum Overall Level F(L)	Minimum Local Flatness F(F)	Minimum Local Level F(L)
Mechanical & Electrical Rooms	Conventional Bull Floated (1/2 inch in 10 foot)	F(F) 15	F(L) 13	F(F) 13	F(L) 10
Janitorial & Utility Rooms at Non-Public Areas	Conventional Straightedge (5/16 inch in 10 foot)	F(F) 20	F(L) 15	F(F) 15	F(L) 10
Carpeting	Moderately Flat (3/8 inch in 10 foot)	F(F) 25	F(L) 20	F(F) 24	F(L) 15

Hard Surface Resilient Flooring	Flat Finish (3/16 inch 10 foot)	F(F) 30	F(L) 20	F(F) 18	F(L) 10
Tile & Wood Flooring	Flat (3/16 inch 10 foot)	F(F) 35	F(L) 25	F(F) 24	F(L) 17
Ground & Hardened Exposed Slab	Flat Finish	F(F) 40	F(L) 20	F(F) 24	F(L) 10
Polished Slabs	Very Flat Finish	F(F) 50	F(L) 35	F(F) 35	F(L) 24

B. Measure F(F) and F(L) in accordance with ASTM E1155, within 48 hours after slab installation; report both composite overall values and local values for each measured section.

C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.11 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
   1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
   2. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.
   3. Cork Floated Finish: Immediately after form removal, apply grout with trowel or firm rubber float; compress grout with low-speed grinder, and apply final texture with cork float.

D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
   1. Edge Forms and Screeds: Use specified screed systems that will not penetrate underlying vapor retarder at interior slab-on-grade.
   2. Placement: Place at rate that allows spreading, straight-edging, and darbying or bull floating before appearance of bleed water.
   3. Tolerances: Measure floor slabs for suspended floors and slabs-on-grade within 72 hours after slab finishing and before removal of supporting formwork or shoring. Verify conformance to tolerance requirements of ASTM E1155 and ACI 117.
   4. Screeding: Set screeds to specified floor levelness and flatness tolerances using wood or magnesium straightedge to strike concrete to predetermined grade.
      a. Tool salient edges of concrete.

b. Make sharp arise at wall to floor conditions.
c. Where water has accumulated, drain and re-screed.

5. Scratch Finish: Provide for slabs receiving subsequent bonded topping slabs.
   a. Place, consolidate, strike off, and level concrete, eliminating high and low spots.
   b. Bull float to achieve finish tolerance requirements.
   c. Roughen surface with stiff brushes or rakes before final set.
   d. Where a bonded concrete composite topping slab diaphragm is required, leave an intentionally roughened surface, conforming to ACI 318 Section 21.9.2.
6. Float Finish: Provide before other finishes to embed aggregates below concrete surface, to make level and flat, and to compact and consolidate slab in preparation for other finishing operations.
7. Float Finish: Provide as final finish at concrete slabs where a float finish is desirable for improved mechanical bonding of subsequent coatings, toppings, underlayments, and floor finishes.
   a. Place, consolidate, strike off, and level concrete, eliminating high and low spots.
   b. Do not work concrete again until it is ready for floating.
   c. Allow concrete time to bleed naturally before beginning work.
   d. When bleed water sheen has disappeared, begin floating with a hand float, a bladed power float equipped with float shoes, or a powered disk float.
   e. Bull float to achieve finish tolerance requirements.
   f. Float to conventional straightedge requirements and then refloat to a uniform texture.
   g. Leave a rough, granular finish, intentionally roughened surface profile, conforming to ACI 318 Section 21.9.2, equivalent to ICRI Guideline No.03732 CSP-3, as required to make suitable surface for mechanical bond and adhesion.
   h. Slope exterior paved surfaces away from building in slopes to drain without ponding.
8. Troweled Finish: Provide at exposed concrete slabs, except where a float finish is desirable for improved mechanical bonding of subsequent coatings, toppings, underlayments, and floor finishes
   a. Float concrete surface then power trowel surface.
   b. Continue troweling until surface is hard enough to ring under trowel.
   c. Towel and compact surface smooth and fee of trowel marks, uniform in texture and appearance.
   d. Finish to specified tolerances. Do not burn or overwork concrete.
   e. Retain moisture in slab surface during finishing. Provide fog spray in dry or windy weather.
   f. Do not blacken or burn concrete surface with power trowel.
9. Heavy Broom Finish:
   a. Provide at exterior paved surfaces and as shown on Drawings.
   b. Float finish slab and promptly after initial set, broom finish surface uniformly and perpendicularly to traffic in accepted texture.
10. Light Shotblast Finish:
    a. Float finish slab.
    b. Perform shotblasting promptly after initial set of concrete and completion of saw cut score lines.
    c. Shotblast evenly and uniformly in texture accepted by mock-up.
12. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in ACI 302.1R; thick floor coverings include quarry tile, ceramic tile, and terrazzo with full bed setting system.

13. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting, resilient flooring, seamless flooring, thin set quarry tile, and thin set ceramic tile.
14. Other Surfaces to Be Left Exposed: "Steel trowel" as described in ACI 302.1R, minimizing burnish marks and other appearance defects.

E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:100 nominal unless noted otherwise in Drawings.

3.12 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.

D. Surfaces Not in Contact with Forms:
1. Slabs and Floors To Receive Adhesive-Applied Flooring: Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
2. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water-fog spray or saturated burlap.
    a. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.
3. Final Curing: Begin after initial curing but before surface is dry.
    a. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.

3.13 REPAIRING UNFORMED SURFACES

A. Surface Defects: Patch and repair defects to specified tolerances and specification, including:
1. Crazing and cracks, in excess of 0.01 inch wide or penetrating to reinforcing steel.
2. Spalls, pop-outs, honeycombs, rock pockets, and other objectionable conditions.

B. Floor Slab Flatness and Levelness: Correct floor flatness and floor levelness, not meeting specified tolerances in conformance to ACI 301, to make suitable substrate for finish floor systems.

C. Correct high areas by wet grinding after concrete has cured at least 14 days. Make test on trial area and obtain acceptance from Architect before proceeding.

D. Correct low areas and swales at floors receiving finished flooring systems by cutting out and replacing with fresh concrete or by using cementitious underlayment as specified in Section 03 45 00.

3.14 REPAIR AND FINISHING FORMED SURFACES

A. Formwork Surfaces: Refer to provision specified by Section 03 11 00.

B. Surface Defects: Patch and repair to specified tolerances and specifications.
   1. Make smooth and free of fins, bulges, ridges, bug holes, offsets, honeycombing, and unacceptable roughness.
   2. Cut out concrete to make patches not less than 1 inch deep.
   3. Chip out concrete to 3/4 inch clearance behind and around exposed reinforcing steel.

C. Gravel Pockets and other Voids: Patch and repair to match adjacent surfaces.
   1. Saturate cavities and adjacent areas with clean water for 24 hours immediately before patching and repair.
   2. Apply commercial bonding agent as instructed by manufacturer
   3. Parge surface with commercial repair cement mortar compound to match adjacent areas. Use as little water in mix as possible.
   4. Fill voids and finish off to match adjacent surfaces in exposed work.
   5. Damp cure patch for 7 days.

D. Finishing Exposed Surfaces: Conform to ACI 301 for Architectural Concrete at exposed concrete.
   1. Knock fins off and patch imperfections for a smooth surface to match adjacent surfaces in appearance.
   2. Rub rough surfaces with carborundum stone as instructed by Architect and Structural Engineer.
   3. Leave surfaces clean and smooth.

E. Sacking:
   1. Patch spalls, and other surface voids and blemishes at exposed to view concrete not conforming ACI 301 for Architectural Concrete while concrete is still green.
   2. Where sacking does not meet acceptable standards, remove concrete and replace with new concrete.

3.17 JOINT FILLING

A. Interior Joints at Exposed Concrete:
   1. Install polyurea or epoxy joint sealant approximately matching color of finish floor slab.
   2. Install backer rod at joint sealant exceeding 1 inch deep.
   3. Overfill and shave sealant flush with floor surface.

B. Exterior Joints:
   1. Install joint sealers and backer rod specified Section 07 92 00 at joints separated by joint filler.
   2. Tool to concave configuration, flush to paving surface.
   3. Do not install sealant at 1/8 inch wide saw cut joints.

3.18 GROUTING

A. Solid Grouting under Structural Base Plates, Mechanical Equipment and Obstructed Voids and Joints.
   1. Mix grout to fluid consistency.
   2. Construct liquid tight formwork and pour grout in place.
   3. To prevent voids, pour grout from only one side so that flow exits from opposite side. Work poured grout firmly in place.
   4. Dry packing not permitted.

B. General Use: Include anchoring, filling cracks, and repairs such as filling rock pockets and pipe penetrations:
   1. Mix non-shrink, aggregate grout to optimal fluid, flowable, or plastic consistency as necessary for solid grouting and repair.
   2. Trowel grout at plastic consistency at voids and around pipe penetrations to fill voids and to match adjacent surfaces.

C. Cold Weather Grouting: When ambient temperatures are below or are predicted to fall below 45 degrees F, use cold weather grout or build a cold weather enclosure over grouting placement area and maintain minimum enclosure temperature at 60 degrees for 72 hours after grout placement and as instructed by manufacturer.

3.19 TOLERANCES

A. General Tolerances: Conform to ACI 117 and ACI 302.1R for tolerances of construction and materials.

B. Vertical, Lateral, and Relative Alignment and Cross Sectional Dimensions: Conform to ACI 117 and as specified for offset between adjacent formwork facing material.

C. Slab Thickness Tolerances:
   1. Cast and finish concrete slabs in constant thickness above steel framing members, conforming to ACI 117.
   2. Compensate thickness of concrete slabs over steel decking between beams, accounting for steel deck deflection, as needed to achieve flat slab within tolerance.

3.20 CONCRETE SURFACE REPAIRS

A. Promptly report surface defects to Architect for direction prior to making repairs.

B. Repair, patch, and remove stains rust, efflorescence, and surface deposits, as directed by Architect.

C. Where repairs and patching are not practical as a solution to achieve intended results, cut out and replace.

3.21 CONCRETE STRUCTURAL REPAIR

A. Prior to Substantial Completion: Repair:

1. Cracks, regardless of widths, penetrating completely through slabs and walls.
2. Cracks that impair structural integrity.
3. Cracks that are subject to water leakage.

B. Inject cracks with epoxy or methyl methacrylate resin.
   1. Use pressure or vacuum injection methods to monolithically bond and seal cracks without expanding cracks.
   2. Submit and follow procedures acceptable to Architect.

3.22 REPAIRING UNFORMED SURFACES

A. Surface Defects: Repair and repair defects to specified tolerances and specification, including:
   1. Crazing and cracks, in exceeding 0.01 inch wide or penetrating to reinforcing steel.
   2. Spalls, pop-outs, honeycombs, rock pockets, and other objectionable conditions.

B. Floor Slab Flatness and Levelness: Correct floor flatness and floor levelness, not meeting specified tolerances in conformance to ACI 301, to make suitable substrate for finish floor systems.

C. Correct high areas by wet grinding after concrete has cured at least 14 days. Make test on trial area and obtain acceptance from Architect before proceeding.

D. Correct low areas and swales at floors receiving finished flooring systems by cutting out and replacing with fresh concrete or by using cementitious underlayment as specified in Section 03 45 00.

3.23 REPAIRING AND FINISHING FORMED SURFACES

A. Formwork Surfaces: Refer to provision specified by Section 03 11 00.

B. Surface Defects:
   1. Patched and repair to specified tolerances and specifications, including defective surfaces affecting appearance.
   2. Make smooth and free of fins, bulges, ridges, bug holes, offsets, honeycombing, gravel pockets, voids, and unacceptable roughness.

C. Repair Procedures for honeycombs, Rock Pockets, Voids, and Similar Surface Defects:
   1. Outline defective area with 1/2 to 3/4 inch deep.
   2. Cut out defective concrete to make patches not less than 1 inch deep.
   3. Chip out concrete to 3/4 inch clearance behind and around exposed reinforcing steel.
   4. Slightly undercut chipped out areas. Do not feather edges.
   5. Saturate cavities and 6 inch wide adjacent areas with clean water for 24 hours immediately before patching and repair.
   6. Apply commercial bonding agent as instructed by manufacturer
   7. Parge surface with commercial repair cement mortar compound to match adjacent areas. Use as little water in mix as possible.
   8. Fill voids leaving patch slightly higher than surrounding surface to permit initial shrinkage.
   9. Leave patch undisturbed before finishing to match adjacent surfaces.
   10. Damp cure patch for 7 days.

D. Tie Holes: Plug tie holes at exposed concrete, except where stainless steel ties, non-corroding ties, or acceptably coated ties are used.
   1. Clean and dampen surfaces prior to patching with Portland cement patching mortar.
   2. Follow manufacturer's instructions for plugs and other proprietary methods.

E. Exposed Surfaces: Conform to ACI 301 for Architectural Concrete at exposed concrete.
   1. Knock fins off and patch imperfections for a smooth surface to match adjacent surfaces in appearance.
   2. Rub rough surfaces with carborundum stone as directed by Architect .
   3. Leave surfaces clean and smooth.

F. Sacking:
   1. Patch spalls, and other surface voids and blemishes at exposed to view concrete not conforming ACI 301 for Architectural Concrete while concrete is still green.
   2. Where sacking does not meet acceptable standards, paint wall under provisions of Section 09 90 00, as directed by Architect at no additional cost to Contract Sum and Contract Time.

G. Commercial Repair Products: As specified by this Section or accepted by Architect.

H. Site Mixed Repair Mortar and Grout:
   1. Bonding Grout: Mix approximately 1 part Portland cement and 1 part fine sand with water to consistency of thick cream.
   2. Repair Mortar: Mix repair mortar using same materials as concrete to be patched, except do not use coarse aggregate. Do not use more than 1 part cement to 2-1/2 parts sand by damp loose volume.
      a. For repairs to exposed concrete, make trial batch and check for color compatibility of repair material to surrounding concrete. Blend white portland cement with standard portland cement to achieve matching color of surrounding when dry.
      b. Use stiff consistency with no more mixing water than necessary for handling and placing.

I. Mix repair mortar and trowel mortar frequently without adding water

3.24 STRUCTURAL CONCRETE REPAIR

A. Prior to Substantial Completion, repair:
   1. Cracks exceeding 0.005 inch width extending full depth through slabs and walls.
   2. Cracks that impair structural integrity.
   3. Cracks that are subject to water leakage.

B. Inject cracks with epoxy or methyl methacrylate resin.
   1. Use pressure or vacuum injection methods to monolithically bond and seal cracks without expanding cracks.
   2. Submit and follow procedures acceptable to Architect.

3.25 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

D. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

E. Compressive Strength Tests: ASTM C39/C39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd or less of each class of concrete placed.

F. Take one additional test cylinder during cold weather concreting (below 40 degrees Fahrenheit per ACI 306) , cured on job site under same conditions as concrete it represents.

G. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

H. Floor Flatness (FF) and Floor Levelness (FL):
   1. Test for FF and FL tolerances, as specified by this Section by certified independent inspection agency.
   2. Notify Architect and Owner of test results within 8 hours after conducting tests.

I. Moisture Content and pH Level for Concrete Slabs Receiving Carpet Tile or Resilient Flooring Systems: Test concrete substrate moisture content and pH level prior to installing flooring system that conditions comply with flooring manufacturer’s Warranty provisions.
   1. Testing Conditions:
      a. Perform testing as soon as building envelope is enclosed and weathertight.
         1) Continue to monitor slab moisture content and PH level to ensure slab will comply with flooring manufacturer's requirements.
         2) Provide report to Owner and Architect.
      b. Perform additional testing when interior ambient temperature and relative humidity are equivalent to that expected during occupancy by Owner.
   2. Moisture Emissions of Concrete Floor Slabs: Test to ASTM F1869.
      a. Maximum 3 pounds in 24 hours per 1000 square foot area.
      b. Maximum 5 pounds in 24 hours per 1000 square foot area, under conditions acceptable to manufacturer.
   3. Percent Relative Humidity within Concrete Floor Slabs: Test to ASTM F2170.
      a. Maximum 75 percent relative humidity at center of slab.
      b. Other percent relative humidity as accepted by flooring manufacturer.
   4. Alkalinity of Concrete Substrate: Test to ASTM F710. Verify maximum pH factor of 9.0 at substrate surface to receive adhesives for resilient floor finishes and as acceptable to flooring manufacturer.

5. Notify Owner and Architect in the event of moisture emissions exceeding 3.0 pounds per 1,000 square foot in 24 hours, percent relative humidity exceeding 75 percent, and alkalinity levels below 7.0 pH or above 9.0 pH.
6. Coordinate with manufacturers of finish flooring products for maximum acceptable moisture emissions from concrete slabs.

3.26 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.

B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.27 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

B. Protect in-place concrete in conformance to ACI 301, Section 1.8.

C. Cover to protect interior exposed concrete slabs subject to foot traffic or other damage with clean, unwrinkled kraft curing paper.

D. Lay down plywood or OSB cover board over concrete slabs over non-staining cover in pathways subject to heavy foot traffic or rolling loads over uncured concrete.

E. Stack and stockpile materials and equipment in manner to prevent mechanical and chemical damage to concrete surfaces. Maintain stacking and stockpiling loading within structural tolerances.

F. Contain and promptly clean spills to maintain concrete suitable for bonding of finish flooring and final finishing of exposed concrete slabs.

END OF SECTION 03 30 00

SECTION 03 35 43

POLISHED CONCRETE FINISHING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Products and procedures for the installation of the Polished Concrete System using multi-step dry mechanical grinding process and accessories indicated, specified or required to complete system and achieve specified finish.
      a. Mechanical dry grinding and polishing with various size grit metal-bonded and resin-bonded diamonds.
      b. Concrete repairs and topping materials.
      c. Concrete treatments:
         1) Application of hardener/densifier.
         2) Concrete protective finish.
   2. Products for concrete repair and topping materials, crack and joint treatments and chemicals.
   3. Products and procedures for the initial and long term maintenance of the Polished Concrete System.

B. Related Sections:
   1. Section 03 30 00 - Cast-In-Place Concrete
   2. Section 07 92 00 - Joint Sealants

1.2 REFERENCES

A. Reference Standards: Current edition at date of Bid.

B. American National Standards Institute (ANSI):
   1. ANSI A1264-2 - Standard for the Provision of Slip Resistance on Walking/Working Surfaces.

C. American Society for Testing and Materials (ASTM) International:
   1. ASTM C171 - Sheet Materials for Curing Concrete.
   2. ASTM C779 -Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
   3. ASTM C805 - Standard Test Method for Rebound Number of Hardened Concrete.
   4. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
   5. ASTM C1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method
   6. ASTM D523 - Standard Test Method for Specular Gloss.
   7. ASTM D4039 - Standard Test Method for Reflection Haze of High-Gloss Surfaces.
   8. ASTM D5767 - Standard Test Method for Instrumental Measurement of Distinctness-of-Image Gloss of Coating Surfaces.

9. ASTM E430 - Standard Test Method for Measurement of High-Gloss Surfaces by Abridge Goniophotometry.

D. National Floor Safety Institute (NFSI) Test Method B 101.1 Standard for Evaluating High-Traction Flooring Materials, Coatings, and Finishes.

E. ANSI Standards B-101.1 - 2009 Manufacturer required to have a letter certifying compliance.

F. Environmental Protection Agency (EPA)
1. Code of Federal Regulations (CFR) Title 40, Part 59 PART 59--National Volatile Organic Compound Emission Standards For Consumer And Commercial Products

1.3 DEFINITIONS

A. Terminology, Aggregate Exposure and Finish Gloss as defined by Concrete Polished Association of America (CPAA).

B. Aggregate Exposure: Grinding a concrete floor surface with bonded abrasives to achieve specified class of exposure aggregate.

CLASS	NAME	MINIMUM SURFACE CUT DEPTH	APPEARANCE
A	Cream	Very Little	Little Aggregate Exposure
B	Fine Aggregate (Salt and Pepper)	1/16 inch	Fine aggregate exposure with little or no medium aggregate exposure at random locations
C	Medium Aggregate	1/8 inch	Medium aggregate exposure with little or no large aggregate exposure at random locations
D	Large Aggregate	1/4 inch	Large aggregate exposure with little or no fine aggregate exposure at random locations

C. Finished Gloss: Processing a concrete floor surface to achieve a specified level of finished gloss prior to application of any protective treatment.

LEVEL	NAME	REFLECTIVE CLARITY	ASTM D5767	REFLECTIVE SHEEN	ASTM D523	GRIT RANGE	MINIMUM NUMBER OF ABRASIVE PASSES
1	Flat	Flat appearance with no to very slight diffused reflection	> 20	None to very low	>15	Below 100	4

2	Satin	Matte appearance with or without slight diffused reflection	>55	Low to Medium	>25	100 to 400	5
3	Semi Polished	Objects being reflected are not quite sharp and crisp but can be easily identified	>65	Medium to High	>35	800 and higher	6
4	Highly Polished	Objects reflected are sharp and crisp as would be seen in mirror-like reflection	>85	High to highest	>50	1500 or higher	7

1. Reflective Clarity - The DOI (distinction of image) value of the degree of sharpness and crispness of the reflection of overhead objects when measured by a device in accordance to ASTM D5767. Value indicated is prior to application of sealer.
2. Reflective Sheen - The specular gloss value of the degree of gloss reflected from a surface, at specified angles of illumination, when measured by a device in accordance to ASTM D523. Value indicated is prior to application of sealer.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Product Data: Published literature describing each component of system, including but not limited to stains/dyes, sealers/topcoats and sealants.

C. Manufacturer's Instructions: Application instruction, special procedures, and conditions requiring special attention,

1.5 CLOSEOUT SUBMITTALS

A. Conform to provisions of Section 01 77 00.

B. Test reports specified in Field Quality Control in Part 3 of this Section.

C. Maintenance Instructions: Include instructions for maintaining flooring.

1. Manufacturer’s instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under intended use.
2. Instructions for precautions against cleaning products and methods, which may be detrimental to finishes and performance.

1.6 QUALTY ASSURANCE

A. Single source responsibility: Obtain products (dyes/stains, sealers, joint sealants) from a single manufacturer.

B. Manufacturer Qualifications:
   1. Manufacturer of polished concrete system that includes products engineered and manufactured specifically for polished concrete system.
   2. Manufacturer capable of providing field service representation during construction and approving application method.
      b. Perform initial inspection and subsequent inspections during and at completion of work to verify conformance with manufacturer’s instructions.
      c. Make recommendations for remedial action where non-conforming work is discovered.

C. Polished Concrete Applicator:
   1. Experienced installer specializing in application of ground and polished concrete flooring systems of type, scope, and quality required for this project.
   2. Adequate number of skilled workers who are thoroughly trained and experienced in the necessary crafts.
   3. Able to document minimum of 5 successful commercial quality concrete floor finishing projects similar to work specified for this project.
   4. Factory trained or approved by system manufacturer for concrete preparation, toppings, grinding and polishing work, with factory-trained with competent supervisor on site at all times when specified work is performed.
   5. Supervisor Qualifications: Current certification from Concrete Polishing Association of America (CPAA) stating that the technicians are certified as Craftsmen Level II or higher.

1.7 PERFORMANCE REQUIREMENTS

A. Dynamic Coefficient of Friction: Provide flooring materials with the following values as determined by testing according to ANSI 137.1 DCOF Standard:
   1. On wet interior surface to be walked on when wet:
      a. On level surface: DCOF > 0.42.
      b. On incline surface: DCOF > 0.45.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Conform to provisions of Section 01 66 00 and manufacturer's instructions.

B. Deliver products packaged in manufacturer’s packaged and sealed containers with manufacturer’s identifying labels intact.

C. Do not use liquid based staining products which have been subjected to freezing.

1.9 PROJECT CONDITIONS

A. Ambient Temperature: Conform to manufacturer's instructions.

B. Concrete Slab:
   1. Water-cure, using curing film as specified Section 03 30 00, for minimum 7 days.
   2. Do not apply curing compounds to concrete floors indicated to receive polished concrete finish.
   3. Cure slab minimum 28 days, or as instructed by manufacturer, before beginning work of this Section.
   4. Finish concrete floor slabs to Flatness of minimum FF 40, as specified Section 03 30 00. Assume that grinding will be required as part of work of this Section.

C. Close areas to traffic during and after polished concrete application for a period of time recommended by the manufacturer.

1.10 COORDINATION

A. Conform to Section 01 31 13 and for coordination with work of other Sections.

B. Phase in and schedule work of this Section with concrete work of Section 03 30 00. Coordinate troweling of concrete finish and curing of concrete slab with work of Section 03 30 00 for best results.
   1. Do not permit use of curing compounds on slabs receiving work of this Section.
   2. Do not permit use of fiber reinforcing in slabs receiving work of this Section.

1.11 WARRANTY

A. Conform to Warranty provisions specified Section 01 78 36.

B. Manufacturer: Standard 20 year Warranty that treated floor slab will remain water-repellant, dust proof, hardened, and abrasion-resistant.

PART 2 PRODUCTS

2.1 MATERIALS

A. Hardener/Densifier: Permanent sealing densifying and hardening compound for concrete. Waterborne sodium silicate or lithium silicate, inorganic, containing no resins or solvents, meeting specified VOC limits.
   1. Abrasion Resistance: Up to 400 percent increase, tested to ASTM C779.
   2. Impact Strength: Up to 21 percent increase, tested to ASTM C805.
   3. Ultra Violet Light and Water Spray: No affect.

B. Colored Chemical Stain/Dye: Product approved by manufacturer of hardener/densifier and meeting specified VOC limits.

C. Crack and Joint Treatment repair prior to polishing: Products approved by manufacturer of hardener/densifier and meeting specified VOC limits.
   1. Greater than 1/8 inch width crack: Epoxy or polyurea resin for permanently filling of cracks and minor spalls.
   2. Less than 1/8 inch width crack: Low Viscosity Rigid Polyurethane Crack and Joint Repair
   3. Concrete control joints: Semi-rigid joint sealant.

D. Cleaner: Specialized cleaner manufactured by or recommended by manufacturer of hardener/densifier.

E. Sealer - Impregnating Stain Protection: Non film forming stain and food resistant penetrating sealer designed to be applied to densified and polished concrete which meets the requirements of OSHA for slip resistance as tested by ASTM D 2047, stain resistance of ASTM D 1308.ensifier AND specified VOC limits.

2.2 ACCESSORIES

A. Water: Clear and potable.

B. Temporary Floor Protection: Heavy-duty vapor permeable curing paper.
   1. Product: Ram Board, www.ramboard.com
      a. Size: 38 inches by 100 feet roll.
      b. Thickness: 46 mils.
      c. Taping Seam: Ram Tape, 3 inch wide.

C. Joint Sealant: Acceptable to the polished floor manufacturer’s system and comply with Section 07 92 00.

2.3 FINISHES

A. Polished Concrete Floor:
   1. Aggregate Exposure: Class B.
   2. Finished Gloss: Level 2.

PART3 EXECUTION

3.1 EXAMINATION

A. Verify conditions as satisfactory to receive work of this Section.

B. Verify that concrete surface is clean, smooth, and flat conforming to specified floor tolerances specified by Section 03 30 00 and Section 03 54 16.

C. Verify surface free of chemicals, acids, curing compounds and other substances that may inhibit quality of chemical staining.

D. Verify that the concrete has cure for a minimum of 28 days. Do not start grinding procedures before this time unless approved in writing by the Architect.

E. Conform to manufacturer's instructions and provisions of Contract Documents. Bring conflicts and omissions in Contract Documents promptly to Architect’s attention for interpretation and direction.

F. Vapor Testing Concrete Floors:
   1. Alkalinity:
      a. Test Method: Measure pH according to method indicated in ASTM F 710.
      b. Acceptable Results: pH between 8 and 10.
   2. Moisture Vapor Transmission Rate:
      a. Test Method: Perform anhydrous calcium chloride test according to ASTM F 1869.
      b. Acceptable Results: Not more than 5 pounds per 1000 square feet in 24 hours.
   3. Relative Humidity:
      a. Test Method: Perform relative humidity test using in situ probes according to ASTM F 2170.
      b. Acceptable Results: Not more than 75 percent.

3.2 PREPARATION

A. Cover to protect surfaces not to receive treatment. Take measures to prevent overspray from staining surfaces not designated for chemical staining. Thoroughly mask and cover all painted surfaces, fixtures, casework, doors, drains, etc.

B. Thoroughly clean concrete surfaces to remove dirt, form oil, plaster, stains, oil, grease, adhesives, water repellants, compounds, and other substances that may deter penetration.

3.3 COLORING CONCRETE FLOORS

A. Dye or Pigmented Micro Stain Application:
   1. Apply solution by methods and techniques required by manufacturer to produce finish matching approved field mock-ups.
   2. Maintain wet edge, working newly applied solution into edges of adjacent wet edges of previously treated surfaces.
   3. Maintain consistent saturation throughout application.
   4. Avoid splashing, dripping, or puddling of solution on adjacent substrates.
   5. When color matches approved mock-ups, neutralize as required by manufacturer.

3.4 POLISHING CONCRETE FLOORS

A. General:
   1. Conform to manufacturer's instructions and provisions of Contract Documents to achieve appearance as accepted by mock-ups.
   2. Dry grinding and polishing process required. Wet process not acceptable.
   3. Electric machines required. Propane fueled machines not acceptable.

B. Initial Grinding:
   1. Grind to provide a flat, even surface to accept hardener/densifier, to within 1 inch of wall obstructions.
      a. Floor Levelness to FL 30.
      b. Floor Flatness to FF 40.

2. Cross grind at 90 degree angles to achieve uniform scratch patterns at each grinding grit level.
3. Grind to exposed cream aggregate (sand) at minimum and to specified aggregate exposure class. Grind to exposed coarse aggregate where required to achieve required flatness and even finish sheen. Variation will be accepted in size of aggregate exposed if necessary to achieve flatness and even finish sheen.
4. Grind using subsequent finer grits until floor is scratch pattern free, ending with finer metal grit at specified aggregate exposure class, or as determined by mock-up testing to be required for uniform hardener/sealer penetration.

C. Treating Surface Imperfections:
1. Mix patching compound or grout material with dust created by grinding operations, manufacturer's tint, or sand to match color of adjacent concrete surfaces.
2. Fill surface imperfections including, but not limited to, holes, surface damage, small and micro cracks, air holes, pop-outs, and voids with grout to eliminate micro pitting in finished work.
3. Work compound and treatment until color differences between concrete surface and filled surface imperfections are not reasonably noticeable when viewed from 10 feet away under lighting conditions that will be present after construction.

D. Grout Grinding:
1. Use grinding equipment and appropriate grit.
2. Apply grout, forced into the pore structure of the concrete substrate, to fill surface imperfections.

E. Liquid Densifier Application: Apply undiluted to point of rejection, remove excess liquid, and allow curing according to manufacturer's instructions.

F. Edges: Work edges of floor with special edge tool.
1. The edge work process to match the corresponding steps for the desired gloss level, and each edge polishing step to be done immediately after the matching main floor polishing step.

G. Honing:
1. Hone concrete in one direction starting with appropriate grit and make as many sequential passes as required to remove scratches, each pass perpendicular to previous pass, reaching maximum refinement with each pass before proceeding to finer grit tooling.

H. Polishing:
1. Make sequential passes with each pass perpendicular to previous pass using finer grit tooling with each pass until the specified level of gloss has been achieved.
2. Achieve maximum refinement with each pass before proceeding to finer grit pads.
3. Stain Protection: Uniformly apply and remove excessive liquid according to manufacturer's instructions.
4. Final Polish: Using burnishing equipment and finest grit abrasive pads, burnish to uniform reflective sheen as specified.

I. Final Polished Concrete Floor Finish:
1. Aggregate Exposure Class: Class C.
2. Finish Gloss Level: Level 2 Satin. Final sheen is before addition of any sealer or coating, regardless of whether that is specified or not.

3.5 FLOOR SEALER

A. Apply floor sealer according to manufacturer's written instructions.

3.6 FIELD QUALITY CONTROL

A. Perform initial inspection and subsequent inspections during and at completion of work to verify conformance with manufacturer’s instructions.

B. Test Reports: Provide field quality control sheen gloss reading and static coefficient of friction test results conducted as specified and recorded on floor plan diagram confirming compliance with specified performance criteria.
   1. Report test results in writing to Architect within 24 hours after tests.

C. Make recommendations for remedial action where non-conforming work is discovered.

3.7 ADJUSTING

A. Repair, replace, or make restitution for staining and overspray damage to surfaces damaged by work of this Section, as instructed by Architect.

B. Touch-up stained concrete prior to Substantial Completion of Project. Repair scratches, and other surface damage to show no evidence of repair.

3.8 CLEANING

A. Leave area clean, free from spillage, overspray, tracking, and other residue resulting from work of this Section.

3.9 PROTECTION

A. Prevent from any spills or stains from coming in contact with the floor. Clean any spills that may occur as quickly as possible.

B. Avoid moisture on slab for 72 hours after completion of installation.

C. Do not lay non-breathing films, membranes, or covers over finished floor.

D. Protect the finished Polished Concrete System from continuing construction and build out as needed by installing the Protective Floor Covering.
   1. Protective Covering must be approved by the Installer and General Contractor of the Polished Concrete installation.

E. Light pedestrian use only in the 24 hours after installation. Normal traffic recommended 14 days after completion of Polished Concrete System.

3.10 CONCRETE FINISH FLOOR SCHEDULE

A. Concrete Floor Finish:
   1. CONC-1: Grind, densifier, seal and polish.

3.11 MAINTENANCE AND TRAINING

A. Polished concrete installer to train Owner's designated personnel in proper procedures for maintaining polished concrete floor.

END OF SECTION 03 35 43

SECTION 03 45 00

PRECAST ARCHITECTURAL CONCRETE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Precast sills

B. Related Requirements:
   1. Section 07 19 10 - Water Repellents.
   2. Section 07 92 00 - Joint Sealers.
   3. Section 09 90 00 - Painting and Coating.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. ACI 301 - Specifications for Structural Concrete; American Concrete Institute International; 2010 (Errata 2012).

C. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2011.

D. American Society for Testing and Materials (ASTM) International:
   1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
   2. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
   3. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
   4. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2009.
   5. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.
   6. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.
   7. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

E. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2011 w/Errata.

F. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; American Welding Society; 2011.

G. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products; Precast/Prestressed Concrete Institute; 2007.

H. PCI MNL-120 - PCI Design Handbook - Precast and Prestressed Concrete; Precast/Prestressed Concrete Institute; Seventh Edition, 2010.

I. PCI MNL-122 - Architectural Precast Concrete; Precast/Prestressed Concrete Institute; 2007, Third Edition.

J. PCI MNL-123 - Design and Typical Details of Connections for Precast and Prestressed Concrete; Precast/Prestressed Concrete Institute; 1988, Second Edition.

K. PCI MNL-135 - Tolerance Manual for Precast and Prestressed Concrete Construction; Precast/Prestressed Concrete Institute; 2000.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.4 SUBMITTALS

A. Product Data: Manufacturer's information on accessory products, including pigments, admixtures, inserts, plates, etc.

B. Shop Drawings: Indicate layout, unit locations, configuration, unit identification marks, reinforcement, integral insulation, insulated panel system connectors, connection details, support items, location of lifting devices, dimensions, openings, and relationship to adjacent materials.
   1. Include details of mix designs.
   2. Include structural design calculations.

C. Fabricator's Qualification Statement: Provide documentation showing precast concrete fabricator is accredited under IAS AC157.

D. Fabricator Qualification Statement: Provide documentation showing precast concrete fabricator is accredited under IAS AC157.

1.5 QUALITY ASSURANCE

A. Design Engineer Qualifications: Design precast concrete units under direct supervision of a Professional Structural Engineer experienced in design of precast concrete and licensed in the State in which the Project is located.

B. All precast Architectural concrete elements include anchorage to surrounding construction.

C. Fabricator Qualifications:
   1. Firm having at least 2 years of documented experience in production of precast concrete of the type required.
   2. Plant certified under Precast/Prestressed Concrete Institute Plant Certification Program; product group and category A1 - Architectural Precast Concrete.
   3. Plant certified under Architectural Precast Association Plant Certification Program for production of architectural precast concrete.

D. Regulatory Requirements:
   1. Conform to the requirements of the jurisdictional code authorities
   2. Furnish all calculations, engineer's stamps, drawings, test reports, and other items required by the code authorities to obtain approval of the installation.

E. Welder Qualifications: Qualified within previous 12 months in accordance with AWS D1.1/D1.1M and AWS D1.4/D1.4M.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Handling: Lift and support precast units only from support points.

B. Protect units to prevent staining, chipping, or spalling of concrete.

1.7 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 PRECAST UNITS

A. Precast Architectural Concrete Units: Comply with PCI MNL-120, PCI MNL-122, PCI MNL-123, PCI MNL-135, and ACI 318.
   1. Concrete Face Mix: Minimum 5000 psi, 28 day strength, air entrained to 5 to 7 percent; comply with ACI 301.
   2. Design Loads: Static loads, anticipated dynamic loading, including positive and negative wind loads, thermal movement loads, and erection forces as defined by applicable code.
   3. Calculate structural properties of units in accordance with ACI 318.
   4. Accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
   5. Provide connections that accommodate building movement and thermal movement and adjust to misalignment of structure without unit distortion or damage.

B. Finishes:
   1. To match the Architect's approved samples.
      a. PCP-1: Natural gray to slightly darkened gray color as selected by the Architect to match existing; light sandblast texture to match existing. Sandblast finish shall remove “fat face” only and not expose large aggregate.

2.2 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi).
   1. Galvanized in accordance with ASTM A767/A767M, Class I.
   2. Maintain 1-1/2 inch clearance from exposed edges and surfaces.
   3. Where 1-1/2 inch of cover cannot be provided due to precast unit design, verify with Architect before beginning work.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.

B. Fine and Coarse Structural Aggregates: ASTM C33.

C. Water: Clean and not detrimental to concrete.

D. Air Entrainment Admixture: ASTM C260/C260M.

2.4 SUPPORT DEVICES

A. Connecting and Support Devices; Anchors and Inserts: ASTM A36/A36M steel; hot-dip galvanized in accordance with ASTM A153/A153M.
   1. Clean surfaces of rust, scale, grease, and foreign matter.
   2. Prime paint in one coat, except surfaces in direct contact with concrete or requiring field welding.

2.5 ACCESSORIES

A. Sealant: Sanded silicone sealant and precompressed foam backer as specified in Section 07 92 00.
   1. Match precast color.

2.6 FABRICATION

A. Architectural Precast Concrete: Concrete mix design employing admixtures and technique to achieve architectural concrete finishes free of voids and inconsistencies in finished units.

B. Cast Shapes: Dimensionally true and square with clean, unbroken edges as indicated on Drawings.

C. Fabricate in conformance with PCI MNL-117 and PCI MNL-135.

D. Maintain plant records and quality control program during production of precast units. Make records available upon request.

E. Maintain consistent quality during manufacture, free of voids or honeycomb, with straight true edges and surfaces.

F. Fabricate connecting devices, plates, angles, items fit to steel framing members, inserts, bolts, and accessories. Fabricate to permit initial placement and final attachment.

G. Embed reinforcing steel, anchors, inserts plates, angles, and other cast-in items.

H. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.

2.7 FABRICATION TOLERANCES

A. Conform to PCI MNL-117 and PCI MNL-135.

2.8 SOURCE QUALITY CONTROL

A. Provide testing of concrete mix.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that building structure, anchors, devices, and openings are ready to receive work of this section.

3.2 PREPARATION

A. Provide for erection procedures and induced loads during erection. Maintain temporary bracing in place until final support is provided.

3.3 ERECTION

A. Erect units without damage to shape or finish. Replace or repair damaged panels.

B. Erect units level and plumb within allowable tolerances.

C. Align and maintain uniform horizontal and vertical joints as erection progresses.

D. When units require adjustment beyond design or tolerance criteria, discontinue affected work; advise Architect.

E. Weld units in place. Perform welding in accordance with AWS D1.1/D1.1M.

F. Provide non-combustible shields during welding operations.

G. Touch-up field welds and scratched or damaged primed painted surfaces.

H. Exposed Joint Dimension: 1/2 inch. Adjust units so that joint dimensions are within tolerances.

3.4 TOLERANCES

A. Erect members level and plumb within allowable tolerances. Conform to PCI MNL-135, except as specifically amended below.
   1. Plan Location from Building Grid Datum: Plus or minus 3/8 inch.
   2. Top Elevation from Nominal Top Elevation: Plus or minus 3/8 inch.
   3. Maximum Plumb Variation Over Height of Structure or 100 ft (whichever is less): Plus or minus 1/2 inch.
   4. Exposed Joint Dimension: Plus or minus 3/16 inch.

5. Maximum Jog in Alignment of Matching Faces or Edges: Plus or minus 3/16 inch.
6. Differential Bowing or Camber as Erected Between Similar Adjacent Members: Plus or minus 3/16 inch.

3.5 CLEANING

A. Clean precast concrete surfaces using methods as instructed by manufacturer.
   1. Remove stains and soiling.
   2. Rinse thoroughly with clean water immediately after cleaning.

3.6 PROTECTION

A. Protect newly laid pre-cast concrete units from exposure to precipitation, rapid drying, freezing, soiling, vandalism, and other harmful conditions.

B. Waterproof Covering: Install before stopping work for each day, regardless of weather conditions.

C. Work During Inclement Weather: Construct waterproof covering as necessary to protect pre-cast concrete units and masonry construction from moisture intrusion.

D. Cold weather protection: Cover and maintain newly laid work at temperatures not less than 40 degrees F for 72 hours minimum.

END OF SECTION 03 45 00

SECTION 03 54 00

CAST UNDERLAYMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Liquid-applied self-leveling floor underlayment.

B. Related Requirements:
   1. Section 01 70 00 - Execution and Closeout Requirements: Alteration project procedures; selective demolition for remodeling.

1.2 REFERENCE STANDARDS

A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2013.

B. ASTM C348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars; 2014.

C. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete; 1999 (Reapproved 2014).

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

1.3 SUBMITTALS

A. Product Data: Provide manufacturer's data sheets documenting physical characteristics and product limitations of underlayment materials. Include information on surface preparation, environmental limitations, and installation instructions.

B. Certificate: Certify that products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the work of this section, and approved by manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Keep dry and protect from direct sun exposure, freezing, and ambient temperature greater than 105 degrees F.

1.6 FIELD CONDITIONS

A. Do not install underlayment until floor penetrations and peripheral work are complete.

B. Maintain minimum ambient temperatures of 50 degrees F 24 hours before, during and 72 hours after installation of underlayment.

C. During the curing process, ventilate spaces to remove excess moisture.

1.7 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MATERIALS

A. Cast Underlayments, General:
   1. Conform to applicable code for combustibility or flame spread requirements.
   2. Provide certificate of compliance from authority having jurisdiction indicating approval of underlayment materials in the required fire rated assembly.

B. Gypsum-Based Underlayment: Gypsum based mix, that when mixed with water in accordance with manufacturer's directions will produce self-leveling underlayment with the following properties:
   1. Compressive Strength: Minimum 2500 psi, tested per ASTM C472.
   2. Density: Maximum 115 lb/cu ft.
   3. Final Set Time: 1 to 2 hours, maximum.
   4. Thickness: 3/4 inch to maximum 3-1/2 inch.
   5. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.

C. Cementitious Underlayment: Blended cement mix, that when mixed with water in accordance with manufacturer's directions will produce self-leveling underlayment with the following properties:
   1. Compressive Strength: Minimum 4000 psi after 28 days, tested per ASTM C109/C109M.
   2. Flexural Strength: Minimum 1000 psi after 28 days, tested per ASTM C348.
   3. Density: 125 lb/cu ft, nominal.
   4. Final Set Time: 1-1/2 to 2 hours, maximum.
   5. Thickness: Capable of thicknesses from feather edge to maximum 3-1/2 inch.
   6. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.

D. Aggregate: Dry, well graded, washed silica aggregate, approximately 1/8 inch in size and acceptable to underlayment manufacturer.

E. Reinforcement: Galvanized metal lath complying with recommendations of underlayment manufacturer for specific project circumstances.

F. Water: Potable and not detrimental to underlayment mix materials.

G. Primer: Manufacturer's recommended type.

H. Joint and Crack Filler: Latex based filler, as recommended by manufacturer.

2.2 MIXING

A. Site mix materials in accordance with manufacturer's instructions.

B. Add aggregate for areas where thickness will exceed 1/2 inch. Mix underlayment and water for at least two minutes before adding aggregate, and continue mixing to assure that aggregate has been thoroughly coated.

C. Mix to self-leveling consistency without over-watering.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are clean, dry, unfrozen, do not contain petroleum byproducts, or other compounds detrimental to underlayment material bond to substrate.

3.2 PREPARATION

A. Concrete: Mechanically prepare steel troweled concrete to create a textured surface necessary to achieve the best bond; acceptable methods include bead blasting and scarifying. Do not use acid etching.

B. Remove substrate surface irregularities. Fill voids and deck joints with filler. Finish smooth.

C. Vacuum clean surfaces.

D. Prime substrate in accordance with manufacturer's instructions. Allow to dry.

E. Close floor openings.

3.3 APPLICATION

A. Install underlayment in accordance with manufacturer's instructions.

B. Pump or pour material onto substrate. Do not retemper or add water.
   1. Pump, move, and screed while the material is still highly flowable.
   2. Be careful not to create cold joints.
   3. Wear spiked shoes while working in the wet material to avoid leaving marks.

C. Place to indicated thickness, with top surface level to 1/8 inch in 10 ft.

D. For final thickness over 1-1/2 inches, place underlayment in layers. Allow initial layer to harden to the point where the material has lost its evaporative moisture. Immediately prime and begin application of the subsequent layer within 24 hours.

E. Place before partition installation.

F. Where additional aggregate has been used in the mix, add a top layer of neat mix (without aggregate), if needed to level and smooth the surface.

G. If a fine, feathered edge is desired, steel trowel the edge after initial set, but before it is completely hard.

3.4 CURING

A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.

B. Air cure in accordance with manufacturer's instructions.

3.5 FIELD QUALITY CONTROL

A. An independent testing agency will perform field inspection and testing, as specified in Section 01 40 00.

B. Placed Material: Agency will inspect and test for conformance to specification requirements.

3.6 PROTECTION

A. Protect against direct sunlight, heat, and wind; prevent rapid drying to avoid shrinkage and cracking.

B. Do not permit traffic over unprotected floor underlayment surfaces.

END OF SECTION 03 54 00

SECTION 04 05 11

MASONRY MORTARING AND GROUTING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Mortar for masonry.
   2. Grout for masonry.

B. Related Requirements:
   1. Section 04 20 00 - Unit Masonry: Installation of mortar and grout.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; American Concrete Institute International; 2011.

C. American Society for Testing and Materials (ASTM) International:
   1. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.
   2. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2014.
   3. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.
   4. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
   5. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2012.
   6. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar; 2011b.
   7. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.
   8. ASTM C476 - Standard Specification for Grout for Masonry; 2010.
   9. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2012.
   10. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.
   11. ASTM C1019 - Standard Test Method for Sampling and Testing Grout; 2013.
   12. ASTM C1072 - Standard Test Method for Measurement of Masonry Flexural Bond Strength; 2013.
   13. ASTM C1142 - Standard Specification for Extended Life Mortar for Unit Masonry; 1995 (Reapproved 2013).
   14. ASTM C1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar; 1992a (Reapproved 2008).
   15. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2012.
   16. ASTM C1357 - Standard Test Methods for Evaluating Masonry Bond Strength; 2009.
   17. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry; 2014.

18. ASTM E518/E518M - Standard Test Methods for Flexural Bond Strength of Masonry; 2010.

1.3 SUBMITTALS

A. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.

B. Samples: Submit two samples of mortar, illustrating mortar color and color range.

C. Reports: Submit reports on mortar indicating conformance of mortar to property requirements of ASTM C270 and test and evaluation reports per ASTM C780.

D. Reports: Submit reports on grout indicating conformance of component grout materials to requirements of ASTM C476 and test and evaluation reports to requirements of ASTM C1019.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.6 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

1.7 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.\

PART 2 PRODUCTS

2.1 MORTAR AND GROUT APPLICATIONS

A. Use only factory premixed packaged dry materials for mortar and grout, with addition of water only at project site.
   1. Exception: If a specified mix design is not available in a premixed dry package, provide equivalent mix design using standard non-premixed materials.

B. Mortar Mix Designs: Conform to IBC Section 2103 and ASTM C270 Proprietary Specification.

C. Grout Mix Designs:
   1. Grout Proportions: IBC/ASTM C476 and as required to meet specified compressive strength, as accepted by Architect.
      a. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
         1) Compressive Strength: ASTM C1019, Minimum 2,500 psi in 28 days.
         2) Fluid Consistency: Maintain minimum 8 inch slump and as necessary to completely fill masonry voids.
         3) Grout for Self-Consolidating Grout (SSG): Minimum 26 inch/maximum 30 inch.
         4) Shear Bond Strength: 498 psi.
         5) Reinforcement Pullout Strength: 67,600 psi.
      b. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
         1) Compressive Strength: ASTM C1019, Minimum 2,500 psi in 28 days.
         2) Fluid Consistency: Maintain minimum 8 inch slump and as necessary to completely fill masonry voids.

2.2 REGULATORY REQUIREMENTS

A. Conform to regulatory provisions of Section 01 41 00.

B. Special Inspections: Conform to Section 01 45 23 for Special Inspections required for reinforced masonry by IBC, Chapter 17.

C. Take initial mortar and grout samplings as specified by this Section to verify conformance to specified requirements before beginning work.

2.3 MATERIALS

A Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
   1. Type: Type N.
   2. Color: Standard gray.

B. Packaged Dry Material for Mortar for Repointing: Premixed Portland cement, hydrated lime, and graded sand; capable of producing Type O mortar in accordance with ASTM C270 with the addition of water only.
   1. Color: Standard gray.

C. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.

D. Portland Cement: ASTM C150.
   1. Type: Type I - Normal.
   2. Color: Standard gray.

E. Hydrated Lime: ASTM C207, Type S.

F. Grout Aggregate: ASTM C404.

G. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
   1. Color(s): As selected from manufacturer's standard.
   2. Manufacturers:
      a. Solomon, www.solomoncolors.com.
      b. Davis Colors, www.daviscolors.com.

H. Water: Clean and potable.

I. Grout Additive: Sika Grout Aid Type II, expanding water-reducer retarding high-lift grouting aid.

J. Bonding Agent: Latex type.

K. Integral Water Repellent Admixture: Polymeric liquid admixture added to mortar and grout at the time of manufacture.
   1. Performance of Mortar and Grout with Integral Water Repellent:
      a. Water Permeance: When tested per ASTM E514/E514M and for a minimum of 72 hours:
         1) No water visible on back of wall above flashing at the end of 24 hours.
         2) No flow of water from flashing equal to or greater than 0.032 gallons per hour at the end of 24 hours.
         3) No more than 25% of wall area above flashing visibly damp at end of test.
      b. Flexural Bond Strength: ASTM C1357; minimum 10% increase.
      c. Compressive Strength: ASTM C1314; maximum 5% decrease.
      d. Drying Shrinkage: ASTM C1148; maximum 5% increase in shrinkage.
   2. Use only in combination with masonry units produced with integral water repellent admixture.
   3. Manufacturers:
      a. BASF Construction Chemicals, Rheopel Plus Mortar Admixture.
      b. Grace Construction Products, Dry-Block Mortar Admixture.
      c. Substitutions: See Section 01 60 00.

2.4 MORTAR MIXING

A. Ready Mixed Mortar: ASTM C1142, Type equivalent to that specified according to ASTM C270.

B. Thoroughly mix mortar ingredients in accordance with ASTM C270 and in quantities needed for immediate use.

C. Maintain sand uniformly damp immediately before the mixing process.

D. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio; mix in accordance with manufacturer's instructions, uniform in coloration.

E. Add admixtures in accordance with manufacturer's instructions; mix uniformly.

F. Do not use anti-freeze compounds to lower the freezing point of mortar.

G. If water is lost by evaporation, re-temper only within two hours of mixing.

2.5 GROUT MIXING

A. Mix grout in accordance with ASTM C94/C94M and Structural Notes on Structural Drawings.

B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

C. Add admixtures in accordance with manufacturer's instructions; mix uniformly.

D. Do not use anti-freeze compounds to lower the freezing point of grout.

2.6 PRECONSTRUCTION TESTING

A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 40 00 - Quality Requirements.

B. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C780 recommendations for preconstruction testing.
   1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.

C. Grout Mixes: Test grout batches in accordance with ASTM C1019 procedures.
   1. Test results will be used to establish optimum grout proportions and establish quality control values for construction testing.

PART 3 EXECUTION

3.1 PREPARATION

A. Apply bonding agent to existing concrete surfaces.

B. Plug clean-out holes for grouted masonry with brick masonry units. Brace masonry to resist wet grout pressure.

3.2 INSTALLATION

A. Conform to manufacturer's instructions and provisions of Contract Documents.

B. Install mortar and grout to requirements of section(s) in which masonry is specified.

3.4 FIELD QUALITY CONTROL

A. An independent testing agency will perform field tests, in accordance with provisions of Section 01 40 00 - Quality Requirements.

B. Test and evaluate mortar in accordance with ASTM C780 procedures.
   1. Test frequency: Take one sample for each day of masonry construction consisting of 4 mortar cubes for each sample.

C. Test and evaluate grout in accordance with ASTM C1019 procedures.
   1. Test frequency: Take one set of specimens for each day of masonry construction consisting of 3 specimens for each set.

D. Prism Tests: Test masonry and mortar panels for compressive strength in accordance with ASTM C1314, and for flexural bond strength in accordance with ASTM C1072 or ASTM E518/E518M; perform tests and evaluate results as specified in individual masonry sections.

END OF SECTION 04 05 11

SECTION 04 20 00

UNIT MASONRY

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Clay Facing Brick.
   2. Reinforcement and Anchorage.
   3. Flashings.
   4. Lintels.
   5. Accessories.

B. Related Requirements:
   1. Section 04 05 11 - Masonry Mortaring and Grouting.
   2. Section 06 10 00 - Rough Carpentry: Nailing strips built into masonry.
   3. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; American Concrete Institute International; 2011.

C. American Society for Testing and Materials (International) ASTM:
   1. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
   2. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
   3. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
   4. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2014.
   5. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.
   1. Schedule meeting to coincide with regularly scheduled progress meeting.

1.4 SUBMITTALS

A. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

B. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Masonry Foreman:
   1. Continuously in attendance and conducting supervision for duration of masonry work.
   2. Able to document 5 years experience supervising and laying out masonry construction.

B. Masonry Crew: Completed State approved journeyman apprenticeship training and able to demonstrate qualifications meeting or exceeding apprenticeship standards.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means of that will prevent mechanical damage and contamination by other materials.

1.8 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 – PRODUCTS

2.1 BRICK UNITS

A. Manufacturers:
   1. Mutual Materials, www.mutualmaterials.com.
   2. Substitutions: See section 01 60 00 - Product Requirements.

B. Facing Brick: ASTM C216, Type FBS, Grade SW.
   1. Nominal size: 2 ½"x 3 ½"x 7 ½".
   2. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.
   3. Provide brick 'solids'
   4. Field Color: 50% Redondo/50% Sea Gray mix to match existing pattern.
   5. Accent Band Color: Limestone.

2.2 MORTAR AND GROUT MATERIALS

A. Mortar and Grout: As specified in Section 04 05 11

   1. Brick Mortar to be colored with non-fading mortar color, "Frank Davis" or Grace Staybrite color to match color selected by Architect.

B. Hydrated Lime: ASTM C207, Type S.

C. Mortar Aggregate: ASTM C144.

D. Grout Aggregate: ASTM C404.

2.3 REINFORCEMENT AND ANCHORAGE

A. Manufacturers of Joint Reinforcement and Anchors:
   1. Blok-Lok Limited: www.blok-lok.com.
   2. Hohmann & Barnard, Inc. (including Dur-O-Wal brand): www.h-b.com.
   3. WIRE-BOND: www.wirebond.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, stainless steel.
   1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
   2. Wire ties: Trapezoidal shape, 0.1875 inch thick.
   3. Vertical adjustment: Not less than 3-1/2 inches.

4. Brick Tie System for Walls with No Wall Insulation:
   a. Hohmann & Barnard, W-10HS Veneer Anchor.
5. Brick Tie System for Walls with Wall Insulation:
   a. Hohmann & Barnard, X-Seal Anchor.

2.4 FLASHINGS

A. Stainless Steel Flashing: ASTM A666, Type 304, soft temper; 26 gauge, 0.0187 inch thick; finish 2B to 2D.

B. Flashing Sealant/Adhesive: Butyl type as specified in Section 07 90 05.

2.5 ACCESSORIES

A. Weeps: Polyethylene tubing.

B. Drainage Fabric: Polyester or polypropylene mesh.

2.6 LINTELS

A. Steel Ledger Angles and Lintels: ASTM A36 cold-rolled steel angle, galvanized to ASTM A123, provide as follow:
   1. Size as indicated on Drawings.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify field conditions are acceptable and are ready to receive masonry.

B. Verify related items provided under other sections are properly sized and located.

C. Verify built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.3 COLD AND HOT WEATHER REQUIREMENTS

A. Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

3.4 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement. Align with existing.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Brick Units:
   1. Bond: Running.
   2. Coursing: Three units and three mortar joins to equal 8 inches.
   3. Mortar Joints: Concave.

3.5 WEEPS/CAVITY VENTS

A. Install weeps in veneer and cavity walls at 24 inches on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.

3.6 CAVITY BEHIND VENEER

A. Do not permit mortar to drop into cavity air space or to plug weep holes.

3.7 VENEER REINFORCEMENT AND ANCHORAGES

A. Secure wall ties to stud framed back-up and embed into masonry veneer at maximum 16 inches vertically and 16 inches on center horizontally. Place at maximum 3 inches on center. each way around perimeter of openings, within 12 inches of openings.

B. Veneer Joint Reinforcement:
   1. Veneer horizontal joint reinforcement shall be spaced at 16 inches on center vertically. Joint reinforcement shall be placed so that longitudinal wires are centered on the veneer wythe.
   2. Embed longitudinal wires in mortar for their entire length.
   3. Lap splices in joint reinforcement at a minimum of 6 inches. Joint reinforcement discontinuous at brick expansion joints.
   4. Engage joint reinforcement by seismic ties.

3.8 MASONRY FLASHINGS

A. Extend flashings under veneer, turn up minimum 8 inches and bed into mortar joint of masonry seal to sheathing over stud back-up

B. Lay end joints minimum 6 inches and seal watertight.

C. Use flashing manufacturer’s recommended adhesive and sealer.

3.9 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control and expansion joints

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer’s instructions.

C. Size control joint in accordance with Section 07900 for sealant performance.

D. Form expansion joint as detailed.

3.10 TOLERANCES

A. Maximum Variation From Unit to Adjacent Unit: 1/32 inch.

B. Maximum Variation From Plane of Wall: ¼ inch in 10 feet and ½ inch in 20 feet or more.

C. Maximum Variation From Plumb: ¼ inch per story non-cumulative; ½ inch in 2 stories or more.

D. Maximum Variation From Level Coursing: 1/8 inch in 3 feet and ¼ inch in 10 feet.

E. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.

3.11 CUTTING AND FITTING

A. Cut and fit for conduit, sleeves and ductwork. Coordinate with other Sections of work to provide correct size, shape, and location.

B. Obtain Architect approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.12 CLEANING

A. Clean work under provisions of Divisions 00 and 01.

B. Remove excess mortar and mortar smears.

C. Replace defective mortar. Match adjacent work.

D. Clean soiled surfaces with cleaning solution.

E. Use non-metallic tools in cleaning operations.

3.13 PROTECTION OF FINISHED WORK

A. Provide protection at exposed external corners where vulnerable to damage by construction activities.

END OF SECTION 04 20 00

SECTION 05 05 23

WELDING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Welding materials and methods of joining miscellaneous metals and structural steel fabrications.

B. Related Sections:
   1. Section 03 20 00 - Reinforcing Steel
   2. Section 05 12 00 - Structural Steel Framing

1.2 REFERENCES

A. Reference Standards: Current edition at date of Bid.

B. American Institute of Steel Construction (AISC):
   1. Manual of Steel Construction, Code of Standard Practice for Steel Buildings and Bridges

C. American Welding Society (AWS): Web Site <http://www.aws.org/>
   1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination
   2. AWS A3.0 - Standard Welding Terms and Definitions
   3. AWS A5.1 - Specifications for Carbon Steel Electrodes for Shielded Metal Arc Welding
   4. AWS D1.1 - Structural Welding Code - Steel
   5. AWS D1.2 - Structural Welding Code - Aluminum
   6. AWS D1.3 - Structural Welding Code – Sheet Steel
   7. AWS D1.4 - Structural Welding Code - Reinforcing Steel
   8. AWS D1.6 - Structural Welding Code - Stainless Steel
   9. AWS D1.7 - Guide for Strengthening and Repairing Existing Structures
   10. AWS D1.8 - Structural Welding Code – Seismic Supplement
   11. AWS D9.1 - Sheet Metal Welding Code

D. American National Standards Institute (ANSI):
   1. ANSI Z49.1- Safety in Welding, Cutting and Allied Processes

E. National Ornamental & Miscellaneous Metal Association (NOMMA)
   1. Website: www.nomma.org.
   2. NOMMA Guideline 1: Joint Finishes.

F. National Fire Protection Association (NFPA):
   1. NFPA 51B- Fire Protection During Welding, Cutting, and other Hot Work.

1.3 DEFINITIONS

A. As defined by AISC - Code of Standard Practice for Steel Buildings and Bridges, Section 2 - Classification of Materials.
   1. Structural Steel: Elements of structural frame shown and sized by Structural Drawings.
   2. Non-Structural Steel: Defined by AISC as Other Steel, Iron or Metal Items.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Shop Drawings: Show welds with AWS A2.4 symbols.

C. Written Welding Procedure (WPS): Submit in accordance with AWS D1.1 requirements for each different welded joint proposed for use at Seismic Critical Welds (complete penetration welds), whether pre-qualified or qualified by testing.
   1. Indicate as-detailed configurations, as well as the maximum and minimum fit-up conditions.
   2. Identify specified electrode and manufacturer.
   3. List actual values of welding parameters to be used so that clear instruction is provided to welders

D. Welders:
   1. Copy of AWS and WABO Certification Cards.

1.5 QUALIFICATIONS

A. Welders:
   1. American Welding Society (AWS) qualified.
   2. Certified within previous 12 months by Washington Association of Building Officials (WABO).

1.6 REGULATORY REQUIREMENTS

A. Conform to requirements of Section 01 41 00 for referenced Codes, ordinances, and other regulatory requirements.

B. Conform to AWS for welding codes referenced by this Section.

C. Special Inspections:
   1. Conforming to IBC Section 1704.3.1, AWS D1.1, Section 01 45 23, and Authority Having Jurisdiction.
   2. Owner will engage an independent testing and inspection agency to perform special inspection of welded structural members and connections designed to resist loads and forces.

PART 2 PRODUCTS

2.1 MATERIALS

A. Refer to individual Sections, Structural Drawings for metals to be welded and additional requirements.

B. Electrodes:
   1. See Structural General Notes

PART 3 EXECUTION

3.1 PREPARATION

A. Take precautions required by regulations and Standard Specifications to protect personnel and property.

B. Carefully mask or shield adjacent surfaces to prevent damage from heat or welding materials. Take particular care to prevent fires.

C. Conform to NFPA 51B, including permit required and area and fire watch procedures, for welding on site.

D. Remove paint, galvanizing, or any other foreign material completely at surfaces to be welded prior to welding.

E. When welding finished assemblies adjacent to or above finished materials, protect surfaces from damage due to welding.

3.2 WELDING PROCEDURES

A. Clean and weld in accordance with AISC Specifications Chapter J and American Welding Society AWS D1.1, D1.2, D1.3 D1.4, D1.6, D1.8 and other welding standards, as applicable.

B. Electrodes: Electrodes to be thoroughly dry prior to use. Use per electrode manufacturer's recommendations. Dispose of spent rods at the end of each work day.

C. Welds at Architecturally Exposed Structural Steel (AESS) and other Exposed-to-View Steel for guardrails, handrails, stair railings, and miscellaneous metals at less than 8 feet above finish floor level in occupied spaces not necessarily defined as AESS: Conform to NOMMA, Guideline 1: Joint Finishes, Finish #2.

D. Welds at Concealed Locations or on Structural Steel Items: Conform to NOMMA, Guideline 1: Joint Finishes, Finish #4.

E. Welding:
   1. Join shape edges as shown on Drawings.

2. Prepare and clean edges free of oil, grease, scale, and rust in accordance with AWS D1.1 and Structural Drawings for type of weld.

F. Reinforcing Steel: Refer to Section 03 21 00 for welding of reinforcing steel. Do not weld reinforcing bar, except as approved by the Structural Engineer or unless specified on Drawings.

G. Bolted Connections: Do not weld structural connections indicated for bolts or unless approved by Structural Engineer.

3.3 FIELD QUALITY CONTROL

A. Inspection and Testing by Owner's Special Welding Inspector:
1. See Structural General Notes.

B. Inspection and Testing by Owner's Special Welding Inspector:
1. Include: X-ray or gamma ray tests, ultrasonic testing, magnetic particle inspection, and other aids to visual inspections that inspector deems necessary to determine quality of welds.
2. Perform ultrasonic testing on all complete penetration welds.
3. Non-destructively test complete penetration groove welds larger than 5/16 inch by ultrasonic methods for conformance with weld quality and standard of acceptance of AWS D1.1 for welds subject to tensile stress. Pass sound through entire weld volumes from two crossing directions if possible.

C. Conform to following provisions:
1. Ultrasonically test base metal thicker than 1-1/2 inches for discontinuities behind welds, conforming to IBC Section 1708.4.
2. Inspect Welds of Seismic Force Resisting System:
   a. Verify Welding Procedure Sheet (WPS) has been provided and has been reviewed with each welder performing the weld.
   b. Reject welds not executed in conformance with the WPS.
   c. Verify fit-up tolerances meet WPS, and mark joint prior to welding.
   d. Verify welding consumables per WPS.
   e. Verify welding qualifications and identifications.
3. Observe preheat and inter-pass temperatures, and weld pass sequence for conformance with WPS.

3.4 ADJUSTING, CLEANING AND TOUCH UP

A. Remove slag or flux remaining on beads.

B. Repair or remove cracks and blow holes appearing on beads. Use methods such as chipping and grinding.

C. Repair or replace finishes, materials, products and construction damaged by welding work.

D. Touch up welded surface with Zinc rich primer as specified in Section 09 90 00.

3.5 PROTECTION AND SAFETY

A. Conform to all Labor and Industries, OSHA and WISHA regulations.

B. Provide fire watch during and for 1/2 hour after the welding work.

C. Provide fire extinguishers within 20 feet of welding work.

D. Provide adequate ventilation for work.

E. Provide fire blankets to cover flammable materials.

F. Protect adjacent work and existing conditions.

END OF SECTION 05 05 23

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Structural steel framing members, support members, struts, and support of architectural finishes.
   2. Base plates, shear stud connectors and expansion joint plates.
   3. Grouting under base plates.

B. Related Requirements:
   1. Section 05 05 23 - Welding.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. American Institute of Steel Construction (AISC):
   1. AISC (MAN) - Steel Construction Manual; American Institute of Steel Construction, Inc.; 2011.
   2. AISC S303 - Code of Standard Practice for Steel Buildings and Bridges; American Institute of Steel Construction, Inc.; 2010.
   3. AISC S348 - Specification for Structural Joints Using ASTM A325 or A490 Bolts; 2004.

C. American Society for Testing and Materials (ASTM) International:
   1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
   2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
   3. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished; 2013.
   4. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
   5. ASTM A242/A242M - Standard Specification for High-Strength Low-Alloy Structural Steel; 2004 (Reapproved 2009).
   6. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2012.
   7. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.
   8. ASTM A325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength (Metric); 2013.
   9. ASTM A490 - Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength; 2012.
   10. ASTM A490M - Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric); 2012.

11. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
12. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
13. ASTM A514/A514M - Standard Specification for High-Yield Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding; 2014.
14. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality; 2005 (Reapproved 2009).
15. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts; 2007a (Reapproved 2014).
16. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts [Metric]; 2007.
17. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2015.
18. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2011.
19. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2013.
20. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability and Ultra-High Strength; 2014.
21. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014.
22. ASTM F436 - Standard Specification for Hardened Steel Washers; 2011.
23. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2007a.

D. American Welding Society (AWS):
   1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2012.
   2. AWS D1.7 - Guide for Strengthening and Repairing Existing Structure.
   3. AWS D1.8 - Structural Welding Code - Seismic Supplement.

E. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc.; 2011.

F. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections; 2009.

G. Society for Protective Coatings (SSPC):

H. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.3 DEFINITIONS

A. Architecturally Exposed Structural Steel: Structural steel designated as "Architecturally Exposed Structural Steel " or "AESS" in the Contract Documents.
   1. Category 1 AESS: AESS that is within 96 inches vertically and 36 inches horizontally of a walking surface and is visible to a person standing on that walking surface or is designated as "Category 1 architecturally exposed structural steel" or "AESS-1" in the Contract Documents.

2. Category 2 AESS: AESS that is within 20 feet vertically and horizontally of a walking surface and is visible to a person standing on that walking surface or is designated as "Category 2 architecturally exposed structural steel" or "AESS-2" in the Contract Documents.
3. Category 3 AESS: AESS that is not defined as Category 1 or Category 2 or that is designated as "Category 3 architecturally exposed structural steel" or "AESS-3" in the Contract Documents.

B. Faying Surfaces: Surfaces in contact at steel bolted connections.
1. Slip-Critical Faying Surfaces at Slip-Critical Structural Steel Joints: Conforming to RCSC - Specifications for Structural Joints Using ASTM A325 and ASTM A490 Bolts
2. Class A Faying Surfaces: Mean slip Coefficient of 0.33 for uncoated clean mill scale steel surfaces or surfaces with Class A coatings on blast-cleaned steel.
3. Class B Faying Surfaces: Mean slip Coefficient of 0.50 for uncoated blast-cleaned steel surfaces or surfaces with Class B coatings on blast-cleaned steel.
4. Class C Faying Surfaces: Mean slip Coefficient of 0.35 for roughened hot-dip galvanized to requirements of ASTM A123 and subsequently roughened by means of hand wire brushing. Power wire brushing is not permitted.

1.4 SUBMITTALS

A. See Section 01 33 00 for submittal procedures.

B. Shop Drawings:
1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
2. Connections not detailed.
3. Indicate cambers and loads.
4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

C. Templates and Placement Plans: As required for satisfactory placing, connection, and anchorages.

1.5 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC "Steel Construction Manual."

B. Comply with Section 10 of AISC "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.

C. Fabricator: Company specializing in performing the work of this section with minimum 5 years of documented experience.

D. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel (AC172).
1. Certified by AISC Quality Certification Program:
   a. Standard for Steel Building Structures (STD)
   b. Metal Buildings (MB)
2. Uncertified Fabricators: May be used subject to approval of the Architect / Structural Engineer and confirmed in writing at least 5 calendar days prior to day set for bid submittal.

Uncertified fabricators shall pay for the cost of periodic plant inspections by the special inspector.

E. Erector: Company specializing in performing the work of this section with minimum 5 years of documented experience of comparable scope for a minimum of 3 projects.
   1. Certified by AISC Quality Certification Program:
      a. Certified Steel Erector (CSE)
      b. Advanced Certified Steel Erector (ACSE)
   2. Uncertified Erectors: May be used subject to approval of the Architect / Structural Engineer and confirmed in writing at least 5 calendar days prior to day set for bid submittal.

F. Welding: Perform by AWS Certified Welders in accordance with Section 050523, and Washington State Building Officials (WABO), Standard Qualification Procedures.

G. Shop Primers and Galvanized Finishes: Conform to Section 05 50 00 - Metal Fabrications.

H. Architecturally Exposed Structural Steel (AESS): Conform to AISC - Code of Standard Practice for Structural Steel Buildings and Bridges, Section 10.

1.6 REGULATORY REQUIREMENTS

A. American Institute of Steel Construction (AISC): AISC - Code of Standard Practice for Steel Buildings and Bridges.

B. Special Inspections and Testing Laboratory Services: Arrange and schedule special inspection and testing by Owner, conforming to IBC Chapter 17, and requirements of Building Code Regulatory Authority having jurisdiction.
   1. Special inspections will be performed periodically, unless continuous inspection is noted on Structural Drawings. Notify and schedule testing laboratory in time to conduct inspection and testing. Do not cover up work until testing results are determined as satisfactory.
   2. Welding: Refer to Section 05 05 23 for inspection and testing requirements.
   3. Structural Steel Erection: Requires visual inspection to verify conformance of work with Contract Documents.
   4. High Strength Bolting: Conform to required inspections of installed bolted connections.
   5. As indicated on Structural Drawings

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Identify and maintain unity of lifts. Stagger blocks. Perform additional handling as required.

B. Storage: Store metal above ground on platform or skids above snow or mud. Locate items to permit easy access for inspection and identification. Do not store on structure in a manner causing distortion or damage to structure.

C. Protect from moisture and corrosion until erected.

D. Include templates and instructions for proper setting of anchor bolts.

PART 2 PRODUCTS

2.1 MATERIALS

A. Steel Angles, Plates, Channels, S Shapes, M Shapes, and HP Shapes: ASTM A36/A36M.

B. Steel W Shapes and Tees: ASTM A992/A992M.

C. Rolled Steel Structural Shapes: ASTM A992/A992M.

D. Steel Shapes, Plates, and Bars: ASTM A242/A242M high-strength, corrosion-resistant structural steel.

E. Steel Shapes, Plates, and Bars: ASTM A529/A529M high-strength, carbon-manganese structural steel, Grade 50.

F. Steel Shapes, Plates, and Bars: ASTM A572/A572M, Grade 50 (345) high-strength, columbium-vanadium steel.

G. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade B.

H. Hot-Formed Structural Tubing: ASTM A501/A501M, seamless or welded.

I. Steel Bars: ASTM A108 .

J. Steel Plate: ASTM A514/A514M.

K. Steel Sheet: ASTM A1011/A1011M, Designation SS, Grade 30 hot-rolled, or ASTM A1008/A1008M, Designation SS, Grade 30 cold-rolled.

L. Pipe: ASTM A53/A53M, Grade B, Finish black and galvanized, as indicated.

M. Shear Stud Connectors: Made from ASTM A108 Grade 1015 bars.

N. Structural Bolts and Nuts: Carbon steel, ASTM A307, Grade A galvanized to ASTM A153/A153M, Class C.

O. High-Strength Structural Bolts, Nuts, and Washers: ASTM A325 or A325M, Type 1, medium carbon, galvanized, with matching compatible ASTM A563 or A563M nuts and ASTM F436 washers.

P. High-Strength Structural Bolts: ASTM A490 or A490M; Type 1 alloy steel, with matching compatible ASTM A563 or A563M nuts and ASTM F436 washers.

Q. Unheaded Anchor Rods: ASTM F1554, Grade 36, plain, with matching ASTM A563 or A563M nuts and ASTM F436 Type 1 washers.

R. Headed Anchor Rods: ASTM A307, Grade C, plain.

S. Grout: Non-shrink, non-metallic aggregate type, complying with ASTM C1107/C1107M and capable of developing a minimum compressive strength of 7,000 psi at 28 days.

T. Adhesive Epoxy Anchor Systems:
   1. Into Concrete: As indicated on Structural Drawings.
   2. Into Masonry: As indicated on Structural Drawings.

U. Expansion Bolts: Types and sizes as detailed or required by condition of installation. As specified on Structural Drawings.

2.2 FABRICATION

A. Shop fabricate to greatest extent possible.

B. Fabricate structural steel in accordance with requirements of referenced AISC Specifications and details as shown on accepted shop drawings.
   1. Identify steel at mill showing grade and yield point.
   2. Identify each piece with erection mark corresponding to identifications noted on erection drawings.

C. Cutting: Do not flame cut by hand, except as accepted in writing by Architect and Structural Engineer and in strict conformance to NFPA 51B. Where approved, smooth handcuts by chipping, planing, or grinding. Cut and fit to required tolerances. No sharp kinks or bends permitted.

D. Straightened Material: Examine straightened material prior to fabrication for signs of distress or other defects. No distressed or otherwise defective material accepted.

E. Connections: Punch and drill steel for attachment of other materials shown or attached permanently to structural steel. Provide required connection angles, plates, and brackets. Attach as shown on Drawings. Weld or bolt shop connections as indicated.

F. Space shear stud connectors at spacing as indicated on Structural Drawings.

G. Continuously seal joined members by continuous welds. Grind exposed welds smooth.

H. Fabricate connections for bolt, nut, and washer connectors.

I. Bolted Construction: Install high-strength threaded fasteners in accordance with RCSC - Specifications for Structural Joints Using ASTM A325 or A 490 Bolts.
   1. Fit bolted parts together tightly. Remove loose scale, burrs, dirt, and other foreign material preventing solid seating of parts.
   2. Remove oil, paint, lacquer, and galvanizing from contact surfaces of high strength bolted connections.

J. Base and Bearing Plates: Drill and fabricate to accurate sizes as drawn. Include fasteners and accessories required for installation.
   1. Manufacturer of bearing material to perform bonding.

2. Protect bearing surfaces from damage. Bearing pads with scratches, or other marks, will be rejected.
3. Reamed or elongated bolt holes are unacceptable.

K. Develop required camber for members.
1. Camber: As shown by Structural Drawings. Provide beams with required camber, in-place, prior to erection of steel decking and concrete slab placement. Compensate for loss of camber due to shipping and handling. Conform to requirements of AISC - Specification for Structural Steel Buildings.

L. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

M. In addition to special care used to handle and fabricate AESS, comply with the following:
1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
2. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
3. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
4. Category 1 AESS:
   a. Grind sheared, punched, and flame-cut edges of steel to remove burrs and provide smooth surfaces and edges.
   b. Fabricate steel with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.
   c. Fabricate steel to the tolerances specified in AISC 303 for steel that is designated AESS.
   d. Seal-weld open ends of hollow structural sections with 3/8-inch closure plates.
5. Category 1 and Category 2 AESS:
   a. Fabricate steel with exposed surfaces free of seams to maximum extent possible.
6. Category 2 and Category 3 AESS
7. Fabricate steel to the tolerances specified in AISC 303 for steel that is not designated AESS.

2.3 FABRICATION TOLERANCES

A. Fabricate structural members to AISC Specifications for allowable tolerances.

B. Architecturally Exposed Structural Steel (AESS): Conform to requirements of AISC - Code of Standard Practice for Structural Steel Buildings and Bridges. Treat exposed-to-view exterior structural steel and interior structural steel in finished areas as AESS whether as shown on Drawings.

C. Straightness: Conform to ASTM A6 tolerances allowed by wide flanged shapes for tolerances of structural members of single rolled shapes or built-up structural members.

2.4 SHOP CONNECTIONS

A. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, and comply with the following:
   1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding specified tolerances.
   2. Use weld sizes, fabrication sequence, and equipment for AESS that limit distortions to allowable tolerances.
      a. Category 1 AESS:
         1) Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where steel is exposed to weather.
         2) Provide continuous welds of uniform size and profile where steel is welded.
      b. Category 1 and Category 2 AESS:
         1) Grind butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus 0 inch.
         2) Make butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus 0 inch. Do not grind unless required for clearances or for fitting other components, or unless directed to correct unacceptable work.
         3) Remove backing bars or runoff tabs; back-gouge and grind steel smooth.
         4) At locations where welding on the far side of an exposed connection of steel occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.
         5) Make fillet welds for steel oversize and grind to uniform profile with smooth face and transition.
         6) Make fillet welds for steel of uniform size and profile with exposed face smooth and slightly concave. Do not grind unless directed to correct unacceptable work.

2.5 SURFACE FINISH PREPARATION

A. Conform to AISC - Code of Standard Practice for Structural Steel Buildings and Bridges.
   1. Clean surfaces of oil, grease, scale, dirt, and other foreign matter present in sufficient quantities to impair bond.
   2. Remove rust and mill scale in accordance with Section 6. Make exposed surfaces and edges smooth, free of burrs and sharp edges.
   3. Conform to Section 10 for additional requirements for Architecturally Exposed Structural Steel (AESS).

B. Exterior, Ungalvanized Metal: In accordance with SSPC-SP-6, Commercial Blast Cleaning.

C. Coat structural steel conforming to IBC Chapter 22 and AISC - Load and Resistance Factor Design for Structural Steel Buildings.

2.6 SHOP PRIMERS AND FINISHES FOR STRUCTURAL STEEL NOT RECEIVING FIREPROOFING COATING

A. Shop Priming and Shop Galvanizing of Structural Steel and Components: Conform to provisions of Section 055000.

B. Shop Primer for Interior Structural Steel Concealed within Construction Not Receiving Finish Coating Systems:
   1. Do not apply primers to steel receiving spray-applied fireproofing, except as conforming to provisions of this Section and as accepted by fire-proofing manufacturer.
   2. Accepted Primer:
      a. Single component, moisture cured, micaceous iron oxide and zinc filled polyurethane. Color: Green/Gray.
         1) Sherwin Williams Corothane 1 Zinc Primer B65A15.
         2) Tnemec Co, Series 394, PerimePrime.
         3) Wasser, MC Miozinc.
      b. MPI #76, Quick Drying Alkyd Metal Primer, anti-corrosive primer:
         1) Benjamin Moore, Rapid Dry Metal Primer, CM05-70.
         2) PPG, Multiprime, Fast Dry 2.8 VOC, 94-258/269.
         3) Rodda, Barrier III HS, High Solids Rust Inhibitive Primer, 708295X.
         4) Rust-Oleum, Industrial Enamel, Quick-Dry Light Gray Primer, 2082.
         5) Sherwin-Williams, Kem-Kromik, Metal Primer, B50NZ6/B50WZ1.

C. Coat structural steel conforming to IBC Chapter 22 and AISC - Load and Resistance Factor Design for Structural Steel Buildings.

D. Coatings at Faying Surfaces at Slip-Critical Structural Steel Joints: Conform to RCSC - Specifications for Structural Joints Using ASTM A325 and ASTM A490 Bolts
   1. Shop Primers: Class B or Class A, [except Class A as accepted by Architect and Structural Engineer].
   2. Galvanized Coatings: Class C.

E. Exterior Structural Steel Receiving Galvanized Coating: Hot-dip galvanize, in accordance with Section 055000. Include steel exposed to weather, steel embeds in contact with masonry and concrete, weldments, connectors, and other steel items, except as otherwise indicated.

F. Bolts and Threaded Fasteners: Hot-dip galvanize, ASTM A153, Class C or Class D, where exposed to weather or moisture.

G. Structural Steel Receiving Finish Paint and Special Coatings: Shop prepare and shop apply primers for interior and exterior steel [specified in Section 055000], compatible with finish coatings specified Section 099000 [and Section 099713].

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.2 PREPARATION

A. Take Field Dimensions: Verify accuracy and suitability for erection.

B. Fabricate and adjust steel members prior to installation accommodating field dimensions and meeting specified tolerances.

C. Plan and adjust delivery schedule and laydown area for an orderly assembly that conforms to the schedule.

3.3 ERECTION

A. Erect structural steel in compliance with AISC "Code of Standard Practice for Steel Buildings and Bridges".

B. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
   1. Erect Category 1 AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
   2. Erect Category 2 and Category 3 AESS to the tolerances specified in AISC 303 for steel that is not designated AESS.

C. Allow for erection loads, and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
   1. Column Bases and Bearing Plates: Align column bases and bearing plates for beams and similar structural members with wedges and shims.
   2. Field Assembly: Accurately assemble structural framing to lines and members of framing system prior to fastening.
   3. Clean bearing surfaces in permanent contact prior to assembly.
   4. Splice structural members only where indicated or approved. Fasten splices of compression members after bringing abutting surfaces completely into contact.

D. Connections:
   1. Steel-To-Steel Field Connections: Use ASTM A325 high strength bolts. Tighten bolts per AISC and manufacturer’s instructions. Do not re-use bolts.
   2. Wood-To-Steel Field Connections: Use ASTM A307 bolts, except as otherwise shown on Drawings or accepted by Architect and Structural Engineer.
   3. Steel-To-Masonry and Steel-To-Concrete Connections: As shown on the Structural Drawings.

E. Conform to AISC Specifications, including AISC - Specification for Structural Steel Buildings, for bearing, adequacy of temporary connections, alignment, and removal of paint of surfaces adjacent to field welds.
   1. Ream holes that must be enlarged to admit bolts.
   2. Do not enlarge misaligned or mislocated holes in members by burning or by use of drift pins.

F. Field weld components and shear studs indicated on shop drawings.

G. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC "Specification for Structural Joints Using High-Strength Bolts".

H. Do not field cut or alter structural members without approval of Architect.
   1. Do not use gas cutting torches in field for correcting fabrication errors in structural framing
   2. Cutting of secondary members that are not under stress may be permitted where accepted in writing by Architect and Structural Engineer. Where permitted, finish gas cut sections to match sheared appearance.
   3. Conform to NFPA 51B for fire prevention.
   4. Protect all adjacent construction from damage.

I. Include necessary or required devices for complete installations.

J. AESS Weld Connections:
   1. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for Category 1 and Category 2 AESS.
   2. Remove erection bolts in Category 1 and Category 2 AESS, fill holes, and grind smooth.
   3. Fill weld access holes in Category 1 and Category 2 AESS and grind smooth.

K. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

L. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

M. Touch-Up Primer:
   1. After steel framing installation, field prime bolt heads and nuts, welded areas, and abraded or rusty surfaces on joists and steel supporting members.
   2. Wire brush surfaces and clean with solvent in accordance with Section 055000 before applying primer.
   3. Use primer as specified Section 055000 or same type used for factory primer.

3.4 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

3.5 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00.

3.6 ERECTION TOLERANCES

A. Maximum Deviation from Plumb, Level, and Alignment:
   1. Do not exceed that specified by AISC - Code of Standard Practice for Structural Steel Buildings and Bridges.
   2. Do not exceed tolerances required for adjacent work.

B. Top of Beams at Beam to Column Connections:

1. Maximum Slope Between Columns: Maximum 1/8 inch in 10 foot.
2. Cumulative Difference Between Columns: Maximum 1/4 inch.

C. Architecturally Exposed Structural Steel (AESS): Conform to AISC - Code of Standard Practice for Structural Steel Buildings and Bridges, Section 10.

3.7 CLEANING AND ADJUSTING

A. Leave work and premises clean and free from residue resulting from Work of this Section.

B. Repair or replace materials, products or installed construction damaged by Work of this Section.

END OF SECTION

SECTION 06 05 75

PRESERVATIVE WOOD TREATMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Factory preservative pressure treatment for wood contacting concrete, masonry, and conditions of moisture.
   2. Field preservative touch-up at cuts in preservative treated wood.

B. Related Sections:
   1. Section 06 05 74 - Fire-Retardant Wood Treatment
   2. Section 06 10 00 - Rough Carpentry

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. American Lumbers Standards Committee (ALSC): www.alsc.org
   1. Treated Wood Enforcement Regulations

C. American Society for Testing and Materials (ASTM) International:
   1. ASTM D3507 - Standard Test Methods for Penetration of Preservatives in Wood and for Differentiating Between Heartwood and Sapwood.
   2. ASTM D38 - Standard Test Methods for Sampling Wood Preservatives Prior to Testing.

D. American Wood Protection Association (AWPA): www.awpa.com.
   1. AWPA E13 -Standard Method of Testing to Determine Water Repellents in Pressure Treated Lumber.
   2. AWPA M4 - Standard for the Care of Preservative Treated Wood Products.
   3. AWPA P5 - Standard for Waterborne Preservatives.
   4. AWPA P8 - Standard for Oil-Borne Preservatives.

E. International Code Council, National Evaluation Service Committee (NER).

1.3 QUALITY ASSURANCE

A. Treatment Plant Qualifications:
   1. Company specializing in work of this Section with minimum 3 years documented experience.
   2. Conforming to ALSC Treated Wood Enforcement Regulations, as inspected by ALSC accredited inspection agency.
   3. Licensed by preservative treatment manufacturer.

B. Stamp or label preservative treated wood in conformance to IBC Chapter 23. Identify:

1. Manufacturer, type of preservative treatment, minimum preservative retention, AWPA Standard for treatment type and use.
2. ALSC accredited inspection agency maintaining quality control supervision, testing, and inspection of treatment.

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of Section 01 41 00 including IBC Chapter 23 for preservative-treated wood.

1.5 COORDINATION

A. Conform to Section 01 31 00 for coordination with work of other Sections.

B. Coordinate with work of Section 06 10 00 and other Sections to reduce corrosive effects on metal fasteners. Use ASTM A153 G185 hot-dipped zinc galvanized or stainless steel fasteners in preservative pressure treated wood.

C. Coordinate with work of other Sections for placement of isolation membrane between connector plates and other galvanized exterior metal in contact with pressure-treated wood.

1.6 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 FACTORY PRESERVATIVE TREATED WOOD

A. Wood Lumber Grade and Species: WWPA or WCLB, Select Structural, Douglas fir or Hem-fir and as specified by Section 06 10 00 and Structural Notes.

B. Preservative Chemical Treatment:
1. Conform to manufacturer instructions and AWPA Standards, including C1, P5, and UCS Standards for treatment process applicable for end use of treated wood.
2. Products containing copper chromium arsenate (CCA), not accepted.

C. Preservative Treatment for Interior Above Ground Use: AWPA U1, Use Categories UC1 (dry) and UC2 (damp).
1. CA-C, ACQ, or DOT treatment at cubic foot retention, conforming to AWPA, applicable Evaluation Report, and manufacturer instructions.
    a. ACQ and DOT: 0.25 pounds per cubic foot
    b. CA-C: 0.06 pounds per cubic foot
    c. SBX: 0.17 pounds per cubic foot
2. Treat wood in the following locations:
    a. In contact with masonry or concrete.
    b. Within 18 inches of grade.
    c. Exposed to weather.

d. Other locations indicated except for wood in contact with roofing, flashing and waterproofing.

3. Treat wood in contact with roofing, flashing and waterproofing:
   a. SBX: 0.17 pounds per cubic foot.
   b. CA-C and ACQ: Not accepted.

D. Preservative Treatment for Exterior, Above Ground: AWPA U1 Use Categories UC3A and UC3B.
1. CA-C or ACQ treatment, at cubic foot retention conforming to AWPA, applicable Evaluation Report, and manufacturer instructions.
   a. ACQ: 0.25 pounds per cubic foot
   b. CA-C: 0.06 pounds per cubic foot
   c. SBX: Not accepted
2. Treat wood in the following locations:
   a. Exterior construction.
   b. Not in contact with ground.
   c. Water run off.

E. Preservative Treatment for Exterior, Ground or Fresh Water Contact: AWPA U1 Use Categories UC4A.
1. CA-C or ACQ treatment, at cubic foot retention conforming to AWPA, applicable Evaluation Report, and manufacturer instructions.
   a. ACQ: 0.40 pounds per cubic foot
   b. CA-C: 0.15 pounds per cubic foot
   c. SBX: Not accepted
2. Treat wood in the following locations:
   a. In contact with ground.
   b. In contact with fresh water.
   c. Noncritical components.

F. Preservative Treatment for Exterior, Ground or Fresh Water Contact: AWPA U1 Use Categories UC4B and UC4C.
1. CA-C or ACQ treatment, at cubic foot retention conforming to AWPA, applicable Evaluation Report, and manufacturer instructions.
   a. ACQ: 0.60 pounds per cubic foot
   b. CA-C: 0.31 pounds per cubic foot
   c. SBX: Not Accepted
2. Treat wood in the following locations:
   a. In contact with ground.
   b. In contact with fresh water.
   c. Critical structural components or difficult to replace components.

G. Kiln dry wood after treatment (KDAT):
1. Lumber: Maximum 19 percent moisture content.
2. Plywood: Maximum 16 percent moisture content.

2.2 SURFACE TREATMENT OF FIELD CUTS

A. Conform to AWPA M4 and manufacturer instructions.

B. Lumber: Treat wood with oil-soluble copper naphthenate based wood preservative, or as accepted by Architect.

2.3 METAL FASTENERS AND CONNECTORS IN CONTACT WITH PRESERVATIVE TREATED WOOD

A. Structural Carbon Steel Connectors:
   1. Exceeding 14 Gauge: Hot-dip galvanize to ASTM A123, as specified Section 05 50 00.
   2. Less than 14 Gauge:
      a. Exterior Use: Galvanize to ASTM A653, G185.
      b. Interior Use: Galvanize to ASTM A653, G90.

B. Carbon Steel Fasteners and Anchors:
   1. Exterior Use: Hot-dip galvanize to ASTM A153, G185.
   2. Interior Use: Galvanize to ASTM A153, G90
   3. Electro-Galvanized Coatings: Not accepted.

C. Stainless Steel: ASTM A276, Type 304 or 316 accepted in lieu of galvanized carbon steel.

PART 3 EXECUTION

3.1 INSTALLATION OF PRESERVATIVE TREATED WOOD

A. Treat in accordance with AWPA, manufacturer's instructions, and provisions of Contract Documents.

B. Install preservative treated wood where in contact with concrete, and conditions subject to moisture, including at foundation sill plates, masonry, roofing, and wood in direct and continual contact with moisture and dampness.

C. Treat end cuts of preservative treated wood members with field-applied end coat prior to installation. Allow to dry before erecting members.

D. Install under work of applicable Sections, including work of Section 06 10 00.

END OF SECTION 06 05 75

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Structural dimension lumber framing.
   2. Exposed timber structural framing.
   3. Non-structural dimension lumber framing.
   4. Rough opening framing for doors, windows, and roof openings.
   5. Sheathing.
   6. Subflooring.
   7. Underlayment.
   8. Roof-mounted curbs.
   9. Roofing nailers.
   10. Roofing cant strips.
   11. Preservative treated wood materials.
   12. Fire retardant treated wood materials.
   13. Miscellaneous framing and sheathing.
   14. Communications and electrical room mounting boards.
   15. Concealed wood blocking, nailers, and supports.
   16. Miscellaneous wood nailers, furring, and grounds.
   17. Wall sheathing with factory applied water-resistive and air barrier sheet.
   18. Roof sheathing with factory applied roofing underlayment.

B. Related Requirements:
   1. Section 07 25 00 - Weather Barriers: Water-resistive barrier over sheathing.
   2. Section 07 62 00 - Sheet Metal Flashing and Trim: Sill flashings.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. AFPA (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; American Forest and Paper Association; 2012.

C. American Society for Testing and Materials (ASTM) International:
   1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
   2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
   3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

D. AWPA U1 - Use Category System: User Specification for Treated Wood; American Wood Protection Association; 2012.

E. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; National Institute of Standards and Technology, U.S. Department of Commerce; 2010.

F. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology, Department of Commerce; 2010.

G. WWPA G-5 - Western Lumber Grading Rules; Western Wood Products Association; 2011.

1.3 SUBMITTALS

A. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.

B. Structural Composite Lumber: Submit manufacturer's published structural data including span tables, marked to indicate which sizes and grades are being used; if structural composite lumber is being substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.

C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

1.5 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.

2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
3. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

2.2 DIMENSION LUMBER

A. Grading Agency: Western Wood Products Association (WWPA).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: Kiln-dry or MC15.

D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
1. Lumber: S4S, No. 2 or Standard Grade.
2. Boards: Standard or No. 3.

2.3 EXPOSED BOARDS

A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.

B. Moisture Content: Kiln-dry (15 percent maximum).

C. Surfacing: S4S.

D. Species: Douglas Fir.

E. Grade: No. 2, 2 Common, or Construction.

2.4 CONSTRUCTION PANELS

A. Roof Sheathing: Any PS 2 type, rated Structural I Sheathing.
1. Bond Classification: Exterior.
2. Span Rating: 60 unless noted otherwise in Drawings.
3. Performance Category: 3/4 PERF CAT.

B. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

2.5 ACCESSORIES

A. Fasteners and Anchors:
1. Metal and Finish: Hot-dipped galvanized steel per ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.

B. Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions.
   1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing per ASTM A653/A653M.

C. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.
   1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing per ASTM A653/A653M.

D. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.

E. Sill Flashing: As specified in Section 07 62 00.

F. Subfloor Glue: APA AFG-01, Waterproof, water base, air cure type, cartridge dispensed.

G. Water-Resistive Barrier: As specified in Section 07 25 00.

H. Bird Screening: 1/2 inch by 0.63 inch diameter factory black paint finished aluminum wire mesh. Mount to extruded aluminum re-wireable frame at installations fitting into finished openings.

I. Insect (Bug) Screening: 18 by 16 factory black paint finished aluminum mesh (minimum 0.011 inch diameter), or as accepted by Architect.

J. Electrolysis Protection: Isolate metal in contact with metals of dissimilar galvanic range by isolation methods including application of suitable primers, paints, or tapes.

2.6 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

B. Preservative Treatment: As specified in Section 06 05 75.

PART 3 EXECUTION

3.1 PREPARATION

A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches and seal.

B. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.

C. Coordinate installation of rough carpentry members specified in other sections.

3.2 INSTALLATION - GENERAL

A. Conform to Structural Note and Drawings.

B. Select material sizes to minimize waste.

C. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

D. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.3 FRAMING INSTALLATION

A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.

B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

C. Install structural members full length without splices unless otherwise specifically detailed.

D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AFPA Wood Frame Construction Manual.

E. Install horizontal spanning members with crown edge up and not less than 1-1/2 inches of bearing at each end.

F. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.

G. Provide bridging at joists in excess of 8 feet span as detailed. Fit solid blocking at ends of members.

H. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.4 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

F. Provide the following specific non-structural framing and blocking:
   1. Cabinets and shelf supports.
   2. Wall brackets.
   3. Handrails.
   4. Grab bars.
   5. Towel and bath accessories.
   6. Wall-mounted door stops.
   7. Chalkboards and marker boards.
   8. Wall paneling and trim.
   9. Joints of rigid wall coverings that occur between studs.

3.5 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at all roof openings except where prefabricated curbs are specified and where specifically indicated otherwise. Form corners by alternating lapping side members.

3.6 INSTALLATION OF CONSTRUCTION PANELS

A. Subflooring: Screw to framing; staples are not permitted.

B. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
   1. At long edges provide solid edge blocking where joints occur between roof framing members.
   2. Nail panels to framing; staples are not permitted. See Structural Drawings.
   3. Install with panel ends over firm bearing. Secure T&G edges at side laps. Attach square cut edges at sides with panel edge clips or solid blocking in accordance with APA.
      a. Install minimum 1 panel edge clip midway between supports greater than 24 inches and under 48 inch span.
      b. Install minimum 2 panel edge clips spaced equal distant between supports at spans at 48 inch and over.
   4. Secure to solid structural framing as indicated on drawings. Include additional attachment as necessary to set securely in place or as indicated on structural drawings.
   5. Set nail/screw heads flush with surface of roof sheathing and other diaphragm sheathing.
      a. Do not penetrate or fracture surface of sheathing.
      b. Remove and replace nails not meeting this requirement.

c. Remove sheathing where nail spacing requirements prohibits replacement of nails.
d. Pneumatic nailing is accepted only on condition that it continuously meet this requirement.

C. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or as indicated on drawings.
1. Place water-resistive barrier horizontally over wall sheathing, weather lapping edges and ends.

D. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
3. Install adjacent boards without gaps.
4. Size and Location: As indicated on drawings.

E. Wall Sheathing and Roof Sheathing with Laminated Water-Resistive Barrier and Air Barrier: Secure to studs as recommended by manufacturer.
1. Install with laminated water-resistive and air barrier on exterior side of sheathing.
2. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
3. Use only mechanically attached and drainable EIFS and exterior insulation with wall sheathing with laminated water-resistive and air barrier.
4. Apply manufacturer's standard seam tape to joints between sheathing panels. Use tape gun or hard rubber roller as recommended by manufacturer.

3.7 SHINGLE NAILING BASE OVER VENTED RIGID INSULATION

A. Lay with longer edge perpendicular to supporting framing members.

B. Install plywood panels with longest dimension perpendicular to roof slope.

C. Stagger plywood joints so that joints are not aligned with vented rigid roof insulation joints.

D. Stagger alternate plywood end joints up roof slope.

E. Fasten plywood end joints with panel edge clips to align top surface of adjacent panels.

F. Secure with 12 screw fasteners in pattern recommend by vented roof insulation manufacturer. Refer to Section 07 21 13.

3.8 BUG AND BIRD SCREENING

A. Install at exterior openings and vents at exterior building envelope, except where other systems are specified.

3.9 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.

B. Allow preservative to dry prior to erecting members.

3.10 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.11 CLEANING

A. Waste Disposal: Comply with the requirements of Section 01 74 19.
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION 06 10 00

SECTION 06 15 00

WOOD DECKING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Solid-sawn wood roof and decking.

B. Related Sections
   1. Section 06 10 00 - Rough Carpentry
   2. Section 09 90 00 - Painting and Coatings

1.2 REFERENCES

A. American Institute of Timber Construction (AITC), www.aitc-glulam.org:
   1. AITC 112 -Standard for Tongue-and-Groove Heavy Timber Roof Decking.

B. National Institute of Standards and Technology:
   1. PS20-05 - American Softwood Lumber Standard.

1.3 QUALITY ASSURANCE

A. Standard for Solid-Sawn Wood Decking: Comply with AITC 112.

B. Forest Certification: Provide wood decking produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

1.4 DELIVERY, STORAGE, AND HANDLING

A. Schedule delivery of wood decking to avoid extended on-site storage and to avoid delaying the Work.

B. Store materials under cover and protected from weather and contact with damp or wet surfaces. Provide for air circulation within and around stacks and under temporary coverings. Stack wood decking with surfaces that are to be exposed in the final Work protected from exposure to sunlight.

1.5 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 WOOD DECKING, GENERAL

A. General: Comply with DOC PS 20 and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.

B. Moisture Content: Provide wood decking with 15 percent maximum moisture content at time of dressing.

2.2 SOLID-SAWN WOOD DECKING

A. Decking Species: As indicated on Drawings.

B. Decking Nominal Size: As indicated on Drawings.
1. Where no size indicated, match existing.

C. Decking Grade: As indicated on Drawings.

D. Grade Stamps: Factory mark each item with grade stamp of grading agency. Apply grade stamp to surfaces that will not be exposed to view.

E. Face Surface: Smooth.

F. Edge Pattern: Vee grooved.

2.3 ACCESSORY MATERIALS

A. Fasteners for Solid-Sawn Decking: Provide fastener size and type complying with decking standard for thickness of deck used.

B. Nails: Common; complying with ASTM F1667, Type I, Style 10.

C. Spikes: Round; complying with ASTM F1667, Type III, Style 3.

D. Fastener Material: Stainless steel.

E. Sealant: Elastomeric joint sealant complying with requirements in Division 07 Section "Joint Sealants" for Use NT (nontraffic) and for Uses M, G, A, and, as applicable to joint substrates indicated, O joint substrates.

F. Penetrating Sealer: Clear sanding sealer complying with Section 09 90 00 and compatible with topcoats specified for use over it.

2.4 FABRICATION

A. Predrill decking for lateral spiking to adjacent units to comply with referenced decking standard.

B. Seal Coat: After fabricating and surfacing decking, apply a saturation coat of penetrating sealer in fabrication shop.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine walls and support framing in areas to receive wood decking for compliance with installation tolerances and other conditions affecting performance of wood decking.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install solid-sawn wood decking to comply with referenced decking standard.
   1. Locate end joints for controlled random lay-up.

B. Anchor wood roof decking, where supported on walls, with bolts as indicated.

C. Apply joint sealant to seal wood roof decking to dissimilar materials.

3.3 ADJUSTING

A. Repair damaged surfaces and finishes after completing erection. Replace damaged decking if repairs are not approved by Architect.

3.4 PROTECTION

A. Provide temporary waterproof covering as the Work progresses to protect roof decking until roofing is applied.

END OF SECTION 06 15 00

SECTION 06 16 43

GYPSUM SHEATHING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Exterior gypsum wall sheathing board
   2. Exterior gypsum soffit sheathing board for paint finish
   3. Soffit vents.

B. Related Sections:
   1. Section 07 25 00 - Weather Barriers
   2. Section 09 90 00 - Painting and Coating

1.2 REFERENCES

A. Reference Standards: Current edition at time of Bid.

B. American Society for Testing and Materials (ASTM) International:
   1. ASTM B117 - Practice for Operating Salt Spray (Fog) Apparatus.
   2. ASTM C954 - Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from (0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) In Thickness.
   3. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
   4. ASTM C1177 - Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel.
   5. ASTM C1278 - Standard Specification for Fiber-Reinforced Gypsum Panels.
   6. ASTM C1280 - Standard Specification for Application of Gypsum
   7. ASTM C1396 - Standard Specification for Gypsum Board.
   8. ASTM D779 - Standard Test Method for Water Resistance of Paper, Paperboard, and Other Sheet Materials by the Dry Indicator Method
   9. ASTM E136 - Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.
   10. ASTM E84 - Test Method for Burning Characteristics of Building Materials.
   11. ASTM E119 - Test Methods for Fire Tests of Building Construction and Materials.

C. Gypsum Association (GA): GA-253 - Recommended Specifications for Application of Gypsum Sheathing.

D. UL Fire Resistance Directory (UL): Fire Resistance Volume 1 – with Hourly Ratings for Beams, Floors, Roofs, Columns, Walls and Partitions.

1.3 PERFORMANCE REQUIREMENTS

A. Fire Resistance:

1. Noncombustible, ASTM E136.
2. Flame Spread and Smoke Developed: 0, as tested to ASTM E84.
3. One hour Fire Rated system, UL Fire Resistance Directory Labeled, tested to ASTM E119.

B. Moisture Resistance: Surface water absorption 0.73, and humidified deflection 1/8 inch, ASTM C1396.

1.4 SUBMITTALS

A. Submit in accordance with the requirements of Sections 01 33 00.

B. Product Data: Manufacturer's descriptive literature indicating material composition, thickness, sizes, and fire resistance for the following.
1. Backing board
2. Fasteners
3. Joint tape
4. Joint compound

C. Sample Warranty: Meet or exceed provisions specified by this Section.

1.5 REGULATORY REQUIREMENTS

A. Conform to IBC for fire rated assemblies.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver to jobsite in manufacturer's original, clearly labeled protective packaging. Immediately upon delivery to job site, place materials in area protected from weather.

B. Manufacturers’ polyethylene wrappers are not sufficient weather protection. Do not expose gypsum sheathing to weather.

C. Stack flat above ground on framework or blocking and cover with protective waterproof covering under cover, protected from moisture and weather conditions.

D. Handle to prevent breaking of gypsum panels and edges.

E. Protect exterior gypsum sheathing from water saturation. Do not encapsulate wet gypsum sheathing.
1. Remove and replace wet or damp gypsum sheathing to avoid mold growth.

1.7 COORDINATION

A. Conform to Section 013100 for coordination with work of related Sections for installation of gypsum sheathing work of this Section.

B. Section 06 10 00 for coordination of framing members for support of gypsum sheathing.

1.8 WARRANTY

A. Manufacturer’s standard minimum 12 month Warranty against damage due to weather exposure.

B. Manufacturer’s standard minimum 10 year Warranty against manufacturing defects.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Gypsum Sheathing:
   1. CertainTeed, www.bpb-na.com.
   2. Georgia Pacific Corp.www.gp.com.
   3. National Gypsum Company. www.nationalgypsum.com.
   4. Substitution Requests: Submit for approval under provisions of Section 01 60 00.

2.2 GYPSUM WALL SHEATHING AND SOFFIT BOARD

A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177, Type X, 5/8 inch thick with fiberglass mat laminated to both sides and with manufacturer's standard edges.
   1. CertainTeed GlasRoc Sheathing, Type X, 5/8 inch thick, meeting or exceeding ASTM C1177.
      a. Core: Silicone treated water-resistant gypsum.
      b. Facing: Embedded inorganic glass mat both sides.
      c. Coating: White colored acrylic on outside face of panel.
   2. GP DensGlas Fireguard Type X Exterior Sheathing, Type X, 5/8 inch thick, meeting or exceeding ASTM C1177.
      a. Core: Silicone treated water-resistant gypsum.
      b. Facing: Inorganic glass mat both sides.
   3. National Gold Bond E2XP (Extended Exposure Sheathing), Type X, 5/8 inch thick, meeting or exceeding ASTM C1177.
      a. Core: Silicone treated water-resistant gypsum.
      b. Facing: Embedded inorganic glass mat both sides.
      c. Coating: Purple colored acrylic on outside face of panel.

2.3 FASTENERS

A. Steel Drill Screws: ASTM C1002 and C954, self-drilling, minimum 1-1/4 inch long, bugle head, corrosion-resistant polymer coating, conforming to ASTM B117.

B. Screws at Steel Framing: Type S, in lengths required to penetrate 3/8 inches beyond steel stud framing.

2.4 GYPSUM WALL SHEATHING ACCESSORIES

A. Flexible Flashing: As specified by Section 07 25 00.

B. Weather Barrier: As specified by Section 07 25 00.

2.5 GYPSUM SOFFIT BOARD ACCESSORIES

A. Metal Trim at Control Joints: 1-3/4 inch wide with 1/4 inch channel 3/32 inch grounds, zinc alloy.
   1. USG Zinc Control Joint No. 093

B. Joint Tape: Self adhering, 2 inch wide by 10 by 10 glass mesh tape. Paper tape is not acceptable.
   1. BPB Marco Fiberglass Drywall Mesh Tape

C. Joint Compound: Chemically curing type. Water based type compound is not accepted.
   1. Georgia Pacific, Speed Set.
   2. USG Sheetrock, Easy Sand or Durabond.
   3. Beadex, Silver Set.
   4. BPB Profin Lightweight Setting Compound.

D. Continuous Soffit Vents: PVC, 4 inch wide, perforated for 16 square inch ventilation per lineal foot, ASTM D1784, suitable configuration for installation.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify installation conditions as satisfactory to receive work of this Section before beginning.

3.2 GYPSUM SHEATHING INSTALLATION

A. Conform to GA-253, manufacturer's instructions, and provisions of Contract Documents.

B. Install with long dimensions horizontal. Abut ends of sheathing at center of supports. Stagger end joints.

C. Fasten gypsum sheathing board with screws or pneumatic pin fasteners. Space at 8 inch or 6 inch on center at panel perimeters and panel field, conforming to manufacturer’s instructions. Set heads flush with sheathing board into solid bearing spaced at maximum 24 inch on center.

D. Drive fasteners to bear tightly against and flush with panel surface. Do not countersink.

E. Do not locate perimeter fasteners closer than 3/8 inch from panel edges and ends.

F. Tape joints with self-adhering membrane flashing as specified in Section 07 25 00.

G. Hold gypsum board 1/2 above the floor to avoid moisture wicking.

3.3 GYPSUM SOFFIT BOARD INSTALLATION

A. Install double layer staggered panels for fire-resistive 1 hour rated assembly.

B. Fasten gypsum sheathing board with screws or pneumatic pin fasteners. Space at 6 inch or 8 inch on center at panel perimeters and panel field, conforming to manufacturer's instructions. Set heads flush with sheathing board into solid bearing spaced at maximum 16 inch on center.

C. Control Joints: Install at designated locations at outside panel, as accepted by Architect.
   1. Do not to exceed 50 linear feet or 2500 square feet.
   2. Verify double framing in place before installing control joints.

D. Apply fiberglass joint tape at joints and embed with chemically curing joint compound.

E. Skim surface with chemically curing joint compound for smooth finish ready for painting specified Section 09 90 00.

END OF SECTION 06 16 43

SECTION 06 17 33

WOOD I-JOISTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wood I-joists for roof and floor framing.
   2. Bridging, bracing, and anchorage.
   3. Framing for openings.
   4. Preservative treatment of wood.

B. Related Requirements:
   1. Section 06 10 00 - Rough Carpentry: Installation requirements for miscellaneous framing.
   2. Section 06 10 00 - Rough Carpentry: Material requirements for blocking, plates, and miscellaneous framing.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. ASTM D5055 - Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists; 2013.

C. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; 2010.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's literature describing materials, dimensions, allowable spans and spacings, bearing and anchor details, bridging and bracing requirements, and installation instructions; identify independent inspection agency.

C. Shop Drawings: Indicate sizes and spacing of joists, bracing and bridging, bearing stiffeners, holes to be cut (if any), and framed openings between joists.

D. Evaluation Reports: Evaluation Services Report for each wood I-Joist type.

E. Design Calculations. Signed and sealed by structural engineer, licensed by State of Oregon, employed by manufacturer.

F. Certificate: Certification by joist manufacturer that products delivered are of the same design and construction as those evaluated by the independent inspection agency.

G. Fire-Resistance Test Data: IBC/ICC ES Evaluation Reports for each fire-rated assembly as tested to UL or other independent testing agency accepted by Building Code Regulatory Agency having jurisdiction.

H. Sample Warranty: Meet or exceed provisions specified by this Section.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
   1. Maintain locally available factory trained technical representative for technical consultation and field inspections.
   2. Able to furnish documentation showing conformance to provisions of this Section.

B. I-Joist Design:
   1. Custom design by structural engineer, licensed by State of Oregon, employed by manufacturer.
   2. Conform to Structural Notes and Drawings for load design requirements.

C. Fabricating Plant: Accepted by IBC/ICC ES certified testing agency and Building Code Regulatory Authority having jurisdiction.

D. Labeling: Stamp each joist with identifying ICC/NER joist type, Evaluation Report number, manufacturer's name, plant number, and independent testing agency logo.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in manufacturer's original packaging with manufacturer's name and product identification intact and legible.

B. Protect products from damage due to weather and breakage.

C. Protect joists from warping or other distortion by stacking in upright position, braced to resist movement, with air circulation under coverings and around stacks.

D. Handle individual joists in the upright position.

E. Moisture Content:
   1. Installed I-joists: less than 15 percent moisture content when enclosed in finished construction. If I-joists have moisture content of 15 percent or greater, the I-joists must be dried prior to enclosing into finished construction.

1.6 WARRANTY

A. Manufacturer: Life time of Building Warranty for I-Joists; free from defects in materials and workmanship, performing to manufacturer’s specifications.

1.7 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Wood I-Joists:
   1. Weyerhaeuser; TJI Joist: www.woodbywy.com.
   2. Boise Cascade; Product BCI Joist: www.boisebuilding.com.
   3. Pacific Wood Tech; Product PWI Joist: www.pacificwoodtech.com.
   4. Substitutions: See Section 01 60 00.

2.2 MATERIALS

A. Wood I-Joists: Solid lumber top and bottom flanges and oriented strand board (OSB) webs bonded together with structural adhesive, with published span rating to meet project requirements.
   1. Span Rating: Established and monitored in accordance with ASTM D5055 by independent inspection agency.
   2. Oriented Strand Board: Comply with PS 2.
   3. Adhesive: Tested for wet/exterior service in accordance with ASTM D2559.
   4. Depth: As indicated on drawings.
   5. Fabrication Tolerances:
      a. Flange Width: Plus/minus 1/32 inch.
      b. Flange Thickness: Minus 1/16 inch.
      c. Joist Depth: Plus 0, minus 1/8 inch.
   6. Marking: Mark each piece with depth, joist spacing, and allowable span for joist spacing.
   7. Provide bearing stiffeners if required by span rating or joist hanger manufacturer.
   8. Ventilation Holes: Provide manufacturer's standard 1-1/2 inch diameter at 12 inch on center at top of webs.
      a. Include other ventilation holes as required or indicated for full ventilation.
      b. Do not punch out holes at installations where fire sprinklers are required at concealed construction. Verify with Architect.
   9. Openings and Penetrations Through Web:
      a. Provide openings through center of web as necessary for penetrations specified by other Sections.
      b. Conform to manufacturer’s charts and instructions for permitted size and locations.
      c. Verify firestop requirements at installations where fire sprinklers are required at concealed locations.

B. Wood-Based Components:
   1. Wood fabricated from old growth timber is not permitted.
   2. Provide sustainably harvested wood, certified or labeled as specified in Section 01 60 00.
   3. Provide wood harvested within a 500 mile radius of the project site.
   4. Wood fabricated from timber recovered from riverbeds or otherwise abandoned is permitted, unless otherwise noted, provided it is clean and free of contamination; identify source;

provide lumber re-graded by an inspection service accredited by the American Lumber Standard Committee, Inc.

C. Joist Hangers: See Structural Drawings.

D. Joist Bridging: Type, size and spacing recommended by joist manufacturer.

E. Wood Blocking: Trus Joist TJI Rim Joist/Blocking Laminated Strand Lumber (LSL) or Parallel Strand Lumber (PSL), or APA-EWS Rim Board Plus.

F. Rim Board:
   1. Trus Joist, Timberstrand LSL Rim Board, or e-Rim, 1 inch to 1-1/2 inch wide by depth of joist, specified for type and quality.
   2. APA-EWS Rim Board Plus 1-1/8 inch to1-1/2 inch wide by depth of joist, accepted.

G. Fasteners: Electrogalvanized steel, type to suit application.

H. Bearing Plates: Electrogalvanized steel, unfinished.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that supports and openings are ready to receive joists.

B. Verify that field measurements are as indicated on shop drawings.

3.2 PREPARATION

A. Coordinate placement of bearing items.

3.3 ERECTION

A. Install joists in accordance with manufacturer's instructions.

B. Set structural members level and plumb, in correct position.

C. Make provisions for erection loads and for sufficient temporary bracing to maintain structure plumb and in true alignment until completion of erection and installation of permanent bracing.

D. Do not field cut or alter structural members without approval of Architect.

E. Install permanent bridging and bracing.

F. Install headers and supports to frame openings required.

G. Frame openings between joists with lumber in accordance with Section 06 10 00.

H. Coordinate installation of sheathing/decking with work of this section.

3.4 TOLERANCES

A. Framing Members: 1/2 inch maximum, from true position.

END OF SECTION 06 17 33

SECTION 06 20 00

FINISH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Finish carpentry items.
   2. Wood door frames, glazed frames.
   3. Wood casings and moldings.
   4. Hardware and attachment accessories.

B. Related Requirements:
   1. Section 06 41 00 - Architectural Wood Casework: Cabinet hardware.
   2. Section 08 80 00 - Glazing: Glass and glazing of wood partitions and screens.
   3. Section 09 90 00 – Painting and Coating: Painting and finishing of finish carpentry items.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.

C. ANSI A208.1 - American National Standard for Particleboard; 2009.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

E. AWI (QCP) - Quality Certification Program, www.awiqcp.org; current edition at www.awiqcp.org.

F. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

G. AWPA U1 - Use Category System: User Specification for Treated Wood; American Wood-Preservers' Association; 2012.

H. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.9).

I. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; Hardwood Plywood & Veneer Association; 2009.

J. PS 1 - Structural Plywood; 2009.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.4 SUBMITTALS

A. Product Data:
   1. Provide data on fire retardant treatment materials and application instructions.
   2. Provide instructions for attachment hardware and finish hardware.

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Provide the information required by AWI/AWMAC/WI (AWS).
   2. Include certification program label.

C. Samples: Submit three samples of finish plywood, 8 x 8 inch in size illustrating wood grain and specified finish.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
   1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
   2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
   3. Single Source Responsibility: Provide and install this work from single fabricator.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect work from moisture damage.
   1. Store materials in ventilated, interior locations. Protect from excessive humidity. Maintain relative humidity of 25 percent to 55 percent before, during, and after installation.

B. Store plywood, fiberboard, particleboard, and other sheet products flat. Allow to stabilize before use.

C. Cover to protect against dirt and dust.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Building completely enclosed and dry. Moisture generating finish work complete before finish woods are delivered.

1.8 FIELD MEASUREMENTS

A. Verify field dimensions with Shop Drawings before beginning fabrications.

1.9 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of Section.

PART 2 PRODUCTS

2.1 FINISH CARPENTRY ITEMS

A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI/AWMAC/WI (AWS) for Premium Grade.

B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

C. Moisture Content of Finish Woods:
   1. Interior Use: Kiln dried or air dried to 5 percent. 10 percent maximum when delivered to site.
   2. Exterior Use: Kiln dried or air dried to 9 percent. 15 percent maximum when delivered to site.

2.2 MILLWORK MATERIALS

A. Hardwood Lumber and Millwork: Clear Finish white maple, plain sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.

2.3 SHEET MATERIALS

A. Softwood Plywood Not Exposed to View: Any face species, veneer core; PS 1 Grade A-B; glue type as recommended for application.

B. Hardwood Plywood (WP-1): Clear Finish White Maple, plain sawn, book matched, medium density fiberboard core; HPVA HP-1, Front Face Grade AA, Back Face Grade 1; glue type as recommended for application.

C. Hardboard: ANSI A135.4; Pressed wood fiber with resin binder, Class 1 - Tempered, 1/4 inch thick, smooth one side (S1S).

D. Medium Density Fiberboard (MDF):
   1. AWS Section 4, ANSI A208.2 Product Class MD, Industrial Grade, 40 to 50 pound density.
      a. Moisture Content: 4 percent to 7 percent.
   2. Formaldehyde Content: Manufactured with formaldehyde free binders. Labeled by manufacturer as containing less than 0.005 parts per million found occurring naturally in wood.
   3. Manufacturers:
      a. Sierra Pine, www.sierrapine.com.

b. FlakeBoard. www.flakeboard.com

F. Medium Density Fiberboard (MDF) Core Plywood:
1. Medium Density Fiberboard Core Plywood:
a. Face and Back Face: Specified hardwood veneer.
b. Core: Medium density fiberboard (MDF). Fire-rated MDF at fire-resistive construction.
c. Thickness: 3/4 inch or as indicated on Drawings.
d. Finish: Transparent finish as indicated Section 09 90 00.

G. Cross-Laminated Hardwood Veneer Core Plywood:
1. Use or exposed-edge cross-laminated hardwood veneer faced plywood core panels.
2. Manufacturers/Products:
a. States Industries, APPLEPLY, 3/4 inch, 13 ply panels, www.appleply.com.
1) Plywood Core: 1/16 inch alder or poplar. Free of edge voids in veneer at exposed surfaces.
2) Hardwood Face Veneer: Select white maple, plain sliced.
(a) Exposed Surfaces: AWI 200, Grade I.
(b) Semi-Concealed Surfaces: AWI 200, Grade II.
(c) Concealed Surfaces: AWI 200, Grade III or less, used as backing.

H. Edge Bands: Same species as wood panel veneer.
1. Wall Panels: Edge band veneer
2. Other Locations: Solid wood edge. Minimum 1/8 inch thick where not otherwise detailed.

2.4 FASTENINGS

A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

B. Fasteners: Of size and type to suit application; steel finish in concealed locations and stainless steel finish in exposed locations.
1. Exposed Fasteners:
a. Stainless steel screw with finish washer.
b. Integral stainless steel washerhead screw.
c. Square drive or spanner (snake-eye) head.
d. Size, length, and screw threads as suitable for secure penetration into solid bearing.
2. Use recessed screws, finish, or casing nails and screws for concealed and exposed work, except as otherwise indicated.

C. Concealed Joint Fasteners: Threaded steel.

2.5 ACCESSORIES

A. Lumber for Shimming, Blocking, and Furring: Softwood lumber of Douglas Fir species.

B. Plastic Edge Trim: Extruded flat shaped; smooth finish; self-locking serrated tongue; of width to match component thickness; color as selected.

C. Aluminum Edge Trim: Extruded convex shape; smooth surface finish; self-locking serrated tongue; of width to match component thickness; natural mill finish.

D. Glass: As specified in Section 08 80 00.

E. Primer: as specified in Section 09 90 00.

F. Wood Filler: Solvent base, tinted to match surface finish color.

2.6 HARDWARE

A. Hardware: Comply with BHMA A156.9.

B. Hot-dipped galvanize rough hardware subject to moisture and as specified Section 06 10 00.

2.7 WOOD TREATMENT

A. Factory-Treated Lumber: Comply with requirements of AWPA U1 - Use Category System for pressure impregnated wood treatments determined by use categories, expected service conditions, and specific applications.

B. Fire Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; capable of providing flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.

C Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

D. Redry wood after pressure treatment to maximum 7 percent moisture content.

2.8 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. Fit exposed sheet material edges with 3/8 inch matching hardwood edging. Use one piece for full length only.

C. Kerf backs of wood members more than 5 inch wide, or more than 3/4 inch thick.

D. Joints: Make tight and form to conceal or reduce exposed shrinkage.

E. Use concealed fastenings wherever possible.

F. Cap exposed plastic laminate finish edges with aluminum trim.

G. Shop prepare and identify components for book match grain matching during site erection.

H. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

I. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.

J. Apply laminate backing sheet to reverse face of plastic laminate finished surfaces.

K. Finish exposed surfaces to be smooth, free from tool and machine marks.

2.9 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.

D. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent:
      a. System - 5, Varnish, Conversion.
      b. Sheen: Satin.
   2. Opaque:
      a. System - 1, Lacquer, Nitrocellulose.
      b. Color: As selected by Architect.
      c. Sheen: Flat.
   3. For Transparent Finishes in Type II Construction:
      a. Flamort “6-3”, Class A, Fire Retardant. www.flamort.com

E. Prime paint surfaces in contact with cementitious materials.

F. Back prime woodwork items to be field finished, prior to installation.
   1. Back prime concealed faces of panels, moldings, and other thin wood, plywood, and panel material subject to warping and bowing.
   2. Apply 2 coats of sealer, primer, or suitable finish system to balance finish on exposed face. Refer to Section 09 90 00.

2.10 FIELD FINISHING

A. Preparation: Sand, seal, and prepare surfaces to receive uniform coatings free of blotches, inconsistent absorption, irregular sheen, and color variations.

B. Back Priming: Prior to installation, back prime concealed faces of panels, moldings, and other thin wood, plywood, and panel material subject to warping and bowing. Apply 2 coats of sealer, primer, or suitable finish system to balance finish on exposed face. Refer to Section 09 90 00.

C. Prime paint surfaces in contact with cementitious materials.

D. Field Finished Wood Trim and Field Fabricated Finished Carpentry: Provide painted and transparent finish systems under work of Section 09 90 00.
   1. Exposed Hardwood Colors: As selected by Architect.
   2. Wood Putty Filler: Match color of finished wood.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

C. See Section 06 10 10 – Rough Carpentry for installation of recessed wood blocking.

3.2 PREPARATION

A. Field Measurements: Take dimensions necessary before fabrication and installation.

B. Prior to installation, back prime work scheduled to be painted.

C. Protect surrounding areas or surfaces to preclude damage during installation.

3.3 INSTALLATION

A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.

B. Set and secure materials and components in place, plumb and level.

C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
   1. Install to Detail with tight joints. Miter casings and moldings except where indicated otherwise. Cut butt splices at 30 degree angles.

D. Install hardware in accordance with manufacturer's instructions.

E. Use finish nails or finish head screws at face of finished installations except where washerhead or other exposed fastener is indicated. Use screws designed for each installation. Set nails and screws, countersink fastenings, and putty recesses, except use blind fastening where indicated or practical.
   1. Countersink nails and screws.
   2. Fill recessed heads with wood putty.

F. Space screws and nails at equal intervals at spacing to fasten permanently and securely in place, except not less than one fastener at each end and at center of each item.

G. Make members and lines level, plumb, and square to line with adjacent construction.

H. Select and cut material to exclude damaged, marked, or defective areas.

I. Eased Edges: Ease exposed edges of finish work 1/16 inch minimum radius whether indicated or not.

3.4 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment in accordance with manufacturer's instructions.

B. Brush apply one coats of preservative treatment on wood in contact with cementitious materials. Treat site-sawn cuts.

C. Allow preservative to dry prior to erecting members.

3.5 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Site Finishing: See Section 09 90 00.

C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.6 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

3.7 CLEANING

A. Leave clean, premises free of residue and debris resulting from of work of this Section.

3.8 PROTECTION

A. Protect exposed finishes and surfaces from construction damage.

END OF SECTION 06 20 00

SECTION 06 41 00

ARCHITECTURAL WOOD CASEWORK

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Specially fabricated cabinet units.
   2. Countertops.
   3. Cabinet hardware.

B. Related Requirements:
   1. Section 08 80 00 - Glazing: Glass for casework.
   2. Division 22 Plumbing, Division 23 HVAC and Division 26 Electrical. Provide for installation of concealed and semi-conceal electrical and mechanical cutouts and items into casework. Include coordination for electrical equipment into electrical equipment closets.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. AWI (QCP) - Quality Certification Program, www.awiqcp.org; current edition at www.awiqcp.org.

C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

D. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.9).

E. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.

1.3 DEFINITIONS

A. Terminology for Surface Visibility: As defined in AWS Section 10.

B. Exposed Exterior Surfaces: Defined as all exterior surfaces exposed to view, including:
   1. All surfaces visible when doors and drawers are closed, including knee spaces.
   2. Underside of cabinet bottom over 42 inches above the finish floor, including cabinet bottoms behind light valances and the bottom edge of light valances.
   3. Cabinet tops under 80 inches above the finish floor, or if 80 inches and over and visible from an upper building level or floor.
   4. Visible front edge of stretcher, ends, divisions, tops, bottoms, shelves, and nailers.
   5. Sloping tops of cabinets that are visible.

C. Exposed Interior Surfaces: Defined as all interior surfaces exposes to view in open casework or behind transparent doors, including:
   1. Shelves, including edge banding.

2. Division and partitions.
3. Interior face of ends (sides), backs and bottoms (including pull-outs). Also included are the interior surfaces of cabinet top members 36 inches or more above the finished floor.
4. Interior face of door and applied drawer fronts.

D. Semi-Exposed Surfaces: Defined as those interior surfaces only exposed to view when doors or drawers are opened, including:
1. Shelves, including edge banding.
2. Division and partitions.
3. Interior face of ends (sides), backs and bottoms (including bank of drawers). Also included are the interior surfaces of cabinet top members 36 inches or more above the finished floor.
4. Drawer sides, sub fronts, backs and bottoms.
5. The underside of cabinet bottoms between 24 inches and 42 inches above the finished floor.
6. Security and dust panels or drawer stretchers.

E. Concealed Surfaces: Defined as those exterior or interior surfaces that are covered or not normally exposed to view, including:
1. Toes space unless otherwise specified.
2. Sleepers, stretchers, and solid sub tops.
3. The underside of cabinet bottoms less than 24 inches above the finished floor.
4. The flat tops of cabinets 80 inches or move above the finished floor, except if visible from an upper floor or building level.
5. The three non-visible edge of adjustable shelves.
6. The underside of countertops, knee spaces, and drawer aprons.
7. The faces of cabinet ends of adjoining units that butt together.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.5 SUBMITTALS

A. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
1. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot.
2. Provide the information required by AWI/AWMAC/WI (AWS).
3. Include certification program label.

B. Product Data: Provide data for hardware accessories.

C. Samples: Submit three (3) actual samples of each finish specified, minimum 4” x 6” in size.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Product Handling: Do not deliver shop-fabricated items until installation areas are ready (including completion of painting, wet work, grinding, and similar operations that could damage, soil or deteriorate casework and millwork).

B. Store in areas meeting requirements for installation areas.

C. Protect units from moisture damage.

D. Protect finished surfaces from soiling and damage during handling and installation. Keep covered with polyethylene film or other protective covering.

1.7 FIELD CONDITIONS

A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

1.8 FIELD MEASUREMENTS

A. Verify field dimensions indicated on shop drawings prior to beginning work of this Section.

1.9 COORDINATION

A. Section 06 10 00 for backing and attachments as necessary for casework and bracket supports at open casework.

B. Division 22 - Plumbing, Division 23 - HVAC and Division 26 - Electrical: Provide for installation of concealed and semi-concealed electrical and mechanical cutouts and items into casework.

1.9 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Single Source Responsibility: Provide and install this work from single fabricator.

2.2 MATERIALS - GENERAL

A. Low-Emitting Materials: Provide manufactured wood casework, including countertops, made with adhesives and composite wood products containing no urea formaldehyde.

2.3 CABINETS

A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI (AWS) for Custom Grade.

B. Plastic Laminate Faced Cabinets: Custom grade.

C. Cabinets:
   1. Finish - Exposed Exterior Surfaces: Decorative laminate.
   2. Finish - Exposed Interior Surfaces: Decorative laminate.
   3. Finish - Concealed Surfaces: Manufacturer's option.
   4. Door and Drawer Front Edge Profiles: Square edge with thin applied band.
   5. Door and Drawer Front Retention Profiles: Fixed panel.

6. Cabinet Design Series: As indicated on drawings.

2.4 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
   1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches wide.
   2. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products: Comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
   1. Recycled Content of Medium-Density Fiberboard and Particleboard: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 20 percent.
   2. Medium-Density Fiberboard: ANSI A208.2, Grade 130 made with binder containing no urea formaldehyde.
   3. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.
   4. Veneer-Faced Panel Products (Hardwood Plywood): Clear Finish White Maple, plain sawn, book matched, medium density fiberboard core; HPVA HP-1, Front Face Grade AA, Back Face Grade 1; glue type as recommended for application.
   5. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.5 LAMINATE MATERIALS

A. Manufacturers:
   1. Formica Corporation: www.formica.com.
   2. Panolam Industries International, Inc./Nevamar: www.nevamar.com.
   3. Wilsonart, LLC www.wilsonart.com.
   4. Substitutions: See Section 01 60 00.

B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.

C. Provide specific types as scheduled.

D. Finish: HDPL, unless otherwise noted. Color as selected from manufacturer standards.
   1. PL-1 Color to be determined.
   2. PL-2 Formica Color Core, color to be determined.
   3. PL-3 Color to be determined.
   4. PL-4 Color to be determined.
   5. PL-5 Color to be determined.

2.6 COUNTERTOPS

A. Plastic Laminate Countertops: Medium density fiberboard substrate covered with HPDL, conventionally fabricated and self-edge banded.

B. Moisture Resistant Countertop Core:
   1. Provide for countertops subject to moisture conditions, such as those with sink cutouts:
      a. Plywood: APA PSI-95, Marine Grade A-A or A-B.

2.7 ACCESSORIES

A. Adhesive: Type recommended by fabricator to suit application.

B. Plastic Edge Banding: Extruded PVC, flat shaped; smooth finish; self-locking serrated tongue; of width to match component thickness.

C. PVC Edge Banding:
   1. Manufacturer:
      a. Doellken Woodtape, specified for type and quality. www.doellken-woodtape.com.
   2. Typical PVC Edge Banding: Provide at plastic laminated faced casework edges.
      a. Exposed and Semi-Exposed Edges: 3 mm (1/8 inch) thick.
      b. Semi-Exposed Edges: 0.02 inch thick.
      c. Concealed Edges: No banding, except at front and back face of shelves.
      d. Trim edges and corners and buff smooth, same thickness as edge.
   3. PVC Upturned Edge Banding: 3mm by 1-3/16 inch. Provide at open athletic shelves and laboratory shelves.
   4. Adhere with hot melt waterproof adhesive under heat and pressure.
   5. PVC Edge Banding Color:
      a. Match color of adjacent plastic laminate from full selection of manufacturer's color selection, as accepted by Architect.
      b. Match melamine where not adjacent to plastic laminate.

D. Mirror: Manufacturer's standard glass mirror.
   1. Provide two (2) 8"x10" mirrors at each Teacher Wardrobe.
      a. Mount to door at +36" and +60" above finish floor.

E. Fasteners: Size and type to suit application.

F. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.

G. Grommets: Standard plastic grommets for cut-outs, in color black.
   1. Grommet with slotted cap, 2-3/8 inch diameter.
   2. Design to accommodate plugs up to 2-1/4 inches such as computer peripheral and business machine plugs.

2.9 HARDWARE

A. Hardware: BHMA A156.9, types as indicated for quality grade specified.

B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self-rests, polished chrome or satin chrome finish, for nominal 1 inch spacing adjustments.
   1. Product:
      a. Pilaster Standards: Knape & Vogt, No. 255 ZC, 19 gauge steel by 5/8 inch wide, zinc plated.
      b. Support Clips: Knape & Vogt, No. 256 ZC, zinc plated.

C. Heavy Duty Storage Shelves: 12 gauge steel, 2 inch adjustment brackets. Capacity 1060 pounds at 12 inch shelf depth, with brackets at 16 inch on center.
   1. Standards: Reeve 40 and K&V 87 ANO.
   2. Brackets: Reeve 81 and K&V 187 ANO with 210 shelf rest.
   3. Screws: Suitable for purpose, flat heads set flush into standards so as not to interfere with mounting of brackets. Screw head finish to visually match standards.

D. Wall Mounted Fixed Shelf Bracket: Welded construction, finished with powder coat or enamel coating matching color of PVC edge banding.
   1. Minimum 1-1/2 inch wide by 1/4-inch thick cold rolled steel flatbar with minimum10 inch horizontal and vertical legs, braced with 1/4 inch diameter steel rod or flat bar welded at junctures.
   2. Product:
      a. Knape & Vogt 208 L-Bracket, 0.20 inch by 1-3/16 inch cold rolled steel flatbar with 11-1/2 inch horizontal and vertical legs, braced with 0.20 inch thick flat bar welded at junctures, 1,000 pound load capacity at 16 inch centers per pair, tested ANSI A156.9.

E. Counter Support Bracket: Manufacturer's standard shelf angle, welded construction, minimum 15 gauge by 1-1/2 inch tube steel or 1/4 inch flat bar. Support counters exceeding 36-inch span.
   1. Horizontal Leg: Less 3-inch width of counter.
   2. Vertical Leg: Minimum 18 inch deep.
   3. Leg Brace: 1/4 inch thick by 1-1/2 inch flat bar gusset plate at 45 degree angle, 6 inch out.
   4. Continuous blocking at back of support bracket.

F. Drawer and Door Pulls: Round Wire Pulls.
   1. Manufacturer: Stanley, or approved.
   2. Model: 5 inch wire pull, nickel color.

G. Cabinet Locks.
   1. Manufacturer: Olympus, www.olympus-lock.com.
      a. Locks: Provide where shown on Drawings.
         1) Door Lock: Olympus 100 DR, 5 pin, 7/8” barrel.
         2) Drawer Lock: Olympus 200DW, 5 pin, 7/8” barrel.
      b. Keying: Master keyed to Owner’s keying system.
         1) Single Doors: Keyed locks at each cabinet door and drawer.
            (a) See Drawings for locations.
         2) Double Doors:
            (a) One keyed lock at door noted on Drawings.
            (b) One interior catch at adjacent door.
      c. Six keys per Lock, each lock keyed separately, each key stamped with key code.
      d. Stamp Key Code on Lock Bolt, visible when lock is in “locked” position.

2. Elbow Catch: Ives No. 2 Elbow Catch.
    a. Install at inactive leaf of double doors where a lock is shown on the active leaf.

H. Drawer Slides:
1. Type: Extension types as required.
2. Static Load Capacity: As scheduled.
3. Mounting: Side mounted.
4. Stops: Integral type.
5. Medium Duty Standard Drawer Slides:
    a. Maximum 16 Inch Drawer Width: Lever disconnect side mounting, 90 pound load rating, 1 inch over travel extension slides.
        1) Accuride 3834
        2) Knape & Vogt No. 8400
    b. Maximum 24 Inch Drawer Width: Rail disconnect side mounting, 100 pound load rating, 1 inch over travel extension slides.
        1) Accuride 7434
6. Heavy Duty Lateral Drawer Slides and File Drawer Slides:
    a. Up to 24 inch Drawer Width: Rail disconnect side mounting, 150 pound load rating, 1-1/2 inch over-travel extension slides.
        1) Accuride 4034
        2) Knape & Vogt No. 8505
    b. Up to 42 Inch Drawer Width: Rail disconnect side mounting, 200 pound load rating, 1-1/2 inch over-travel extension slides.
        1) Accuride 3640

I. Cabinet Door Hinges:
1. Concealed, self-closing, wide angle with integrated side adjustment, 170 degree opening angle.
2. Opening Angle: 170 degrees.
3. Product:
    a. Blum, or approved.
4. Finish:
    a. Nickel-plated.

J. Coat Hooks:
1. Ives 1571 or eq.
    a. Provide two (2) Coat Hooks at each Teacher Wardrobe.
        1) Mount at 48-inches and 60-inches above finish floor.
    b. Provide two (2) Coat Hooks at each 24-inch high cubby in Building D, E, and F.

K. Cafe Door Hinges:

1. McKinney Gravity Pivot Hinge 8007 or approved.

2.10 SHOP TREATMENT OF WOOD MATERIALS

A. Provide UL approved identification on fire retardant treated material.

B. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

2.11 FABRICATION, GENERAL

A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.

B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.

C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.

D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
   1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
   2. Cap exposed plastic laminate finish edges with material of same finish and pattern.

E. Matching Wood Grain: Comply with requirements of quality standard for specified Grade and as follows:
   1. Provide center matched panels at each elevation.
   2. Provide sequence matching across each elevation.

F. Mechanically fasten back splash to countertops as recommended by laminate manufacturer at 16 inches on center.

G. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

H. Shop glaze glass materials using the Interior Dry method specified in Section 08 80 00.

2.12 CASEWORK AND MILLWORK FABRICATION:

A. AWS Section 10, Custom Grade, Reveal Overlay construction.

B. Plastic Laminate Faced Casework: Shop fabricate conforming to AWS Section 10.

C. Hardwood Faced Casework: Shop fabricate conforming to AWS Section 10.

D. Casework Construction Joints:
   1. Doweled: 6 minimum 10mm diameter hardwood, fluted dowels. Glued and clamped.
   2. Lock Shoulder Joint: Glued and stapled or screwed.
   3. Rabbeted Construction Joints: Glued and stapled or screwed.
   4. Spline or Biscuit Joints: 3 per foot, glued under pressure.
   5. Flush Butt Panel Joints: Accepted only at concealed backs. Glued and screwed. Not accepted at drawer bottoms.

2.13 COUNTERTOP AND BACKSPLASH FABRICATION

A. Plastic Laminate Countertop Fabrication:
   1. Core: 3/4 inch thick MDF or agrifiber with 3/4-inch thick buildup at edges and spans exceeding 36 inch.
      a. Moisture resistant MDF core at sink countertops and where subject to moisture.
      b. Fire-resistant MDF core at counters extending through fire-resistive rated wall construction.
   2. Plastic Laminate Face Sheet: Horizontal Grade HPDL.
      a. Post Forming Grade at countertops with integral backsplash.
   3. Backing Sheet: Liner Grade at countertops and backsplashes.
   4. PVC Edge Banding: 1-1/2 inch face exposure at countertop edge. Scribe to wall at top edge of back splash.
   5. Back Splash Fabrication: 4 inch high by 1/2 deep

2.14 CABINET FABRICATION

A. Wall and Base Cabinets:
   1. Panel Core: 3/4 inch thick MDF or agrifiber panels.
   2. Exposed Vertical Surface Finish: Vertical Grade HDPL. Include areas that will be exposed when movable appliances are removed.
   3. Semi-Exposed Surface Finish: Melamine laminate.
   4. Concealed Surface Finish: Liner Grade balancing sheet, including at concealed tops, bottoms, sides, and backs of casework.
   5. Edges: Specified PVC edge banding at horizontal and vertical edges.
   6. Underside Surfaces: Underside surfaces that might be exposed to moisture should have barrier seal.

B. Base Cabinet Subtops: Solid, except 4 inch wide front to back rails at each side of sink openings.

C. Toe Kicks: 4 inch high by 3/4-inch thick plywood or MDF panels set into 3-inch deep toe kick at front and open ends of base cabinets.

D. Base Cabinet Toe Kicks: 4 inch high by 3/4-inch thick veneer core plywood set into 3-inch deep toe kick at front and open ends of base cabinets. MDF and agrifiber not accepted.
   1. Base Cabinets Set on Continuous Bases: Build in place, level, and shim. Align with adjoining casework
   2. Base Cabinets Set Directly On Floor: Extend end and back panels to floor. Make level and aligned with adjoining cabinets.

E. Hardwood Veneer Plywood Panels:
   1. Core: 3/4 inch thick MDF core panels.
   2. Faces: Hardwood veneer both sides.
   3. Edges: Exposed plywood edge laminations. No edge banding. Finish exposed edges smooth and free of voids and other visual imperfections.
   4. Fasteners: Concealed at locations exposed to view.

F. Hardwood Veneer Faced/Cross-Laminated Plywood Core Cabinets:

1. Exposed, Semi-Exposed, and Concealed Surfaces: 3/4 inch thick cross-laminated hardwood veneer plywood panel. AWI Quality Standards as specified.
2. Edges: Exposed plywood edge laminations. No edge banding.

G. Cabinet Backs:
1. Concealed Backs Installed Against Walls:
   a. 1/2 inch thick MDF or agrifiber panel.
   b. Seal concealed panel face to prevent moisture intrusion.
2. Exposed Backs at Freestanding Casework: Vertical Grade HDPL face over 3/4 inch thick MDF or agrifiber panel [or hardwood veneer plywood panel, as applicable, exposed cabinet finish to match.
3. 3/4-inch thick MDF or cross-laminated hardwood veneer plywood panel, as applicable.

H. Hardwood Veneer Faced Casework:
1. Faces: Hardwood veneer at both door faces.
   a. Edges: Exposed plywood edge laminations. No edge banding.

I. Hardware:
1. Pulls: One vertically mounted pull for each door and horizontally mounted for each drawer, except 2 pulls on drawers exceeding 30 inch width.
2. Keyed Locks: One lock for each door, double door, or drawer opening where indicated on Drawings.
3. Hinges: Two hinges per door, except three hinges on doors 48 inch high and over.

2.15 CABINET DOOR AND DRAWER FABRICATION

A. Cabinet Doors:
1. Plastic Laminated Casework:
   a. Core: 3/4 inch thick MDF or agrifiber panels.
   b. Faces: Vertical Grade HDPL at outside door face and melamine laminate at inside door face.
   c. Edges: PVC edge banding.
2. Hardwood Veneer Faced Casework:
   a. Front: Hardwood veneer face and back.
   b. Edges:
      1) Exposed plywood edge laminations. No edge banding.
3. Hardware:
   a. Pulls: One vertically mounted pull per door.
   b. Keyed Locks:
      1) Right Hand Door: One keyed lock.
      2) Left Hand Door: One catch at interior side of door to hold door closed using single keyed lock [and flush bolt, at top and bottom of 1-3/4 inch doors].
   c. Hinges: Two hinges per door, except three hinges on doors 36 inch high and over.
   d. Magnetic Catches: One magnetic catch per door, two magnetic catches on doors 48 inch high and over.

B. Cabinet Drawers:
1. Plastic Laminate Faced Casework:

a. Front: 3/4 inch MDF or agrifiber core.
b. Face: Vertical Grade HDPL. Back with melamine laminate
c. Edges: PVC edge banding.

2. Hardwood Veneer Faced Casework:
   a. Front: Hardwood veneer face and back.
   b. Edges: Exposed plywood edge laminations. No edge banding.] [Hardwood edge trim matching face veneer.
3. Subfronts and Backs: 11/16 to 3/4 inch MDF or agrifiber, faced with melamine laminate.
4. Sides: 1/2 inch MDF or agrifiber faced with melamine laminate.
5. Bottoms: 1/2 inch thick MDF, agrifiber, or marine grade plywood faced with melamine laminate.
   a. House into sides, front, and back with continuous dado or lock shouldered construction.
   b. Completely glued around perimeter with hot-melt or PVA adhesive.
6. Edges of Drawer Box: PVC edge banding.
7. Drawers Over 30 Inch Wide: MDF or agrifiber stiffeners or metal reinforcing.
7. Drawer Joints: Assemble true and square with doweled, lock-shoulder, or rabbeted joints.
9. Hardware:
   a. Drawer Slides: Mount with positive in and out stops for permanent alignment and quiet operation.
   b. Pull: One horizontally mounted pull for each drawer.
   c. Keyed Lock: One lock for each drawer.

2.16 SHELVING FABRICATION

A. Fixed and Adjustable Casework Shelves:
   1. Shelf Span:
      a. Spans up to 30 inches: 3/4 inch thickness MDF or agrifiber.
      b. Spans between 30 and 42 inches: 1 inch thickness MDF or agrifiber.
      c. 1-1/8 inch thick veneer core plywood over 42 inch span.
   2. Faces: Melamine cabinet liner both sides.
   3. Edges: PVC edge band at exposed face of fixed shelves and all four edges of adjustable shelves.
      a. Provide upturned PVC lip at edges of open athletic storage shelves and laboratory shelves.
   4. Hardwood Veneer Faced Casework:
      a. Faces: Hardwood veneer both sides.
      b. Edges: Hardwood edge trim.

2.17 SHOP FINISHING

A. General: Finish architectural wood cabinets at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

B. Sand work smooth and set exposed nails and screws.

C. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.

D. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.

E. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent:
      a. As selected by Architect.
      b. Sheen: TBD.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and provisions of Contract Documents.

B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.

C. Use fixture attachments in concealed locations for wall mounted components.

D. Use concealed joint fasteners to align and secure adjoining cabinet units.

E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

F. Secure cabinets to floor using appropriate angles and anchorages.

G. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

H. Close exposed joints, spaces, and openings to make tight hairline joints against adjacent construction to prevent papers and other materials from falling behind cabinets.
   1. Install scribes and fillers of same material and finish as casework.
   2. Secure with concealed screws.

I. Install minimum 3 inch deep by 4 inch high toe space at floor mounted casework.

J. Plastic Laminate Countertop:
   1. Install intermediate joints between corners in longest possible length for each top
   2. Maintain joint distance of minimum 24 inch clearance from sink cutout.
   3. Where joints cannot be avoided at knee spaces, install additional reinforcing without reducing knee space clearance.

4. Apply acrylic latex adhesive at each field joint, and tighten together with 1/4 inch drawbolts set into routed bottom face as needed to make flush and hairline.
5. Cut smooth, crack free holes and cutouts with minimum 1/4 inch diameter radiused inside corners.
6. Seal exposed edges with waterproof sealant
7. Install wall ledgers and counter support angles, secured to wall for support of counters spanning over 36 inch and as needed to eliminate deflection at knees pace.

K. Make cutouts using templates supplied by work of Division 22, 23 and Division 26 for mechanical and electrical fixtures and equipment installations into casework. Provide backing as required for secure attachment of fixtures and equipment.

L. Field Installed Backsplash: Fasten with concealed screws at 12 inch center into bed of acrylic resin along entire back edge of countertops.

M. Door and Drawer Hardware:
1. Mount hardware using manufacturer’s templates, aligned, plumb, and true between adjacent doors and drawers.
2. Mount with adjacent door and drawer reveals equally spaced, plumb, and square.
3. Install operating hardware to act smoothly without hanging up or binding.
4. Lubricate hardware in accordance to manufacturer's instructions.

N. Wall Shelves: Support shelves on standards and brackets at 36 inch maximum spacing.

3.3 ADJUSTING

A. Adjust installed work and test for rigidity and ability to support load.

B. Adjust moving or operating pars to function smoothly and correctly.

3.4 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

3.5 PROTECTION

A. Take applicable protection measures and maintain conditions in manner acceptable to manufacturer through completion of Project.

B. Protect countertops with polyethylene, kraft paper, or other protective covering.

END OF SECTION 06 41 00

SECTION 06 82 00

GLASS FIBER REINFORCED PLASTIC

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fiberglass reinforced polyester plastic wall panels (FRP).
   2. Accessories including moldings, fasteners, adhesives, and sealants.

B. Related Sections:
   1. Section 07 92 00 - Joint Sealants
   2. Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. American Society for Testing and Materials (ASTM) International:
   1. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
   2. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.

C. National Fire Protection Association (NFPA):
   1. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

1.3 SUBMITTALS

A. Product Data: Provide data on specified component products.

B. Samples: Submit two sample chips, 3 x 4 inch in size, illustrating color, texture, and finish.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in architectural glass fiber and resin components with 5 years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect components from damage by retaining shipping protection in place until installation.

1.6 FIELD CONDITIONS

A. Do not install site fabricated components when site conditions may be detrimental to successful installation.

B. Maintain temperature and humidity conditions favorable to proper curing of resin during and after installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Glass Fiber and Resin Fabrications:
   1. Marlite; Product Class A/1 Fire Rated FRP Panels. www.marlite.com.
   2. Crane Composites, Kemlite Fire X Glasbord, www.cranecomposite.com.
   3. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 REGULATORY REQUIREMENTS

A. UL listed for Class A, tested ASTM E84.

2.3 FIBER REINFORCED POLYESTER PANELS

A. Fiberglass reinforced polyester panels, complying with ASTM D5319.

B. Surface Burning Characteristics: IBC Class A rated per ASTM E84 and NFPA 286.

C. Thickness: Approximately 3/32 (0.09) inches (2.3 mm).

D. Health Department Approval: United States Department of Agriculture Food Safety and Inspection Service (USDA/FSIS).

2.4 ACCESSORIES

A. Moldings: Manufacturer's standard including division bars, inside corner, outside corner, and cap one or two piece moldings.

B. Drive Rivets: Manufacturer’s standard nylon drive rivets.

C. Adhesive: Structural construction adhesive as recommended by manufacturer.

D. Sealant: Silicone sealant as recommended by manufacturer and as specified in Section 07 92 00.

2.5 FINISH

A. Color: as selected.

B. Exposed to view Surface Texture: Light dimple finish smooth.

C. Trim Color: As selected by Architect from Manufacturer’s standard finishes.

D. Sealant: Clear.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work and dimensions are as indicated on shop drawings.

3.2 INSTALLATION

A. Install in conformance to Contract Document provisions and manufacturer's instructions.

B. Predrill holes slightly larger for drive rivets. Space at not to exceed 16 inches on center. Install sealant prior to inserting fastener.

C. Apply adhesive uniformly to cover panel and wall surface.

D. Install moldings allowing space for panel expansion and contraction.

E. Install in largest practical panel with no horizontal joints.

F. Trim panels and install into bed of sealant at moldings. Apply enough sealant to fill bottom trim to top edge when panel is inserted.

G. Allow panels to expand and contract due to temperature and humidity changes.

3.3 ADJUSTING

A. Repair or replace damaged installed products.

3.4 TOLERANCES

A. Maximum variation from true position: 1/4 inch.

B. Maximum offset from true alignment: 1/8 inch.

3.5 CLEANING

A. Clean installed products in accordance with manufacturer’s instructions.

B. Remove any adhesive or excessive sealant from panel face using solvent or cleaner recommended by panel manufacturer.

C. Remove temporary coverings and protection of adjacent work areas.

D. Leave installations clean and premises free from residue and debris from work of this section.

3.6 PROTECTION

A. Place protective structural covering over installed units.

END OF SECTION 06 82 00

SECTION 07 19 00

WATER REPELLENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Clear water repellent sealer coating applied to exterior and concrete surfaces.

B. Related Requirements:
   1. Section 03 30 00 - Cast-In-Place Concrete.
   2. Section 04 05 15 - Masonry Mortaring and Grouting.
   3. Section 04 20 00 - Unit Masonry.
   4. Section 07 92 00 - Joint Sealants.

1.2 REFERENCE STANDARDS

A. Reference Standard: Current edition at date of Bid.

B. American Society for Testing and Materials (ASTM) International:
   1. ASTM C140/C140M - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2014.
   2. ASTM D5095 - Standard Test Method for Determination of the Nonvolatile Content in Silanes, Siloxanes, and Silane-Siloxane Blends Used in Masonry Water Repellent Treatments; 1991 (Reapproved 2013).
   3. ASTM E514 - Water Permeance of Masonry.
   4. ASTM C67 - Brick and Structural Clay Tile, Part 7 Water Absorption.
   5. ASTM D6490 - Water Vapor Transmission of Non Film forming Treatments on Cementitious Panels.

C. Brick Industry Association (BIA) - Technical Notes on Brick Construction, www.bia.org
   1. Technical Note 6A - Colorless Coatings for Brick Masonry.

D. Environmental Protection Agency (EPA)
   1. Code of Federal Regulations (CFR) Title 40, Part 59 PART 59--National Volatile Organic Compound Emission Standards For Consumer And Commercial Products

1.3 PERFORMANCE REQUIREMENTS

A. Acceptance of Final Products: Based upon mock-ups and final determination prior to application.

B. Water-Repellent Sealers: Vapor permeable, non-yellowing, deep penetrating, water repellent sealers, consisting of chemical technology forming hydrophobic structure in pores of masonry, masonry mortar, and concrete.
   1. Resist intrusion of water, chlorine ions and other salts, deicer chemicals, and acids.
   2. Permit vapor transmissions through concrete [and masonry] concrete.

3. Leave no visible residue, surface film, color change, darkening, or sheen on treated concrete [and masonry] surfaces.
4. Present no visible difference in appearance between wall surfaces treated with water-repellent sealers.
5. Silicone oils, polymer, acrylic, latex, and other film forming water repellent coating technologies are not accepted.

C. Volatile Organic Compound (VOC) Emissions:
1. For Exterior Application:
a. Water Repellent Coating: Maximum 600 grams per liter.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a meeting at least three weeks prior to starting work; require attendance of affected installers; invite Architect, Owner, enveloper consultant and manufacturer's representative.

1.5 SUBMITTALS

A. Product Data: Provide product description.

B. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention; cautionary procedures required during application.

C. Samples: For each type of water repellent on substrate indicated, 12 by 12 inches in size, with specified water-repellent coating treatment as accepted for project illustrating no visible difference between coating systems in hue, shade, or sheen.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.6 CLOSEOUT SUBMITTALS

A. Manufacturer's Certification: Certify that applications are in accordance with these specifications and as required to conform to manufacturer’s Warranty provisions.

B. Purchase Invoice: Show that amount of water repellent applied to wall surfaces conform to required coverage rates as determined from approved mock-up and manufacturer's field tests and instructions.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum 5 years documented experience.
1. Maintain locally available trained technical representative to perform tests, make evaluations, certify results, and as necessary to obtain specified Warranty.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years experience.

1. Company specializing in work of this Section and performing masonry restoration work of Section 04 01 21, or working under direct supervision of masonry restoration sub-contractor.
2. Trained and certified by manufacturer as qualified to perform work of this Section prior to Bid, or accepted by Architect.

C. Supply products from single manufacturer or under responsibility and Warranty of single manufacturer.

D. Arrange with manufacturer’s authorized representative to perform testing, verifications, and inspections as necessary to determine final product use and to obtain specified Warranty.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original labeled and sealed containers.

B. Protect from freezing and from harmful temperature extremes in accordance with manufacturer's instructions.

1.9 FIELD CONDITIONS

A. Protect liquid materials from freezing.

B. Do not apply water repellent when ambient temperature is lower than 50 degrees F or higher than 100 degrees F.

1.10 COORDINATION

A. Section 03 30 00, Section 04 21 13, and Section 04 22 00 for application of water repellent sealers coatings over concrete and brick veneer masonry systems.

1.11 WARRANTY

A. Water-Repellent Sealers: Manufacturer minimum 10 year labor and material water repellent Warranty. No exclusions accepted for wind driven rain.

1.12 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Silane/Siloxane Water Repellents:
1. BASF Construction Chemicals: www.buildingsystems.basf.com.
2. Evonik (Degussa Corporation) Chemtrete: www.protectosil.com
3. PROSOCO, Inc.: www.prosoco.com.
4. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify joint sealants are installed and cured.

C. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of water repellent.

D. Verify masonry restoration and cleaning work complete and repointing of loose and disintegrating mortar and cracks repaired.

E. Verify that that moisture vapor drive resulting in efflorescence is complete. Do not attempt applications or to seal walls that are efflorescing.

3.2 PREPARATION

A. Notify Manufacturer's representative at least 48 hours before application. Do not begin application until manufacturer's representative has approved proposed application conditions and equipment.

B. Protection of Adjacent Work:
   1. Protect adjacent landscaping, property, and vehicles from drips and overspray.
   2. Protect adjacent surfaces not intended to receive water repellent.

C. Prepare surfaces to be coated as recommended by water repellent manufacturer for best results.

D. Do not start work until masonry mortar substrate is cured a minimum of 60 days.

E. Remove loose particles and foreign matter.

F. Remove oil and foreign substances with a chemical solvent that will not affect water repellent.

G. Scrub and rinse surfaces with water and let dry.

H. Allow surfaces to dry completely to degree recommended by water repellent manufacturer before starting coating work.

3.3 APPLICATION

A. Apply water repellent in accordance with manufacturer's instructions, using procedures and application methods recommended as producing the best results.

B. Apply at rate recommended by manufacturer, continuously over entire surface.

C. Application Surfaces:

1. Exposed Exterior above Grade Unpainted Masonry and Concrete Walls: Apply water repellent sealers coating systems as follow:
   a. Water repellent sealers: Apply on all exterior surfaces.

D. Do not exceed coverage rates or build-up in application thickness that may result in lack of uniformity in hue, sheen, or light reflectance from surface.
   1. Limit run-down over dried coating surfaces below application.
   2. Do not overlap new application over adjacent application.

E. Remove water repellent from unintended surfaces immediately by a method instructed by water repellent manufacturer.

3.4 FIELD QUALITY CONTROL

A. Provide manufacturer's field service representative to inspect preparation and application work continuously during entire application period to ensure that manufacturer's "best practices" for preparation and application are being followed.

B. Manufacturer: Perform tests by manufacturer’s certified technical representative.
   1. Following application, perform moisture tests to verify water repellent sealer coating performance, as necessary to conform to Warranty requirements specified by this Section.
   2. Use RILEM Tube Test Method to determine required repellency.
   3. Test several different locations including head joints and bed joints.
   4. Verify required coverage with that required by Mock-Up results.

3.5 ADJUSTING

A. Reapply additional coatings where testing, logs, or invoices indicate insufficient coverage.

B. Repair or replace damaged surfaces caused from over-spray, blow-over, and spillage.

3.6 CLEANING

A. Promptly clean spillage, blow-over, and over-spray from glass, vegetation, paint, and other surfaces following manufacturer recommended cleaning methods.

B. Leave premises clean of debris and residue resulting from work of this Section.

END OF SECTION 07 19 00

SECTION 07 21 00

THERMAL INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   2. Batt insulation and vapor retarder in exterior wall, ceiling, and roof construction.
   3. Acoustic insulation in wall and ceiling construction.

B. Related Requirements:
   1. Section 06 10 00 - Rough Carpentry: Installation requirements for board insulation over steep slope roof sheathing or roof structure.
   2. Section 07 51 13 Built-Up Roofing and Roof Insulation: Insulation as part of built-up roof assemblies.
   3. Section 07 54 00 – Single-Ply Membrane Roofing: Insulation as part of membrane roofing assemblies.
   4. Section 07 84 00 - Firestopping: Insulation as part of fire-rated through-penetration assemblies.
   5. Section 09 21 16 - Gypsum Board Assemblies: Acoustic insulation inside walls and partitions.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. American Society for Testing and Materials (ASTM) International:
   1. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
   2. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
   3. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2011.
   4. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.
   5. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
   6. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
   7. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.

C. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

1.3 SUBMITTALS

A. See Section 01 33 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
   1. Published R-Value for thickness of batt insulation, product characteristics, performance criteria, and limitations.
   2. Accessories including insulation hangers and other specified items.
   3. Sound Absorptive Coefficient for fiberglass sound blanket.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.4 PERFORMANCE REQUIREMENTS

A. Provide thickness and R-Values shown on Drawings.

1.5 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Formaldehyde free binders: 3RD Party Certified with UL Environmental Validation.

1.6 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:
   1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
   2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
   3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

1.8 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Insulation:
1. CertainTeed Corporation: www.certainteed.com
2. Dow Chemical Co. www.dow.com
3 John Manville. www.jm.com
4. Knauf Insulation. www.knaufinsulation.com
5. Owens Corning. www.owencorning.com
6. Roxul Inc. www.roxul.com
7. R-Max: www.rmaxinc.com
8. Substitutions: See Section 01 60 00.

2.2 APPLICATIONS

A. Batt Insulation:
1. Insulation in Wood Framed Walls: Batt insulation with separate vapor retarder.
2. Insulation in Wood Framed Ceiling Structure: Batt insulation with separate vapor retarder.
3. Insulation Above Lay-In Acoustical Ceilings: Batt insulation with no vapor retarder.

2.3 BATT INSULATION MATERIALS

A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used, at Contractor's option. Size insulation to friction fit between framing members.

B. Thermal Resistance Values: Conform to ASTM C518.
1. Provide High Density blanket insulations, except Normal Density insulation is accepted in thickness as required to meet Thermal Resistance Values shown on Drawings.
2. Thermal Performance for Normal Density Fiberglass Batt and Blanket Insulation:
a R-11: 3-1/2 inch thick
b. R-13: 3-1/2 inch thick
c. R-19: 6-1/4 inch thick
d. R-22: 6-1/2 inch thick
e. R-25: 8 inch thick
3. Thermal Performance for High Density Fiberglass Batt and Blanket Insulation:
a. R-11: 2-1/2 inch thick
b. R-15: 3-1/2 inch thick
c. R-21: 5-1/2 inch thick
d. R-30: 8-1/4 inch thick

C. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
2. Smoke Developed Index: 50 or less, when tested in accordance with ASTM E84.
3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
4. Formaldehyde Content: Zero.
5. Facing: Aluminum foil, flame spread 25 rated; one side.

D. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit or fastened with insulation fasteners; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
   1. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.

E. Acoustic Insulation:
   1. Unfaced, non-combustible, rigid, rock wool insulation.
   2. Surface burning characteristics per ASTM E84:
      a. Flame spread: 5.
      b. Smoke developed: 10.
   3. Thicknesses: As indicated on Drawings.
   4. Density: 6 lb/ft3 to ASTM C612.

2.4 ACCESSORIES

A. Vapor Retarder at Concealed Conditions: Typically in walls between gypsum board and stud:
   1. Manufacturer/Product: CertainTeed, MemBrain, Smart Vapor Retarder.
      a. 2 mil thick polyamide (Nylon) sheet.
      b. Fire Testing: Tested to ASTM E84.
         1) Flame Spread Index: 20.
         2) Smoke Developed Index: 55.
      c. Permeance: Tested to ASTM E96
         1) 1 perm or less using dry cup method (Procedure A - Desiccant Method).
         2) Increases up to 10 perms using wet cup method (Procedure B - Water Method).

B. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

C. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.

D. Batt Insulation Support: Provide as necessary to support insulation in ceiling and floor assembly.
   1. Install between joists.
   2. Length to suit spacing as required.
   3. Made from carbon steel, spring wire for optimum flexibility and strength, 14 gage wire.

E. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation and adhesive.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

C. Clean construction cavities prior to installation.

3.2 BOARD INSTALLATION OVER LOW SLOPE ROOF DECK

A. Installation of board insulation over low slope roof deck is specified in Section 07 51 13 and Section 07 54 00.

3.3 BATT INSTALLATION

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. At wood framing, place vapor retarder on warm side of insulation by stapling at 6 inches on center. Lap and seal sheet retarder joints over member face.

F. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over member face.

G. Tape seal tears or cuts in vapor retarder.

H. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

3.4 INSTALLATION OF VAPOR RETARDERS

A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs.
   1. Wood Framing:
      a. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.

C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.

D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

3.5 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION 07 21 00

SECTION 07 25 00

WEATHER BARRIERS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Weather Barriers

B. Related Requirements:
   1. Section 06 10 00 - Rough Carpentry.
   2. Section 06 16 43 - Gypsum Sheathing.
   3. Section 07 62 00 - Sheet Metal Flashing and Trim.
   4. Section 07 92 00 - Joint Sealants.

1.2 REFERENCE STANDARDS

A. AATCC Test Method 127 - Water Resistance: Hydrostatic Pressure Test; 2013.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2013a.

C. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2013.

D. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.

1.3 SUBMITTALS

A. Product Data: Provide data on material characteristics.

B. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.

1.4 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

1.5 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 – PRODUCTS

2.1 Weather Barrier Materials (water vapor permeable and water-resistive).

A. Air Barrier Sheet, Mechanically Fastened: AB-1.
   1. Air Permeance: 0.001 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178.
   2. Water Vapor Permeance: 23 perms, minimum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant method).
   3. Water Penetration Resistance: Withstand a water head of 21 inches, minimum, for minimum of 5 hours, when tested in accordance with AATCC 127.
   4. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for minimum of 6 months weather exposure.
   5. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 50 or less, when tested in accordance with ASTM E84.
   6. Seam and Perimeter Tape: Polyethylene self-adhering type, mesh reinforced, 2 inches wide, compatible with sheet material; unless otherwise specified.
   7. Basis of Design Products:
      a. DuPont Building Innovations; Tyvek Commercial Wrap with FlexWrap NF, StraightFlash, StraightFlash VF, Tyvek Wrap Caps, and Tyvek Tape: www.dupont.com.
   8. Substitutions: Conform to provisions of Section 01 60 00 and show compliance with product performance requirements below.
      a. Vapor Permeance: Minimum 20 perm, ASTM E96, Procedure A.
      b. Air Permeance of Material: Maximum 0.004 cfm/sq. ft. at 0.3 inch wg; ASTM E 2178.
      c. Air Permeance of Assemblies: Maximum 0.04 cfm/sq. ft. at 0.3 inch wg; ASTM E 2357.
      d. Tensile Strength: Minimum 38/35, ASTM D 882, Method A.
      e. Ultraviolet Exposure Limit: Minimum 6 months.
      f. Surface Burning Characteristics: UL/IBC Class A, tested to ASTM E84.
         1) Flame Spread: Less than 25.
         2) Smoke Developed: Less than 450.

2.2 SEALANTS

A. Sealant Backers: As specified in Section 07 92 00.

B. Primers, Cleaners, and Other Sealant Materials: As recommended by sealant manufacturer, appropriate to application, and compatible with adjacent materials.

2.3 ACCESSORIES

A. General: Provide accessory materials as recommended by building wrap manufacturer to produce a complete assembly.

B. Pre-formed Transition Membrane: Semi-rigid silicone composition, tapered edges, ribbed back, tear-resistant.
   1. Products:
      a. As recommended by air barrier manufacturer.

C. Metal Flashing at Open Joint: Prefinished 26 gauge sheet steel, 4 inch wide. Black color.

D. Cleaners: As recommended by material manufacturer.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and conditions are ready to accept the work of this section.

3.2 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive air barrier in accordance with manufacturer's instructions.

3.3 INSTALLATION

A. Install materials in accordance with manufacturer's instructions.

B. Install continuous barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces, including existing weather barriers.

C. Mechanically Fastened Sheets - On Exterior:
   1. Install sheets shingle-fashion to shed water, with seams generally horizontal.
   2. Overlap seams as recommended by manufacturer and at least 6 inches.
   3. Overlap at outside and inside corners as recommended by manufacturer and at least 12 inches.
   4. Attach to framed construction with fasteners extending through sheathing into framing. Space fasteners at 12 to 18 inches on center along each framing member supporting sheathing.
   5. Attach to masonry construction using mechanical fasteners spaced at 12 to 18 inches on center vertically and maximum 24 inches on center horizontally.
   6. Seal seams, laps, penetrations, tears, and cuts with self-adhesive tape.
   7. Where stud framing rests on concrete or masonry, extend lower edge of sheet below bottom of framing and seal to foundation with sealant. Ensure assembly is not visible in finished condition.
   8. Install air barrier and vapor retarder UNDER jamb flashings.
   9. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.

D. Openings and Penetrations in Exterior Weather Barriers:

1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with at least 4 inches wide; do not seal sill flange.
3. At openings to be filled with non-flanged frames, seal weather barrier to all sides of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.
4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

3.4 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION 07 25 00

SECTION 07 26 16

BELOW-GRADE VAPOR BARRIERS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Underslab vapor barrier sheeting.
   2. Prefabricated boots, seaming tape, and accessories.

B. Related Sections:
   1. Section 03 11 00 - Concrete Formwork
   2. Section 03 21 00 - Reinforcing Steel
   3. Section 03 30 00 - Cast-in-Place Concrete
   4 Division 22 - Plumbing
   5. Division 26 - Electrical
   6. Division 31- Earthwork

1.2 REFERENCES

A. Reference Standards: Current edition at date of Bid.

B. American Concrete Institute (ACI):
   1. ACI 302.1R - Guide for Concrete Floor and Slab Construction.
   2. ACI 302.1R - Addendum Vapor Retarder Location

C. American Society for Testing and Materials (ASTM) International:
   1. ASTM E154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth under Concrete Slabs, on Walls, or as Ground Cover.
   2. ASTM E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
   3. ASTM E1745 - Standard Specifications for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.3 SUBMITTALS

A. Product Data: Manufacturer’s literature for vapor barrier, seaming, patching materials, and accessories

B. Manufacturer Instructions: Installation instructions, special procedures, and perimeter, penetration and other conditions requiring special attention. Include product limitations.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Take precautions to prevent puncturing, tearing and damage to vapor barrier.

1.5 COORDINATION

A. Division 22 and Division 26 for penetrations through vapor barrier.
   1. Coordinate and sequence penetrations through the vapor barrier to allow proper flashing and sealing of all penetrations prior to placement of concrete.
   2. Flash and seal penetrations through the vapor barrier prior to placement of concrete.
   3. Space utility penetrations through the vapor barrier a minimum of 12-inches apart.

B. Division 31 for compacted subgrade under vapor barrier, fully compacted and complete.

1.6 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 VAPOR BARRIER

A. Location: Horizontal underslab vapor barrier.

B. Sheet Vapor Barrier:
   1. Material: Polyolefin vapor retarder meeting ASTM E1745 Class A.
      a. Minimum Thickness: 15-mil.
      b. Perm Rating: 0.01 or less after conditioning, tested to ASTM E 154.
   2. Manufacturers/Products:
      a. Stego Industries, Stego Wrap 15-mil Class A, www.stego.com
      b. Fortifiber Corp, Moistop Ultra-15, www.fortifiber.com
      c. Reef Industries, Griffolyn 15-Mil, www.reefindustries.com
      d. Viper, Viper II 15-Mil, www.insulationsolutions.com
      e. WR Meadows, Perminator 15, www.wrmeadows.com
   3. Substitution: Submit for approval under provision of Section 01 60 00.

2.2 ACCESSORIES

A. Pressure Sensitive Tape, Seam Splice Tape Primer, Boots, and Other Accessories: As instructed by manufacturer for watertight impermeable Underslab barrier.

B. Pipe Boots: Manufacturer’s supplied pipe boot system.

C. Granular Base: See Division 31 Sections for granular base below concrete slab.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify installation conditions as satisfactory to receive work of this Section.
   1. Underslab Utilities: Drain lines and utilities of Division 22 and Division 26 properly installed and ready for work of this Section.

2. Through-Slab Penetrations: Ready for work of this Section.

B. Verify subgrade free from conditions that may cause puncture or other damage to vapor retarder.

3.2 PREPARATION

A. Complete subgrade and subbase prior to before beginning work of this Section.

B. Refer to Division 31 for earthwork preparation of capillary break under vapor retarder.

C. Granular Base Course as Capillary Break Under Vapor Retarder:
1. Install minimum 4 inch thick, and as required by soil conditions.
2. Install over well compacted rough graded structural subgrade or subbase.
3. Fine grade granular base course to tolerance of plus zero inch / minus 1 inch and conduct proof-rolling, conforming to ACI 302 Chapter 4.
4. Survey using rod and level to confirm tolerances by taking measurements at 20 foot intervals, less at elevator pit
5. Repair rutting and pumping of base resulting in depressions exceeding 1/2 inch by raking and then re-compacting repaired areas of base course.

3.3 INSTALLATION

A. Install underslab vapor barrier continuous, with all penetrations, transitions, and perimeters sealed, to fully protect concrete slabs-on-grade from moisture vapor migration into occupied spaces.

B. Install and protect vapor barrier in conformance to manufacturer's instructions, ASTM E1643, and provisions of Contract Documents.

C. Interior Concrete Slabs-On Grade: Provide vapor barrier as specified this Section whether or not indicated on Drawings.

D. Install vapor retarder sheet over compacted granular base course, and where specified over rigid insulation placed over compacted granular base.

E. Roll down vapor barrier in widest practical width, parallel with direction of concrete pour, and with minimum number of joints.

F. Lap vapor barrier over footings, turn up to full slab thickness, and seal with pressure sensitive tape to foundation wall.

G. Overlap vapor barrier 6 inches minimum at all side and end laps and seal with manufacturer’s pressure sensitive tape. Roll tape thoroughly to achieve water vapor-tight performance.
1. No wrinkles and fish-mouths allowed in the laps where tape is to be installed to seal vapor retarder.

H. Fully seal pipe and other penetrations with vapor barrier or prefabricated boots and pressure sensitive tape. Field fabricate boots and other shapes as necessary to seal vapor retarder against vapor penetration.

I. Place concrete slab-on-grade directly over installed vapor barrier under work of Section 03 30 00. Do not install granular fill layer over vapor retarder.

3.4 FIELD QUALITY CONTROL

A. Verify vapor barrier installed in accordance with manufacturer's instructions with penetrations taped and sealed.

B. Verify that vapor barrier has not been penetrated by screed stakes and that base set screed posts are in place.

3.5 ADJUSTMENTS

A. Patch penetrations with pressure sensitive tape and make adjustments as necessary to maintain performance of vapor barrier as instructed by manufacturer. Ensure penetrations are fully sealed against vapor migration.

B. Repair damaged areas by cutting vapor barrier patches. Overlap tears and holes 6 inch beyond damaged area with patches. Seal patch to installed vapor barrier with pressure sensitive tape or as instructed by manufacturer.

3.6 PROTECTION

A. Protect From Penetration: Do not permit use of ground set stakes, screed posts, and other items to puncture vapor barrier. Where punctured, remove penetrating item and patch vapor barrier, as specified this Section, before placing concrete.

B. Protect From Damage: After sweeping area clean and free of debris, lay rigid insulation then plywood, or other protection board over installed vapor barrier at areas of traffic and protect from construction loads. Do not stack loose items or any construction materials directly on vapor barrier.

END OF SECTION 07 26 16

SECTION 07 41 13

METAL ROOF PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Canopy roofing panels.
   2. Fastening system.
   3. Factory finishing.
   4. Accessories and miscellaneous components.

B. Related Requirements:
   1. Section 05 12 00 - Structural Steel Framing: Roof framing and purlins.
   2. Section 06 10 00 - Rough Carpentry: Roof sheathing.
   3. Section 07 92 00 - Joint Sealants: Sealing joints between metal roof panel system and adjacent construction.

1.2 REFERENCE STANDARDS

A. Reference Standards? Current edition at date of Bid.

B. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2011.

C. American Society for Testing and Materials (ASTM) International:
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
   2. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.
   3. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
   4. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference; 2005 (Reapproved 2012).
   5. ASTM E1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference; 1995 (Reapproved 2011).
   6. ASTM E1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems; 2011.

D. IAS AC472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems; 2012.

E. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Current Edition, Including All Revisions.

1.3 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Storage and handling requirements and recommendations.
   2. Installation methods.
   3. Specimen warranty.

B. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
   1. Show work to be field-fabricated or field-assembled.

C. Test Reports: Indicate compliance of metal roofing system to specified requirements.

D. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in the manufacture of roofing systems similar to those required for this project.
   1. Not less than 5 years of documented experience.
   2. Accredited by IAS according to IAS AC472.

B. Installer Qualifications: Company trained and authorized by roofing system manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.6 WARRANTY

A. Finish Warranty: Provide manufacturer’s special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of 20 year period from date of Substantial Completion.

B. Waterproofing Warranty: Provide manufacturer’s warranty for weathertightness of roofing system, including agreement to repair or replace roofing that fails to keep out water within specified warranty period of 5 years from date of Substantial Completion.

C. Contractor: 2 year labor warranty for roofing installation, including flashing, sealants, fasteners, and accessories to remain watertight and weatherproof.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Design is based on Select Seam, Narrow Batten, manufactured by AEP Span, www.aepspan.com.

B. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 METAL ROOF PANELS

A. FMP-1 Metal Roofing Canopy: Provide complete roofing assemblies, including roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for conformance to the following minimum standards:
   1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads at support spacing indicated, with deflection not to exceed 1/180 of the span when tested in accordance with ASTM E1592.
      a. Dead Loads: Weight of roofing system.
      b. Live Loads: As required by ASCE 7.
   2. Overall: Complete weathertight system tested and approved in accordance with ASTM E1592.
   3. Wind Uplift: Class 90 wind uplift resistance of UL 580.
   4. Air Infiltration: Maximum 0.06 cfm/sq ft at air pressure differential of 6.24 lbf/sq ft, when tested according to ASTM E1680.
   5. Water Penetration: No water penetration when tested according to procedures and recommended test pressures of ASTM E1646.
   6. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F.

B. Metal Panels: Factory-formed panels with factory-applied finish.
   1. Type: Single skin, uninsulated.
   2. Steel Panels:
      a. Zinc-coated SS (structural steel) sheet conforming to ASTM A653/A653M; minimum G60 galvanizing.
      b. Steel Thickness: Minimum 22 gage (0.03 inch).
   3. Profile: Standing seam, with minimum 1.0 inch seam height; concealed fastener system for snap-on application of separate, matching standing seam batten.
   4. Texture: Smooth.
   5. Length: Maximum possible length to minimize lapped joints.
   6. Width: Maximum panel coverage of 12 inches.

2.3 ATTACHMENT SYSTEM

A. Concealed System: Provide manufacturer's standard stainless steel concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.4 PANEL FINISH

A. Fluoropolymer Coating System: Manufacturer’s standard multi-coat thermocured coating system, including minimum 70 percent fluoropolymer color topcoat with minimum total dry film thickness of 1.0 mil; color and gloss to match sample.

B. Panel Back Coating: Panel manufacturer's standard polyester wash coat.

2.5 ACCESSORIES AND MISCELLANEOUS ITEMS

A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, and caps of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.

B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish.

C. Sealants:
   1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
   2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
   3. Seam Sealant: Factory-applied, non-skinning, non-drying type.

D. Underlayment: Self-adhering rubber-modified asphalt sheet complying with ASTM D1970/D1970M; 22 mil total thickness; with strippable release film and woven polypropylene sheet top surface.
   1. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
   2. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
   3. Water Vapor Permeance: 0.067 perm, maximum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant method).
   4. Products:
      a. Henry Company; Blueskin PE200HT: www.henry.com.
      b. Carlisle; Product WIP 300HT: www.carlisleresidential.com.
      c. Grace; Product Ice and Water Shield HT: www.grace.com.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

2.6 FABRICATION

A. Panels: Fabricate panels and accessory items at factory, using manufacturer’s standard processes as required to achieve specified appearance and performance requirements.

B. Joints: Factory-install captive gaskets, sealants, or separator strips at panel joints to provide weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to assure that the completed roof will be free of leaks.

B. Coordinate installation of waterproof membrane over roof sheathing with 06 10 00.

C. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by roof panel manufacturer.

D. Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.3 INSTALLATION

A. Overall: Install roofing system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.
   1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
   2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.

B. Accessories: Install all components required for a complete roofing assembly, including flashings, gutters, downspouts, closure strips, caps, rib closures, ridge closures, and similar roof accessory items.

C. Roof Panels: Install panels in strict accordance with manufacturer’s instructions, minimizing transverse joints except at junction with penetrations.
   1. Form weathertight standing seams incorporating concealed clips, using an automatic mechanical seaming device approved by the panel manufacturer.
   2. Incorporate concealed clips at panel joints, and apply snap-on battens to provide weathertight joints.
   3. Install sealant or sealant tape, as recommended by panel manufacturer, at end laps and side joints.

3.4 CLEANING

A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

3.5 PROTECTION

A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.

B. Touch-up, repair, or replace damaged roof panels or accessories before date of Substantial Completion.

END OF SECTION 07 41 13

SECTION 07 42 13

METAL WALL PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Manufactured metal panels for walls, related flashings, and accessory components.

B. Alternates: Refer to Section 01 23 00 for Alternates effecting work of this Section.

C. Related Requirements:
   2. Section 07 25 00 - Weather Barriers: Weather barrier under wall panels.
   3. Section 07 92 00 - Joint Sealants: Sealing joints between metal wall panel system and adjacent construction.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at time of Bid.

B. American Society for Testing and Materials (ASTM) International:
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.

1.3 SUBMITTALS

A. Shop Drawings:
   1. Wall elevations showing location of components, layout of panels, and interfacement with adjacent construction.
   2. Details, specific to this project, indicating factory coating, gauges, profiles, forming, joining, flashings, accessories, fastener types and locations. Include edges, terminations, and penetrations.
   3. Indicate provisions for thermal expansion and contraction.

B. Product Data: Manufacturer's technical data, installation instructions, standard detail drawings, and recommendations for metal panels and accessories showing compliance with specified requirements.

B. Samples: Submit two samples of wall panel, 12 inch by 12 inch in size illustrating finish color, sheen, and texture.

1.4 QUALITY ASSURANCE

A. Manufacturer/Source: Provide metal panel and panel accessories from a single manufacturer.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 5 years of documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.

B. Store prefinished material off ground and protected from weather. Prevent twisting, bending, or abrasion, and provide ventilation to stored materials. Slope metal sheets to ensure drainage.

C. Prevent contact with materials that may cause discoloration or staining of products.

1.6 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design; AEP Span, www.aepspan.com.

B. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 MANUFACTURED METAL PANELS

A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
   1. Provide exterior panels assembly.
   2. Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall.
   3. Maximum Allowable Deflection of Panel: 1/180 of span.
   4. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
   5. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
   6. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
   7. Corners: Factory-fabricated in one continuous piece with minimum 18 inch returns.

B. Exterior Panels: FMP-1
   1. Profile: AEP Span, Select Seam Concealed Fastener Panels.
   2. Seam: Factory applied sealant on Narrow Batten (3/8 inch x 1 inch).
   3. Material: Precoated steel sheet, 22 gauge, minimum thickness.

4. Panel Width: 12 inches.
5. Color: As selected by Architect from manufacturer’s custom range.

C. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.

D. Expansion Joints: Same material, thickness and finish as exterior sheets; 22 gauge thick; manufacturer's standard brake formed type, of profile to suit system.

E. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

F. Anchors: Galvanized steel.

2.3 MATERIALS

A. Precoated Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M Structural Steel (SS) or Forming Steel (FS), with G90/Z275 coating; continuous coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

2.4 FLASHINGS: FMT-1

A. Metal Flashing and Fascias: 24 gauge steel same material, color, and finish as panels and in accordance with Section 07 62 00.

B. Provide custom metal flashing shapes to suit conditions for watertight installation.

C. Panel and Flashing Closures: Waterproof, semi-rigid, neoprene closed cell foam, or solid rubber in size and shape to tightly fit panel configuration.

2.5 PANEL FINISH

A. Fluoropolymer Coating System: Manufacturer’s standard multi-coat thermocured coating system, including minimum 70 percent fluoropolymer color topcoat with minimum total dry film thickness of 1.0 mil; color and gloss as selected from manufacturer’s standards.

B. Panel Back Coating: Panel manufacturer's standard polyester wash coat.

2.6 ACCESSORIES

A. Sealants:
1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
2. Concealed Sealant: Non-curing butyl sealant or tape sealant.

B. Sealants: As specified in Section 07 92 00.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that building framing members are ready to receive panels.

B. Verify that weather barrier has been installed over substrate completely and correctly.

3.2 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. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
   8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:
   1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior.
   2. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior.
   3. Copper Panels: Use copper, stainless-steel, or hardware-bronze fasteners.
   4. Stainless-Steel Panels: Use stainless-steel fasteners.

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. Lap ribbed or fluted sheets one full rib. 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.
   5. Flash and seal panels with weather closures at perimeter of all openings.

E. 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, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

F. 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 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 sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 FIELD QUALITY CONTROL

A. Owner’s Field Inspections and Testing: Conform to provisions of Section 01 40 00.

B. Manufacturer's Field Services:
   1. Progress Inspections: Provide field representative to make job-site inspections and reports on quality of installation. Verify that panels are properly designed and installed.
   2. Final Inspection: Confirm that panel system is in conformance with manufacturer's instructions, design requirements, and meets specified Warranty provisions.

3.5 TOLERANCES

A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.

B. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.

3.6 ADJUSTING

A. Correct identified defects and irregularities.

B. Replace damaged, soiled, or discolored work.

3.7 CLEANING

A. Remove site cuttings from finish surfaces.

B. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

END OF SECTION 07 42 13

BUILT-UP ROOFING AND ROOF INSULATION

SECTION 07 51 00

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Roofing system for nailable wood deck

B. Roofing system over insulated, wood deck.

C. Insulation board.

D. Roofing accessories and incidentals.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02 05 00 - Demolition

B. Section 06 10 00 - Rough Carpentry

C. Section 07 21 00 - Thermal Insulation

D. Sect ion 07 62 00 - Sheet Metal Flashing & Trim

1.3 QUALITY ASSURANCE

A. Applicator Qualifications

1. Company specializing in built-up bituminous roofing application, with minimum experience of three years. Provide documentation, if requested.

2. Installer approved by roofing materials manufacturer

1.4 REGULATORY REQUIREMENTS

A. Comply with local, state and federal regulations, safety standards and codes. Conform to most stringent regulation.

B. Underwriters Laboratories, Inc. (UL); Class A Fire Hazard Classification

C. Uniform Building Code, Factory Mutual

1.5 SUBMITTALS

A. Submit in accordance with Section 01 30 00

B. Manufacturers' product data – 3 copies

C. Confirmation of Applicator Qualifications – 2 copies

D. Material Safety Data Sheets (MSDS) including roofing components, related accessories and materials – 2 copies

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in unbroken packages, with manufacturers' original labels intact

B. Store materials in accordance with manufacturer's recommendations, and as directed by Owner's Representative.

C. Protect materials from sun and weather-related extremes.

D. Ensure protection from incidental damage from work activities of other trades.

E. Select and handle materials and equipment to avoid damage to materials, existing construction, or applied roofing.

1.7 PROJECT CONDITIONS

A. Use special precautions when installing roof system at temperatures below 45^0F to ensure satisfactory application and performance.

B. Apply no roofing materials during inclement weather

C. Apply no roofing materials over damp substrate.

D. Apply no roofing materials unless proper asphalt application temperatures (EVT) can be maintained.

1.8 WARRANTY

A. Warrant roofing, flashings, and deck insulation for two (2) years, as stipulated in Section 00 80 00 – Supplementary Conditions. Warranty period commences after date of Substantial Completion.

B. Roofing Contractor shall warrant metal work in contact with roofing; metal work as provided by other trades.

C. Warranty includes minimum of two (2) annual inspections and necessary repairs for warranty period.

D. Repair defects occurring within warranty period. Failure to make proper repairs within warranty period shall extend period until acceptable completion of applicable repair items.

1.8 REFERENCES

A. American Society for Testing and Materials (ASTM)

B. D41 Specification for asphalt primer used in roofing, dampproofing and waterproofing.

C. D312 Specification for asphalt used in roofing.

D. D2178 Specification for asphalt glass felt used in roofing and waterproofing.

E. D3909 Specification for asphalt roofing (glass felt) surfaced with mineral granules.

F. D4586 Specification for asbestos-free asphalt roof cement.

G. D4601 Specification for glass fiber base sheet.

H. E108 Fire Tests of roof covering.

I. Underwriter's Laboratories (U.L.)

1.9 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of Section.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS & ROOF SYSTEMS

A. Manufacturers' Systems using Modified SBS Surfacing on Nailable Deck. Roof system consists of base sheet, three type VI plies, SBS cap sheet, and DFE base flashing.

- Mansville: 5GNC GLASBASE, Three GLASPLY Premier; GLASKAP PLUS cap sheet; DFE flashing system: GLASKAP PLUS.

- GAF: N-B-3-601/P6 375 base sheet, Three GAFGLAS ply VI, Rubberoid No. 601 SBS Modified cap sheet. DFE Flashing system: Rubberoid No. 601 SBS.
- Malarkey: M5-WU-AIB-H FibreGlas base sheet #515, Three type VI Plies #506, No. 601 Premium Polyglass SBS mineral surface cap sheet. DFE flashing system: No. 601 Premium Polyglass SBS.
- Conglas: ND-36A-CMBH CONBASE base sheet, Three CONPLY HT60 Type VI plies, MB CAP 100 modified cap sheet. DFE flashing system:MB CAP 100
- U.S. Intec, Inc: BF170-B5UP-N; Ultra base sheet, Three type VI Ultra Ply, Brai-Flex 170 cap sheet.DFE flashing system:Brai-Flex 170.
- Tamko: 214M Tamko Glass Base, Three TamkoTam Premium Type VI Ply, AWAPLAN Premium SBS cap sheet. DFE Flashing System: AWAPLAN Premium SBS cap sheet
- Certainteed: GMS-N-B5 Glasbase, Three Flintglas Premium Ply Type VI, Flintlastic GMS Mineral Surface cap sheet. DFE Flashing System: Flintlastic GMS

B. Manufacturers' Systems using Modified SBS Surfacing over Insulation with Nailable Deck. Roof system consist of four type VI plies, SBS cap sheet, and DFE base flashing.

- Mansville: 5GIC, Four GLASPLY premier type VI plies; GLASKAP PLUS cap sheet; DFE flashing system: GLASKAP PLUS.
- GAF: I-4-I-60/PR, Four GAFGLAS type VI plies, Rubberoid No. 601 SBS Modified cap sheet. DFE Flashing system: Rubberoid No. 601 SBS.
- Malarkey: M5-WI-XIB-H, Four No. 506 super 6 type VI plies; Premium Polyglass SBS mineral surface cap sheet. DFE flashing system: No. 601 Premium Polyglass SBS.
- Conglas: RI-46 (none) CMBH, Four CONPLY HT60 Type VI plies, MB CAP 100 modified cap sheet. DFE flashing system:MB CAP 100
- U.S. Intec, Inc.: BF170-5UP-RI; Four type Ultra type VI plies, Brai-Flex 170 SBS cap sheet. DFE flashing system: Brai-Flex 170.
- Tamko: 2108M, Four TamkoTam Premium Type VI Ply, AWAPLAN Premium SBS cap sheet. DFE Flashing System: AWAPLAN Premium SBS cap sheet
- Certainteed:GMS-C-P4-IN, Four Flintglas Premium Ply Type VI, Flintlastic GMS Mineral Surface cap sheet. DFE Flashing System: Flintlastic GMS

2.2 INSULATION BOARD

A. Retro-Fit Board

1. Non-tapered high-density board of expanded perlite and cellulose fibers meeting requirements of ASTM C728. Size: 4 x 8 feet x ½ inch thickness, alternate sizes as may be required to suit installation. Top surface sealed with Top-Loc coating. Retro-Fit Board as manufactured by Johns Manville; Sealskin by International Permalite, Atlas Roofing Corp. or approved.

B. Insulation

1. Non-tapered, and tapered polyisocyanurate foam core, closed cell insulation with fiberglass reinforced felt face. 4 x 4 feet and 4 x 8 feet sheet sizes in 1-inch thickness with 6.0 "R" value. ASTM C1289 type II, Class I by Atlas Roofing Corp.; Johns Manville; Isoperl by International Permalite, or approved.

C. Vapor Barrier System below Insulation
   1. Vapor retarder same product manufacturer as roofing system. On nailable deck, include the following minimum materials per 100 square feet of area:
   a. Modified Base Sheet mechanically fastened to deck – 28 pounds
   b. Ply sheet asphalt mopped to Base Sheet per ASTM D2178, Type VI – 11 pounds
   c. Asphalt to embed Insulation – 33 pounds
   d. Total Weight (approximately) – 72 pounds

2.3 COMPONENTS & ACCESSORIES

A. Slope less than 2:12 ratio – Bitumen Primer ASTM D41; Bitumen – ASTM D-312, Type III; Asphalt emulsion – ASTM D-1227, Type I

B. Slope greater than 2:12 ratio – Bitumen Primer ASTM D41; Bitumen – ASTM D-312, Type IV; Asphalt emulsion – ASTM D-1227, Type II.

C. Fiber cants – 5 and 4 inch size as per requirements of conditions of installation. Johns Manville, International Permalite, or approved.

E. Fasteners
   1. Tape and Staple system – Senco base sheet tape system with divergent tape 7/8-inch leg staples, or approved.
   2. Nails – galvanized annular ring shank nails through flat tin discs, 7/8 inch (¾ inch penetration).

F. Primer – Asphalt primer ASTM D41; Fed Spec SS-A-701B.

G. Flashing Cement – Fiberglass plastic cement Fed Spec SS-C-153, Type 1.

H. Mastic – Neoprene base material.

I. Reuse or provide new, replacement steel clamping rings and strainers at cast-iron sumps, matching existing.

J. Pre-made flashings at pipe penetrations through parapet cap flash: EPDM rubber pipe flashing with aluminum gasket, secured with 304 stainless steel fasteners. Manufacture: Dektite, or approved.

K. Tapered edge strip: 1½ inch – 0 inch x 12 inch width.

L. Pitch Pocket Material: Elastomeric sealant; Goodyear, Firestone, Gaco or approved.

M. Red rosin paper protective base sheet. 3 ounces psf weight. Continuous coverage.

PART 3 – EXECUTION

3.1 PRE-APPLICATION CONFERENCE

A. Convene Pre-Application Conference at job site prior to delivery of product and commencement of installation work,. Attendees shall include General Contractor, Roofing Contractor and Foreman, Sheet Metal and other applicable Subcontractors. Coordinate time and location with Architect and Owner's Representative(s).

B. Agenda - include review of pertinent details and specifications; potential problems, nature and availability of roofing materials, submittal requirements, scheduling, weather conditions, regulatory requirements, protection of building, building components, and completed roof system; proposed installation procedures, and additional items related to total roof system.

C. Review acceptability of roofing substrates (decks), and discuss substrate construction and general conditions, including deck slope, expansion joints, curb and penetration installation, drain locations, and material compatibility.

3.2 GENERAL

A. Precautions:
1. Storage on Roof - Store minimum of materials on existing roof. Ensure materials stored on existing roof are sufficiently space to protect roof and structure from overloading. Store materials minimum of 8 feet from roof edges.
2. Fire Protection – Exercise extra care and observe fire safety precautions when torch applications are in process.
3. Maintain sufficient number of fire extinguishers on roof at areas of work.
4. Exercise caution with combustibles and utility lines at roof.

B. Prior to installation, inspect wood decking for loose or unsatisfactory plywood sheathing, lack of bearing; loose or popped edges and raised fasteners; or otherwise deteriorated material which will adversely affect roofing installation. Notify General Contractor for repair of such conditions and re-inspect to determine suitability prior to application. Commencement of work constitutes acceptance of substrate and responsibility for repair of unsatisfactory conditions.

C. Cover voids in sheathing greater than 3 inches and open knotholes with sheet metal secured to plywood.

D. Ensure that surfaces to receive roofing materials are dry and free from ridges, warps and voids; and slope to drains.

E. Coordinate installation of roof mounted components or work projecting through roofing materials. Verify that roof openings are framed and completed prior to application.

F. Follow procedures of Section 01 01 00 if hazardous materials are uncovered.

G. Complete areas of roofing activity in their entirety each day. Protect incomplete sections from moisture infiltration into completed work and into existing building envelope.

H. Prevent interior leakage, materials falling into interior, or other such like occurrences. Accomplish material installation in such a manner that bitumen spillage does not occur.

3.3 BOARD INSULATION INSTALLATION

A. Remove debris from roof deck.

B. Apply board insulation as per manufacturer’s instructions over areas designated on Drawings.

C. Install tapered edge strips and cant strips as required for smooth transition between varying roof planes and exposed insulation edges.

D. Embed insulation board into vapor barrier and underlying layers in minimum of 33 pounds per 100 square feet hot asphalt. Ensure that temperature of asphalt is sufficient to obtain positive adhesion.

E. Install rigid insulation in thickness shown

F. Thoroughly “walk-in” individual insulation boards to ensure maximum adhesion.

G. Offset and stagger joints. Stagger end and edge joints at minimum 24 inch offset.

H. Install insulation square to building lines, with no gaps. Fill gaps greater than ½ inch.

I. Install tapered edge strips and cants where shown.

J. Install tapered edge strips as required for smooth transitions between differing roof planes and at exposed insulation edges.

K. Install only as much insulation as can be covered with roof membrane in same workday.

L. Leave surfaces prepared and ready for specified bituminous roofing installation.

3.4 BITUMINOUS ROOFING & CAP SHEET INSTALLATION

A. Apply asphalt, roofing and base flashing systems in strict accordance with manufacturer's published instructions.

1. At roof penetrations, use details shown for conduit risers, vent pipes, curb extensions, ventilators, roof edges, walls, and roof drains.

B. Apply asphalt between temperatures of 375 and 450^0 F.

C. Cover felts exposed overnight or during inclement weather. Glaze coat at end of work period.

D. Roll-out base sheet and allow to relax; mechanically attach base sheet with 2-inch side laps and 6 inch end laps and as per manufacturer's specifications. Embed membrane plies or felts in shingle fashion with uniform solid mopping of asphalt using 23 pounds per 100 square feet between plies.

E. Turned-up roof membrane is unacceptable. Install reinforcement base sheet at vertical roofing transitions; mop base sheet over end tails and cover laterally with 6-inch header over roof membrane.

F. Install membrane to top of curb at cants and walls. Install reinforcement base strip to top of curb, down, over cant with 6-inch minimum lap onto roof membrane.

G. Cut out and remove voids in roof membrane. Install two-ply sheets steeped in hot asphalt over repaired voids.

H. Remove debris and access asphalt prior to application of cap sheet. Apply roofing material to dry roof deck surface.

I. Build-in sheet metal flashings and counter flashings.

J. Repair loose ply laps with hot bitumen and roof assembly surfacing.

K. Repair fish-mouths by cutting plies. Secure and repair area by using manufacturer's recommendations for repairing test cuts.

L. Install tapered edge strip at roof drains. Sump drains back to ease transition and roofing. Install lead flashings prior to cap sheet installation. Roll lead flashings down into drains minimum of 1 inch. Set flashing in mastic, prime top surface, and install two stripping plies. Install drain ring and compress clamping ring with evenly spaced stainless steel fasteners. Install cap sheet and curl around drain; seal cut edge with plastic cement.

M. Install modified cap sheet in solid, uniform asphalt mopping. Install cap sheet in shingle fashion with asphalt at rate of 23 pounds per 100 square feet onto roof membrane. Embed 12-foot maximum lengths in solid mopping of hot asphalt.

N. Install cap sheet at vertical roof intersections and at inclined transitions to top of cant strips. Install and fasten base flashing from minimum height down, over cant strip onto roof and cap sheet at minimum of 4 inches.

O. Affix embedded flashings into roof system with plastic cement. Prime top of exposed with asphalt primer and two reinforcement plies solidly mopped over flashings prior to modified cap sheet surfacing.

3.5 BLENDING NEW TO EXISTING

A. Overlap new, mechanically fastened base sheet by 6 inches, minimum, beyond edge of existing roof system. Apply roof membrane in asphalt, overlapping each successive new play an additional 6 inches beyond ply below. Broom and press felts together tightly, resulting in smooth and wrinkle free surface.

B. 24 hours prior to blending, prime existing surfaces with asphalt primer. Install cap sheet uniformly steeped in hot asphalt adhesive to existing.

C. Extend roofing minimum 3 feet each way onto existing roofing.

3.6 BASE FLASHING

A. Provide modified base flashing ply where roof intersects at vertical transition or at incline transition. Install base flashing to reinforce transition. Install reinforcement flashing in lengths not exceeding nine (9) feet.

3.7 REPAIR

A. Mark and remove wet, damaged or defective material same day as when identified. Replace material at no cost to Owner. No exceptions.

B. Clean patched area(s) thoroughly of debris; prepare following appropriate manufacturer's instructions.

C. Overlap work in layers 18 inches at minimum, unless directed otherwise.

3.8 TESTING

A. Roof cut-out samples, site repairs and remedial roofing at no additional cost to Owner.
1. Make two samples in locations as directed.
2. Cut 4 x 48 inch sample at 90^0 to direction of roofing
3. Install temporary protection needed to prevent moisture penetration through roof until final patches or new roofs are installed. Repair roof sample area to like-new condition.
4. Apply additional felts and bitumen or replace entire area of roof, if sample fails to meet manufacturer's minimum standards.
5. Replace cut areas to avoid depression in membrane. Build up plies and feather out onto adjacent membrane, extend succeeding plies 4 inches, minimum, beyond previous ply in all directions.

3.9 CLEANING

A. Remove bituminous residue from finished surfaces. At areas where finished surfaces are soiled by work of this Section, follow instructions of manufacturer of soiled product.

B. Promptly remove scraps, debris and surplus material from job-site upon completion of work of this Section

END OF SECTION

SECTION 07 54 00

SINGLE-PLY MEMBRANE ROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Adhered system with thermoplastic roofing membrane.
   2. Vapor retarder.

B. Related Requirements:
   1. Section 06 10 00 - Rough Carpentry: Wood nailers and curbs.
   2. Section 07 72 00 - Roof Accessories: Roof-mounted units; prefabricated curbs.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. American Society for Testing and Materials (ASTM) International:
   1. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
   2. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2014.
   3. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2011.

C. NRCA ML104 - The NRCA Roofing and Waterproofing Manual; National Roofing Contractors Association; Fifth Edition, with interim updates.

D. UL (RMSD) - Roofing Materials and Systems Directory; Underwriters Laboratories Inc.; current edition.

1.3 SUBMITTALS

A. See Section 01 33 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, and fasteners.

C. Specimen Warranty: For approval.

D. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, and paver layout.

E. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.

F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

G. Warranty:
   1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
   2. Submit installer's certification that installation complies with all warranty conditions for the waterproof membrane.

H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with NRCA Roofing and Waterproofing Manual.

B. Wind Uplift Performance: Roofing system shall be identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist wind uplift pressure calculated in accordance with ASCE 7.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years of documented experience.
   1. Able to document list of manufacturer trained and certified roofing subcontractors, local storage of roofing materials, and local product representation and technical field support for jobsite inspection.

D. Installer Qualifications: Company specializing in performing the work of this section:
   1. With minimum 5 years documented experience.
   2. A qualified firm prior to bid, that is approved, authorized or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
   3. Single Installer Responsibility: A single installer (contractor) shall perform the work, including sheet metal work, as required by this specification; and shall be a firm specializing in roofing system work who has been in business under the same name and ownership for at least 5 years, capable of showing successful installations similar to the work required for this project.
   4. Roofing job superintendent or job foreman with minimum 4 successful projects installing manufacturer's system.
   5. Selected from manufacturer approved installer list and able to provide warranty as specified in this section.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.

B. Store products in weather protected environment, clear of ground and moisture.

C. Protect foam insulation from direct exposure to sunlight.

1.6 FIELD CONDITIONS

A. Do not apply roofing membrane during unsuitable weather.

B. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

1.7 COORDINATION

A. Arrange work sequence to prevent walking, storage of materials, or movement of equipment on unprotected roofing membrane.

B. Section 07 42 13 for tying in work of this Section with metal roofing for continuous waterproof system integrity.

C. Section 07 62 00 for tying in work of this Section with flashing for continuous waterproof system integrity.

D. Division 22 - Mechanical for roof penetrations and roof drains

E. Division 26 - Electrical for roof penetrations for power supply to mechanical equipment.

1.8 WARRANTY

A. See Section 01 77 00 for additional warranty requirements.

B. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind or other natural causes.
   1. Warranty Term: 20 years. No dollar limit.
   2. For repair and replacement include costs of both material and labor in warranty.
      a. Include TPO membrane, rigid insulation, roof cover board, membrane clad metal flashings, thermal barrier board, termination bars, fasteners, adhesives, and other components above decking as one complete roofing system.
   3. Exceptions NOT Permitted:
      a. Damage due to roof traffic.
      b. Damage due to wind of speed greater than 56 mph but less than 90 mph.
      c. Warranty exclusions for conditions leading to standing water and insufficient roof slope not accepted.

C. Applicator/Roofing Contractor Warranty: The applicator to provide the Owner with a separate workmanship warranty. In the event any work related to roofing, flashing, or metal is found to be within the Applicator warranty term, defective or otherwise not in accordance with the Contract Documents, the Applicator shall repair that defect at no cost to the Owner. The Applicator's warranty obligation shall run directly to the Owner, and a copy shall be sent to membrane manufacturer.

1.9 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain components including roof insulation, fasteners, roof flashing and accessories for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. Thermoplastic Polyolefin Membrane Materials:
   1. Carlisle Roofing Systems, Inc.; Sure-Weld TPO: www.carlisle-syntec.com.
   2. Firestone Building Products, LLC; UltraPly Platinum TPO: www.firestonebpco.com.
   3. Johns Manville; JM TPO: www.jm.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

D. Insulation:
   1. As recommended by membrane roofing manufacturer.

2.2 ROOFING

A. Single-Ply Membrane Roofing: One ply membrane over vapor retarder and insulation.
   1. System Components:
      a. Roof Membrane – mechanically fastened.
      b. Cover Board – mechanically fastened.
      c. Cricket – mechanically fastened.
      d. Roof Insulation – mechanically attached.
      e. Vapor Retarder – self-adhered type.
      g. Substrate Boards/Deck Sheathing - mechanically attached.

B. Roofing Assembly Requirements:
   1. Solar Reflectance Index (SRI): 78, minimum, calculated in accordance with ASTM E1980.
      a. Field applied coating may not be used to achieve specified SRI.
   2. Roof Covering External Fire Resistance Classification: UL Class A.
   3. Insulation Thermal Value (R), minimum: 20; provide insulation of thickness required.
   4. Wind Exposure: Category B, See Structural Drawings.

C. Acceptable Insulation Types - Constant Thickness Application: Any of the types specified.
   1. Minimum 2 layers of uniform thickness polyisocyanurate board. Tapered insulation board layers in addition to uniform thickness boards.

D. Acceptable Insulation Types - Tapered Application:

1. Tapered polyisocyanurate board.
2. Tapered polyisocyanurate board covered with uniform thickness polyisocyanurate board.
3. Uniform thickness polyisocyanurate board covered with tapered polyisocyanurate board.

2.3 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

A. Membrane:
   1. Reinforcing: Both internal fabric and backing.
   2. Thickness: 60 MILS, minimum.
   3. Sheet Width: Factory fabricated into largest sheets possible.
   4. Thermal Emissivity: 0.80, minimum, initial, and 0.79, minimum, 3-year, certified by Cool Roof Rating Council.
   5. Color: White.

B. Seaming Materials: As recommended by membrane manufacturer.

C. Membrane Fasteners: As recommended and approved by membrane manufacturer.

D. Vapor Retarder: Material approved by roof manufacturer complying with requirements of fire rating classification; compatible with roofing and insulation materials.
   1. Fire-retardant adhesive.

E. Flexible Flashing Material: Same material as membrane.

F. Rigid Perimeter Edge Flashing:
   1. Membrane coated heat weldable sheet metal capable of being formed into a variety of shapes and profiles. G-90 galvanized metal sheet with a 20-mil unsupported membrane laminated on one side.

2.4 DECK SHEATHING AND COVER BOARDS

A. Recovery Board at existing roofing to remain: Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 1/4 inch thick.
   1. Products:
      a. Georgia-Pacific DensDeck, DensDeck Prime, or DensDeck DuraGuard: www.densdeck.com.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

B. Cover Boards: Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 1/2 inch thick.
   1. Products:
      a. Georgia-Pacific DensDeck, DensDeck Prime, or DensDeck DuraGuard: www.densdeck.com.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

2.5 INSULATION

A. General: Preformed roof insulation boards manufactured or approved by membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.
   1. Untapered Insulation: Separate layers in thickness to achieve stabilized R-Value.
   2. Tapered Insulation: Provide in 1/8 inch, 1/4 inch, and 1/2 inch taper per foot to meet requirements of installation and where indicated on the Drawings. Do not average thickness to achieve stabilized R-Value. Insulation thickness must be additive.
   3. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

B. Polyisocyanurate Board Insulation: Rigid cellular foam, complying with ASTM C1289, Type II, Class 1, cellulose felt or glass fiber mat both faces; Grade 1 and with the following characteristics:
   1. Compressive Strength: 16 psi
   2. Board Size: 48 x 48 inch.
   3. Untapered Insulation: Separate layers in thickness to achieve stabilized R-Value. Maximum thickness per layer of 2.5 inch.
   4. Tapered Board: Slope as indicated; fabricate fewest layers possible.
   5. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated
   6. Board Edges: Square.

2.6 ACCESSORIES

A. Prefabricated Roofing Expansion Joint Flashing: As specified in Section 07 71 00.

B. Prefabricated expansion joint cover compatible with roofing membrane. designed for securement to vertical or horizontal surfaces to span and accommodate the movement of new and existing expansion gaps from 1 inch to 4-1/2 inches across.

C. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane.

D. Roof Drain Insert:
   1. Membrane-coated heavy-duty aluminum roof drain insert that mechanically seals to the drainpipe interior. Made of aluminum with urethane seal installed in at the end of drainpipe. Flange dimension minimum 18 by 18 inches with aluminum drain strainer.

E. Prefabricated outside and inside flashing corner: As recommended by membrane manufacturer.

F. T-Joint Reinforcement: Circular membrane patch welded over T-joints formed by overlapping membranes, as recommended by manufacturer.

G. Wood Nailers: Treated wood nailers as required per membrane manufacturer. Provide at perimeter of entire roof and around such other roof projections and penetrations as indicated on Drawings.
   1. Lumber: No. 2 or better.
   2. Maximum moisture content 19% by weight on a dry-weight basis.
   3. Fire retardant treatment as specified in Section 06 05 74.

4. Preservative treatment as specified in Section 06 05 75.
5. Installer option to provide 18 gauge galvanized sheet metal in lieu of or in conjunction with wood blocking.

H. Plywood: 1/2 inch thick CDX (C side out), smooth-surfaced exterior grade plywood with exterior grade glue.
1. Maximum moisture content 19% by weight on a dry-weight basis.
2. Fire retardant treatment as specified in Section 06 05 74.

I. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.
1. Length as required for thickness of insulation material and penetration of deck substrate, with metal washers.

J. Membrane Adhesive: As recommended by membrane manufacturer.

K. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.

L. Strip Reglet Devices: Galvanized steel, maximum possible lengths per location, with attachment flanges.

M. Sealants: As recommended by membrane manufacturer.

N. Walkway Pads: Suitable for maintenance traffic, contrasting color or otherwise visually distinctive from roof membrane.
1. Composition: Roofing membrane manufacturer's standard.
2. Size: Manufacturer's standard size(s).
3. Surface Color: White.
4. Products:
   a. As recommended by roofing membrane manufacturer.

O. Splash Pads: Stainless steel, of size and profiles indicated; provide protection pad under splash pads.

PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.

B. Do not apply roofing membrane during unsuitable weather.

C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.

D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

F. Coordinate the work with installation of associated counterflashings installed by other sections as the work of this section proceeds.

3.2 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify deck is supported and secure.

C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.

D. Verify deck surfaces are dry and free of snow or ice.

E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

3.3 VAPOR RETARDER AND INSULATION - UNDER MEMBRANE

A. Apply vapor retarder to deck surface with adhesive in accordance with manufacturer's instructions.
   1. Extend vapor retarder under cant strips and blocking to deck edge.
   2. Install flexible flashing from vapor retarder to air seal material of wall construction, lap and seal to provide continuity of the air barrier plane.

B. Ensure vapor retarder is clean and dry, continuous, and ready for application of insulation.

C. Attachment of Insulation:
   1. Mechanically fasten insulation to deck in accordance with roofing manufacturer's instructions and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

D. Lay subsequent layers of insulation with joints staggered minimum 6 inch from joints of preceding layer.

E. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.

F. On metal deck, place boards parallel to flutes with insulation board edges bearing on deck flutes.

G. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

H. At roof drains, use factory-tapered boards to slope down to roof drains over a distance of 18 inches.

I. Do not apply more insulation than can be covered with membrane in same day.

J. Recovery Board: Install Recovery Board over existing insulation where required by work.

3.4 MEMBRANE APPLICATION

A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.

B. Shingle joints on sloped substrate in direction of drainage.

C. Fully Adhered Application: Apply adhesive to substrate at rate of ____ gal/square. Fully embed membrane in adhesive except in areas directly over or within 3 inches of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.

D. Overlap edges and ends and seal seams by contact adhesive, minimum 3 inches. Seal permanently waterproof. Apply uniform bead of sealant to joint edge.

E. At intersections with vertical surfaces:
   1. Extend membrane over cant strips and up a minimum of 4 inches onto vertical surfaces.
   2. Insert flashing into reglets and secure.

F. Around roof penetrations, seal flanges and flashings with flexible flashing.

G. Install roofing expansion joints where indicated. Make joints watertight.
   1. Install prefabricated joint components in accordance with manufacturer's instructions.

H. Coordinate installation of roof drains, sumps, and related flashings.

I. Install protection membrane below solar panels ballast supports and where indicated or required. Coordinate installation with other trade and solar panels installers.
   1. Install protection layer over roof membrane. Heat weld or adhere to roof membrane with compatible adhesive according to roofing system manufacturer's written instructions.
   2. Overlap layer a minimum of 4 inches. Overlap shall be with the flow of water where possible.

3.5 WALKWAY INSTALLATION

A. Check deck membrane seams that are to be covered by Walkway and re-weld any inconsistencies before Walkway installation.

B. Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions. Check all welds and re-weld any inconsistencies.

3.6 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field quality control and inspection.

B. Owner will engage an independent envelope consultant who will be on site during the course of the work.

C. Require site attendance of roofing and insulation material manufacturers daily during installation of the Work.

D. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel and Owner's envelope consultant to inspect roofing installation on completion.

E. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.

F. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 CLEANING

A. Remove bituminous markings from finished surfaces.

B. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

C. Repair or replace defaced or damaged finishes caused by work of this section.

3.8 PROTECTION

A. Protect installed roofing and flashings from construction operations.

B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION 07 54 00

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fabricated sheet metal items, including flashings, counterflashings, gutters, downspouts, sheet metal roofing, and other items indicated in Schedule.
   2. Reglets and accessories.

B. Related Requirements:
   1. Section 06 10 00 - Rough Carpentry.
   2. Section 07 41 13 – Metal Roof Panels.
   3. Section 07 42 13 – Metal Wall Panels.
   2. Section 07 72 00 - Roof Accessories.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at time of Bid.

B. American Architectural Manufacturers Association (AAMA):
   1. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.

C. American Society for Testing and Materials (ASTM) International:
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
   2. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
   3. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
   4. ASTM B749 - Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products; 2003 (Reapproved 2009).
   5. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
   6. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012)e1.

D. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012.

E. NCRA - National Roofing Contractors Association: The NRCA Roofing and Waterproofing Manual.

1.3 SUBMITTALS

A. See Section 01 33 00 for submittal procedures.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

C. Sample Gutters: Minimum 12 inch length of specified gutter types including endcaps, support strap, drain outlet, strainer, accessories and selected finishes.

D. Color Samples: Sheet metal samples, 3 by 5 inch, illustrating accepted colors and finishes.

E. Samples: Submit two samples, 12 x 12 inch in size illustrating material of typical standing seam.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA 1793 and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience and member of SMACNA.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

1.6 COORDINATION

A. Conform to Section 01 31 00 for coordination with work of other Sections.

B. Coordinate with work of Division 22 or Division 33 for downspout connections to bell housing at tight line drainage system.

1.7 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.

1.8 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

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. FM Approvals Listing: Manufacture and install copings and roof edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with name of fabricator and design approved by FM Approvals.

D. Recycled Content of Steel-Sheet Flashing and Trim: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25percent.

E. 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. Differential values in "Temperature Change" Subparagraph below (for aluminum in particular) are suitable for most of the U.S.
   2. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 SHEET MATERIALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gauge/ 0.024 inch thick base metal.

C. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gauge/ 0.023 inch thick base metal, shop pre-coated with PVDF coating.
   1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 621; multiple coat, thermally cured fluoropolymer finish system.
   2. Color: As selected by Architect from manufacturer's standard colors.

D. Lead: ASTM B749, 2.5 lb/sq ft thick.

E. Stainless Steel: ASTM A666 Type 304, soft temper, 24 gauge/ 0.025 inch (0.64mm) minimum thickness; smooth No. 4 finish.

2.3 REGLETS AND COUNTERFLASHINGS

A. Shop Fabricated Reglet and Counter Flashing Systems: 24 gauge stainless steel or ASTM A792 zinc-aluminum alloy-coated steel with factory applied PVDF finish conforming to AAMA 621.

B. Shop fabricated types suitable for watertight installations.
   1. Shop-fabricated S-lock reglet receivers.
   2. Shop-fabricated counterflashing with hemmed drip edge, inserted into receivers, bayonet joinery, and attached with high-dome washered, EPDM gasketed, color-finished, stitch screws.
   3. Concrete Masonry (CMU wall):
      a. Through-wall flashing type reglet receivers at CMU veneer.
      b. Raggle joint type reglet receivers at single-wythe CMU, where necessary.
      c. Surface Mounted Reglet Types: Not accepted.
   4. Roof to Wall Transitions:
      a. Two-piece separate reglet and counterflashing.

2.4 ACCESSORIES

A. Fasteners: Suitable fasteners designed to withstand design load and recommended by manufacturer of primary sheet metal or manufactured items .
   1. Exposed Fasteners: Self-drilling, self-tapping, corrosion-resistant fasteners with heads finished to match flashings, gasketed with EPDM washers.
   2. Concealed Sheet Metal Fasteners: Panhead self-drilling, self-tapping, corrosion-resistant fasteners, and as instructed by manufacturer.
   3. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
   4. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
   5. Fasteners for Zinc-Tin Alloy-Coated Stainless-Steel Sheet: Series 300 stainless steel.
   6. Fasteners for Zinc Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
   7. Fasteners for Zinc Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

B. Self-Adhering, High-Temperature Underlayment: Slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing.
   1. Minimum Thickness: 30 mils.
   2. Primer: Provide primer according to written recommendations of underlayment manufacturer.
   3. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F or higher.
   4. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F or lower.
   5. Manufacturer/products:
      a. Carlisle Construction Materials, WIP 300 HT, www.carlisle-ccw.com.
      b. Grace Construction Products, Grace Ultra, www.na.graceconstruction.com.
      c. Henry Company, Blueskin PE200 HT, www.henry.com.

C. Single Pipe Flashing at Roofing Systems:
   1. Soft Metal Pipe Flashing: Sheet Lead, minimum 2.5 lb per square foot, minimum 8 inch flashing height, top of flashing capped or rolled into pipe approximately 1 inch.

D. Slip Sheet: Rosin sized building paper.

E. Primer: Zinc chromate type.

F. Protective Backing Paint: Zinc molybdate alkyd.

G. Sealant to be Concealed in Completed Work: Non-curing butyl sealant.

H. Sealant to be Exposed in Completed Work: ASTM C920; elastomeric sealant, 100 percent silicone with minimum movement capability of plus/minus 25 percent and recommended by manufacturer for substrates to be sealed; clear.

I. Joint Sealers: As specified Section 079200.
   1. Exposed to Ultra-Violet (UV): Silicone sealant.
   2. Concealed from UV: Non-skinning butyl.

J. Plastic Cement: ASTM D4586, Type I.

K. Electrolytic Protection: Bituminous paint, tape, or other isolation treatments as accepted by Architect.

L. Solder: ASTM B32; Sn50 (50/50) type.

M. Miscellaneous: Incidental and accessory materials, methods, tools and equipment to complete work of this Section.

2.5 FABRICATION, GENERAL

A. General: Conform to SMACNA and NRCA design and installation provisions and provision of Contract Documents. Form sections true to shape, accurate in size, square, and free from distortion or defects.
   1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
   2. 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.
   3. Obtain field measurements for accurate fit before shop fabrication.
   4. Form sheet metal flashing and trim to fit substrates without oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
   5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabricated flashings from stainless steel where in contact or embedded in masonry and concrete.

C. Fabricate cleats and starter strips of same material as sheet, in widths and thickness required by SMACNA to interlock with sheet.

D. Form pieces in longest possible lengths.

E. Provide expansion joints not exceeding 50 foot intervals, except where shorter intervals are shown on Drawings or indicated by SMACNA.

F. Hem exposed edges on underside 3/4 inch; miter and seam corners. Seam seal corners not intended to be soldered.

G. Seal all metal joints, laps to be minimum 6 inches and sealed with (3) three watertight continuous beads of project specified sealant. Laps to be installed away from prevailing weather exposure.

H. Form material with cover plate type seam sealed with (3) three continuous beads of project approved sealant on each side of the butt-joint.

I. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

J. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, solder all joints.

K. Fabricate vertical faces with bottom edge formed outward 3/4 inch and hemmed to form drip.

L. Fabricate flashings to allow toe to extend 4 inches over roofing materials. Return and brake edges.

M. Provide end dams at window, door, louver or other opening to prevent moisture dripping off the end, solder all joints.

N. Accessories and Miscellaneous: Provide as necessary. Items of same materials as items to which applied.

2.6 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Gutters and Downspouts: Size for rainfall intensity determined by a storm occurrence of 1 in 100 years in accordance with SMACNA Architectural Sheet Metal Manual.

B. Gutters: Profile as indicated.
   1. Fabricate from prefinished galvanized steel sheet, matching flashing and metal panel finish. Gutter girth metal thickness and weight in accordance with NCRA and SMACNA, with minimum thickness not less than 22 gauge/ 0.030 inch (0.76mm).
   2. Field roll form continuous gutters in 50-foot lengths maximum.
   3. Suspend from continuous gutter cleat system without penetrating gutter.
   4. Gutter Straps: As indicated on Drawings, minimum 1/8 inch thick by 2 inch wide.
   5. Gutter Brackets: As indicated on Drawings, minimum 3/16 inch thick by 1-1/2 inch wide.
   6. Front Edge of Gutter: Fabricate minimum 1 inch below back of gutter and as necessary for overflow water to spill over face of gutter.
   7. Expansion Joints: Locate at equal distance between downspouts. Do not exceed 50 foot length of gutter without expansion joint.
   8. Seams and Ends: Watertight.
   9. Gutter Outlets: Size to fit minimum 4 inch deep into downspout.
   10. Stand-offs: Fabricate of same gauge and finish as gutter and as necessary to hold gutters plumb and true off fascias. 22 gauge at 4 inches wide spaced every 36 inches.

C. Downspouts: Profile as indicated.
   1. Prefinished Galvanized Steel Pipe Downspouts: Schedule 10, ASTM A53, hot-dipped galvanized inside and out. Provide shop assemble units with welded joints.
      a. Downspout frequency: Provide one per every 50 feet of gutter for drainage egress per SMACNA recommendations.
      b. Size: Minimum 4 inch nominal diameter standard pipe, unless noted otherwise.
      c. Include elbow at downspout to direct water away from building.
      d. Downspout Supports: Hangers and Straps.
         1) 1/8 inch (0.125 inch) thick steel bent plate design as shown on Drawings.
   2. Fasteners For Mounting Downspouts to Walls:
      a. New Construction: AISI Type 302/304, stainless steel.
   3. Downspout Strainer: Cast Aluminum Dome Strainers with scissor expansion anchor fitting into drain or downspout.
      a. Profiled to suit gutter, conductor head, drain or downspouts.
      b. Size to suit condition of installation.
      c. Manufacturer: Marathon Roofing Products Inc., www.marathondrains.com
   4. Downspout Cleanouts: ASTM A123 hot-dip galvanized steel plate, 3 inch wide by 4 inch high or as detailed, attach with 4 stainless steel threaded bolts, over 2 inch by 3 inch opening located at 12 inch from bottom of downspout.
   5. Downspout Boots: Neoprene downspout coupler boot with stainless steel clamp.
   6. Downspout Connections to Storm Drainage System: Per Civil Drawings and Specifications. Exposed neoprene coupler is not acceptable.

D. Conductor Heads:
   1. Custom fabricate as shown on Drawings from the following materials:
      a. Pre-finished Galvanized Steel: minimum 22 gauge/ 0.030 inch (0.76mm) thick.
   2. Fabricate conductor heads with built-in overflow openings and with top of conductor not less than 1 inch below scupper.

E. Overflow Scuppers:
   1. Custom fabricate as shown on Drawings from the following materials:
      a. Pre-finished Galvanized Steel: minimum 22 gauge/ 0.030 inch (0.76mm) thick.
   2. Fabricate and coat materials to receive watertight bond with roof membrane.
   3. Use concealed fasteners and continuous cleat at perimeter penetration of external wall coping.

F. Accessories:
   1. Splash Pans: Fabricate of stainless steel, same metal thickness as downspout. Fabricate to SMACNA Figure 1-36 and verify with Architect.
   1. Provide at downspouts terminating above roof surfaces.
   2. Include elbow at downspout to direct water away from building.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Coping: Fabricate in minimum 96-inch- long, but not exceeding 12-foot-long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, solder or weld watertight. Shop fabricates interior and exterior corners.
   1. Coping Profile: As indicated on Drawings.
   2. Seam: Double lock standing seam per SMACNA figure 3-3.

3. Fabricate from the following materials:
    a. Pre-finished Galvanized Steel: 19 gauge/0.040 inch thick.

2.8 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch-long, but not exceeding 12-foot long, sections, under copings, and at shelf angles. Provide splice plated at joints of formed, smooth metal flashing.
    1. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; 6-inch minimum vertical flange and form with 2-inch high end dams, seal joints watertight with soldered joints and sealant. Fabricate with drip edge unless otherwise indicated by extending flashing 1/2 inch out from wall, with outer edge bend down 30 degrees and 1/2-inch hemmed.
    2. Fabricate foundation wall flashing with 6-inch vertical flange extending over horizontal concrete slab surface, 3-inch down and Foundation Wall Flashing: Vertical flange to extend over horizontal slab surface and 3-inch down the face of concrete footing, including 1 3/4-ich drip edge with 1/2-inch hem.
    3. Fabricate from the following materials:
        a. Stainless Steel: 24 gauge/0.025 inch (0.64mm) thick.

B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 6-inch minimum vertical flange, 2-inch- high end dams, seal all joints watertight with fully soldered joints and sealant. Fabricate from the following materials:
    1. Stainless Steel: 24 gauge/ 0.025 inch (0.64mm) thick.

C. Saddle Flashing:
    1. Custom shop fabricated saddle flashings at all parapet and roof edge intersections to adjacent rising walls and as shown on Drawings.
    2. Obtain field measurements for accurate fit to suit specific field condition before shop fabrication.
    3. Fully solder all joints watertight and seal with sealant. Fabricate from the following materials:
        a. Stainless Steel: 24 gauge/ 0.025 inch (0.64 mm) thick.

2.9 FINISHES

A. Steel Sheet and Coil: Factory pre-finished coil coating:
    1. Weather Face: Polyvinylidene Fluoride (PVDF) finish coating with 70 percent Kynar 500 or Hylar 5000 resin content, conforming to AAMA 621, over aluminum-zinc alloy base coated sheet steel.
    2. Non-Weather Face: 0.50 mil minimum non corrosion-resistant primer and off-white topcoat.
        a. Primer: 0.15 mil minimum
        b. Finish Coat: 0.35 mil minimum
        c. Include strippable protective film for protection of prefinished steel finish.
    3. Prefinished Steel Metal Colors: Match adjacent sheet metal wall and roof panels.
        a. FMT-1-1: Verify with Architect
    4. Location:
        a. Match trim color to adjacent metal panel color.
        b. See exterior elevations for all other conditions.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.3 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 (50 mm).

B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller. Cover underlayment within 14 days.

C. Apply slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.

3.4 INSTALLATION, GENERAL

A. Conform to drawing details.
   1. Install in accordance with SMACNA and provisions of Contract Documents.
   2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
   3. 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.
   4. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
   5. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
   6. Torch cutting of sheet metal flashing and trim is not permitted.
   7. 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. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. 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 50 feet with no joints within 24 inches of corner or intersection.

D. Insert flashings into reglets to form tight fit. Secure in place with lead wedges. Seal flashings into reglets with sealant.

E. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

F. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.

G. Apply plastic cement compound between metal flashings and felt flashings.

H. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

I. Seal metal joints watertight.
   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 (4 and 21 deg C), 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 (4 deg C).
   2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."

J. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

K. Rivets: Rivet joints where necessary for strength.

3.5 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Hanging Gutter:
   1. Install continuous gutter cleats allowing for free thermal expansion and contraction.
   2. Fasten gutter straps to front and back of gutter, spaced alternately with brackets at 18 inches on center maximum.
   3. Anchor gutter with brackets, spaced 18 inches on center maximum.

4. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.
5. Secure to solid wood blocking or other acceptable backing.

C. Downspout:
1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches maximum on center. Space at even, consistently uniform intervals.
2. Provide elbows at base of downspout to direct water away from building.
3. Hold downspouts 1 inch clear from top of gutter outlets and at storm drainage system to allow for expansion and contraction.
4. Connect downspouts to underground drainage system
5. Fit downspouts into collar or clamping ring as indicated on Civil Drawings. Connect to tight line storm drainage system. Do not connect into foundation drainage system.

D. Secure gutters and downspouts in place using concealed fasteners.

E. Splash Pans: Set splash pans under downspouts. Set in place with asphalt roofing cement or elastomeric sealant compatible with substrate.

F. Parapet Scuppers: Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane. Seal at perimeter of exterior of scupper.

G. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 1 inch below scupper or gutter discharge.

3.6 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.
1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 16-inch centers.
2. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch centers.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches. Secure in waterproof manner by the following means unless otherwise indicated:
   1. Snap-in installation and sealant or lead wedges and sealant or interlocking folded seam or blind rivets and sealant

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric or butyl sealant and clamp flashing to pipes that penetrate roof.

3.7 WALL FLASHING INSTALLATION

A. General: Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 04 20 00 Unit Masonry.

C. Reglets: Installation of reglets is specified in Section 03 30 00 Cast-In-Place Concrete and Section 04 20 00 Unit Masonry.

D. Opening Flashings in Frame Construction: Install continuous head, sill, and jamb and similar flashings to extend 4 inches beyond wall openings. Mechanically fastened to each framing members through exterior wall sheathings.
   1. Door Sill Pan Flashing:
      a. Install at each exterior door rough opening, integrated into fluid applied flashings membrane and WRB, and bed in continuous beads of non-skinning butyl sealant.
      b. Provide fully watertight door sill pan flashing installation and bed on 3 continuous beads of non-skinning butyl sealant.

3.8 MISCELLANEOUS FLASHING INSTALLATION

A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

B. Overhead-Piping Safety Pans: Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.

3.9 JOINT SEALERS

A. Conform to provisions of Section 07 92 00 and NRCA Manual, as required to make weathertight joints.

B. Standing Seam Coping Joints: Install approved sealant, specified in Section 07 92 00, at all standing seam joints, ensuring bleed out at each end of joint.

C. Overlapping Metal Flashing Joints: Lap all joints facing away from prevailing weather, and install lap sealant at copings, reglets, counterflashing, gutters, and other continuous flashing joint overlaps.
   1. Install minimum three beads of butyl bedding sealant between flashing overlaps.
   2. Seal exposed open ends of flashing with silicon joint sealant.
   3. Install bead of butyl or silicone sealant at joints under cap flashing and overlapped flashing. Install minimum one bead of butyl bedding sealant or silicone sealant on each side of joint.
   4. Install one bead of butyl bedding sealant or silicone sealant between substrate and flush mounted reglets, termination bars, and other overlaps or metal to metal or metal to other construction.

D. Sheet Metal Cover Plates: At cover, and at backer plates at metal flashing joints, set minimum two, continuous beads of butyl bedding sealant between sheet metal at each side of joint.

3.10 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.11 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for field inspection requirements.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

3.12 ADJUSTING

A. Make adjustments to make installations plumb and true to line, except where gutters are intended to be neatly sloped to drain.

B. Repair installations as required to make watertight for long-term successful performance.

C. Touch up finishes to match adjacent surfaces where scratched or marred, at locations where replacement with new material may not be required.
   1. If Galvalume or Zinc alum base coating is scratched off or damaged, replace that piece/unit/section/component.

3.13 CLEANING

A. Leave installations clean, free from residue and debris from work of this Section.

END OF SECTION 07 62 00

SECTION 07 72 00

ROOF ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Manufactured curbs, equipment rails, access ladders, and pedestals.

B. Related Requirements:
   1. Section 07 62 00 - Sheet Metal Flashing and Trim: Roof accessory items fabricated from sheet metal.

1.2 REFERENCE STANDARDS

A. 29 CFR 1910.23 - Guarding floor and wall openings and holes; current edition.

B. Reference Standards: Current edition at date of Bid.

C. American Society for Testing and Materials (ASTM) International:
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
   2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
   3. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

1.3 SUBMITTALS

A. See Section 01 33 00 for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used.
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Maintenance requirements.

C. Shop Drawings: Submit detailed layout developed for this project. Show dimensioned location and number for each type of roof accessory.

D. Warranty Documentation:
   1. Submit manufacturer warranty.
   2. Ensure that forms have been completed in Owner's name and registered with manufacturer.
   3. Submit documentation that roof accessories are acceptable to roofing manufacturer, and do not limit the roofing warranty.

1.4 QUALITY ASSURANCE

A. Manufacturer:
   1. Design, fabricate, and furnish roof curbs and equipment supports to accurate dimensions, configuration, and structural rigidity to meet requirements for watertight systems.
   2. Accommodate loading capacity and connections of roof equipment, configuration of and watertight connections to roofing system, and configuration and spanning capacity between structural members at openings in roof deck.

1.5 QUALIFICATIONS

A. Manufacturer:
   1. Able to document minimum 10 years continuous experience designing, manufacturing, and supplying work of this Section.
   2. Maintain engineering and design capabilities to furnish customized curbs, expansion joints, and equipment supports.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store products under cover and elevated above grade.

1.7 COORDINATION

A. Section 08 43 13 for roof curb support.

1.8 WARRANTY

A. See Section 01 77 00 - Closeout Procedures, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

1.9 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURED CURBS

A. Manufactured Curbs, Equipment Rails, and Other Roof Mounting Assemblies: Factory-assembled hollow sheet metal construction with fully mitered and welded corners, integral counterflashing, internal reinforcing, and top side and edges formed to shed water.
   1. Sheet Metal: Hot-dip zinc coated steel sheet complying with ASTM A653/A653M, SS Grade 33 ; G90 coating designation.
   2. Sheet Metal Thickness:
      a. Minimum 18 gauge, and as engineered by manufacturer.

b. Minimum 14 gauge for curbs supporting HVAC units
c. Minimum 20 gauge for expansion joint curbs.

3. Insulation: Factory installed 1-1/2 inch thick three-pound density semi-rigid fiberglass blanket.
4. Roofing Cants: Provide integral sheet metal roofing cants dimensioned to begin slope at top of roofing insulation; 1:1 slope; minimum cant height 4 inches.
5. Manufacture curb bottom and mounting flanges for installation directly on roof deck, not on insulation; match slope and configuration of roof deck.
6. Height Above Finished Roof Surface: 8 inches, minimum.
7. Provide the layouts and configurations shown on the drawings.

B. Curbs Adjacent to Roof Openings: Provide curb on all sides of opening, with top of curb horizontal for equipment mounting.
1. Provide preservative treated wood nailers along top of curb.
2. Insulate inside curbs with 1-1/2 inch thick fiberglass insulation.
3. Height Above Finished Roof Surface: 8 inches, minimum.
4. Height Above Roof Deck: 14 inches, minimum.

C. Equipment Rails: Two-sided curbs in straight lengths, with top horizontal for equipment mounting.
1. Provide preservative treated wood nailers along top of rails.
2. Height Above Finished Roof Surface: 6 inches, minimum.
3. Height Above Roof Deck: 14 inches, minimum.

D. Pipe, Duct, and Conduit Mounting Pedestals: Vertical posts, minimum 8 inches square unless otherwise indicated.
1. Provide sliding channel welded along top edge with adjustable height steel bracket, manufactured to fit item supported.
2. Height Above Finished Roof Surface: 6 inches, minimum.
3. Height Above Roof Deck: 14 inches, minimum.

E. Access Ladder: Tubular Rail with walk-through rail extensions.
1. O’keeffe’s Inc. Model 504 Access Ladder, or approved.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. General: Install in accordance with manufacturer's instructions, in manner that maintains roofing weather integrity.

B. Roof Hatches and Curbs:
   1. All curb height to be minimum 6 inches at step flashing and 8 inches at upslope cricket flashings, above finished roof system surface.
   2. Include sheet metal step flashings, apron flashings, and saddle/cricket flashings.
   3. See Section 07 62 00 for sheet metal flashing section.

3.4 CLEANING

A. Clean installed work to like-new condition.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 07 72 00

SECTION 07 84 00

FIRESTOPPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Firestopping systems.
   2. Firestopping of all joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not, and other openings indicated.
   3. Firestopping system as an application to limit sound transmission between designated rooms.
   4. Code-required identification at firestopped locations.
   5. Code-required identification at all walls where fire or smoke protected openings or penetrations are required.

B. Related Requirements:
   1. Division 22 – Plumbing.
   2. Division 23 – Heating, Ventilating, and Air Conditioning.
   3. Division 26 – Electrical.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. American Society for Testing and Materials (ASTM) International:
   1. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.
   2. ASTM E1966 - Standard Test Method for Fire Resistive Joint Systems; 2007 (Reapproved 2011).
   3. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus; 2010.
   4. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2013.
   5. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2013.

C. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

D. FM Global:
   1. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.

E. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.

F. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Underwriters Laboratories Inc.; 2004.

G. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.3 SUBMITTALS

A. See Section 01 33 00 for submittal procedures.

B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.

C. Product Data: Provide data on product characteristics, performance ratings, and limitations.

D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
   1. Listing in the current-year classification or certification books of UL, FM, or ITS (Warnock Hersey) will be considered as constituting an acceptable test report.
   2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
   3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and:
   1. Trained by the manufacturer.
   2. With minimum 3 years documented experience installing work of this type.
   3. Able to show at least 5 satisfactorily completed projects of comparable size and type.
   4. Licensed by authority having jurisdiction.
   5. Same installer is preferred but not required to be responsible for both penetration firestopping and joint systems at fire-resistance rated assemblies.

D. Single source firestopping responsibility:
   1. Penetration Firestopping: Provide firestopping by or under direct responsibility of single installer for mechanical, electrical, fire protection, telecommunication, and other membrane penetration and through-penetration firestopping at fire-resistance rated assemblies.
   2. Joint Firestopping: Provide firestopping by or under direct responsibility of single installer for joints, openings, and voids at fire-resistance rated assemblies.
   3. Same installer is preferred but not required to be responsible for both penetration firestopping and joint systems at fire-resistance rated assemblies.

E. Firestopping systems, supplied by more than one manufacturer, are accepted under condition that:

1. Same manufacturer’s products are used consistently for each firestopping system or condition of use.
2. Firestopping products from different manufacturers are not permitted to come in contact with one another.

1.5 REGULATORY REQUIREMENTS

A. IBC Chapter 7 for joint systems and through-penetration fire stops as required to maintain assemblies and construction.

1.6 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

1.7 COORDINATION, SCHEDULING, AND SEQUENCING

A. Conform to Section 01 31 00 for coordination with work of related Sections.

B. Division 21 - Fire Suppression, Division 22 - Plumbing, Division 23 - HVAC and Division 26 - Electrical for fire protection firestopping requirements for penetrations through construction.

1.9 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 FIRESTOPPING - GENERAL REQUIREMENTS

A. Manufacturers:
1. A/D Fire Protection Systems Inc.: www.adfire.com.
2. 3M Fire Protection Products: www.3m.com/firestop.
3. Hilti, Inc.: www.us.hilti.com.
4. Nelson FireStop Products: www.nelsonfirestop.com.
5. Specified Technologies, Inc.: www.stifirestop.com.
6. Tremco, Inc.: www.tremcofirestop.com.
7. Rectorseal Corporation, Metacaulk / Bio Fireshield: www.rectorseal.com / www.biofireshield.com .
8. USG, Firestop Systems: www.usg.com.
9. Holdrite Hydroflame: www.holdrite.com.
10. Substitutions: See Section 01 60 00.

B. Firestopping: Any material meeting requirements.

1. Provide components including mortars, sealants, putties, collars, wrap strips, mineral wool fire safing, devices, and accessories as required to complete each firestopping system, conforming to manufacturer's instructions and provision of Contract Documents.

C. Firestopping Materials with Volatile Content: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.

D. Mold Resistance: Provide firestoppping materials with mold and mildew resistance rating of 0 as determined by ASTM G21.

E. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.

F. Fire Ratings: See Drawings for required systems and ratings.

G. Firestopping Warning Label: Minimum 3 inch by 5 inch label. Red color or with red colored type. Adhesive backed or other means for permanent attachment. "WARNING" written in bold type. Identify or include spaces for following information:
   1. Name of manufacturer.
   2. Name of installer.
   3. Date firestopping was installed.
   4. Firestopping Assembly Reference Number included in O&M Manual specified Section 017823.
   5. Firestopping UL, WHI, or OPL number or manufacturer's engineered design number.
   6. F Rating and T Rating.

2.2 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Perimeter Fire Containment Firestopping: Use any system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of the floor assembly.
   1. Movement: In addition, provide systems that have been tested to show movement capability as indicated.
   2. Temperature Rise: In addition, provide systems that have been tested to show T Rating as indicated.
   3. Air Leakage: In addition, provide systems that have been tested to show L Rating as indicated.
   4. Where floor assembly is not required to have a fire rating, provide systems that have been tested to show L Rating as indicated.

B. Head-of-Wall Firestopping at Joints Between Non-Rated Floor and Fire-Rated Wall: Use any system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of floor or wall, whichever is greater.
   1. Movement: In addition, provide systems that have been tested to show movement capability as indicated.

C. Floor-to-Floor, Wall-to-Wall, and Wall-to-Floor Joints, Except Perimeter, Where Both Are Fire-Rated: Use any system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.

1. Movement: In addition, provide systems that have been tested to show movement capability as indicated.
2. Air Leakage: In addition, provide systems that have been tested to show L Rating as indicated.
3. Watertightness: In addition, provide systems that have been tested to show W Rating as indicated.
4. Listing by UL, FM, or Intertek in their certification directory will be considered evidence of successful testing.

D. Through Penetration Firestopping: Use any system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
1. Temperature Rise: In addition, provide systems that have been tested to show T Rating as indicated.
2. Air Leakage: In addition, provide systems that have been tested to show L Rating as indicated.
3. Watertightness: In addition, provide systems that have been tested to show W Rating as indicated.
4. Listing by UL, FM, or Intertek in their certification directory will be considered evidence of successful testing.

2.3 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Non-hardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
   1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

2.4 MIXING

A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

C. Install backing materials to arrest liquid material leakage.

D. Apply primers and other materials and methods as instructed by manufacturer to achieve bonding of firestopping materials and to hold securely and permanently in place.

E. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.3 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Do not cover installed firestopping until inspected by Owner's Independent Testing Agency.

C. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
   1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.

D. Install fill materials for firestopping by proven techniques to produce the following results:
   1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
   2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
   3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

E. Do not cover installed firestopping until inspected by authority having jurisdiction.

F. Install labeling required by code.

3.4 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections.

B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.

C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.5 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.6 PROTECTION

A. Protect adjacent surfaces from damage by material installation. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

END OF SECTION 07 84 00

SECTION 07 92 00

JOINT SEALANTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Nonsag gunnable joint sealants.
   2. Self-leveling pourable joint sealants.
   3. Joint backings and accessories.

B. Related Requirements:
   2. Section 07 84 00 - Firestopping: Firestopping sealants.
   3. Section 08 71 00 - Door Hardware: Setting exterior door thresholds in sealant.
   4. Section 08 80 00 - Glazing: Glazing sealants and accessories.
   5. Section 09 21 16 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.
   6. Section 09 22 16 - Non-Structural Metal Framing: Sealing between framing and adjacent construction in acoustical and sound-rated walls and ceilings.
   7. Section 09 30 00 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. American Standards for Testing and Materials (ASTM) International:
   1. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2015.
   2. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012.
   3. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2000 (Reapproved 2011).
   4. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
   5. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2013.

C. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.

D. SWRI (VAL) - SWR Institute Validated Products directory; Sealant, Waterproofing and Restoration Institute; online at http://www.swrionline.org/ValidatedSealants.

1.3 SUBMITTALS

A. See Section 01 33 00 for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.
   5. Substrates for which use of primer is required.
   6. Substrates for which laboratory adhesion and/or compatibility testing is required.
   7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
   8. Sample product warranty.
   9. Certification by manufacturer indicating that product complies with specification requirements.
   10. SWRI Validation: Provide currently available sealant product validations as published by SWRI for specified sealants.

C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and approved by manufacturer.
   1. Installer/applicator to designate a single individual as project foreman who shall be on site at all times during installation; use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the work of this Section; perform work in accord with ASTM C-1193 guidelines except where more stringent requirements are indicated or specified.

1.5 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

B. Provide joints properly dimensioned to receive the approved sealant system. Provide joint surfaces that are clean, dry, sound and free of voids, deformations, protrusions and contaminants which may inhibit application or performance of the joint sealant. Where expansion joints having preformed joint fillers are scheduled to be sealed, provide a reservoir to accept the sealant such as by a molded breakaway joint cap or a removable block out.

1.6 WARRANTY

A. See Section 01 77 00 - Closeout Procedures, for additional warranty requirements.

B. Correct defective work within a five year period after the Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

1.7 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Joint Sealant:
   1. Dow Corning:www.dowcorning.com.
   2. GE Silicones: www.gesilicone.com.
   3. Pecora Corporation: www.pecora.com.
   4. Sika: www.sika.com
   5. Sonneborn Division of Degussa: www/chemrex.com.
   6. Tremco Sealant/Weatherproofing Division: www.tremcosealant.com.
   7. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on the drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
      a. Wall expansion and control joints.
      b. Joints between door, window, and other frames and adjacent construction.
      c. Joints between different exposed materials.
      d. Openings below ledge angles in masonry.
      e. Other joints indicated below.
   2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
      a. Joints between door, window, and other frames and adjacent construction.
      b. Other joints indicated below.
   3. Do not seal the following types of joints.
      a. Intentional weepholes in masonry.
      b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
      c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
      d. Joints where installation of sealant is specified in another section.
      e. Joints between suspended panel ceilings/grid and walls.

2.3 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 61 16.

B. Colors: As indicated on the drawings.

2.4 EXTERIOR JOINT SEALANT - VERTICAL

A. Porous or Non-Porous Materials Adhered to Porous or Non-Porous Materials, Weatherproofing Sealant, Non-Paintable. Neutral curing.
   1. Joint Movement Capabilities: 100 percent extension and 50 percent compression in accordance with ASTM C719 as specified in ASTM C920.
   2. Single Component Silicone: ASTM C920, Type S, Grade NS, Class 100/50, Use NT, M, G, A, and O.
      a. Dow Corning 790 Silicone Weatherproofing Sealant.
      b. GE Silpruf SCS 2700.
      c. Pecora 890.
      d. Sika SikaSil-C995.
      e. Tremco Spectrem 1.

B. Structural Sealant application, Non-Paintable: Includes glass to glass and glass to metal at aluminum curtain wall.
   1. Joint Movement Capabilities: 50 percent extension and 50 percent compression in accordance with ASTM C719.
   2. Single Component Silicone, ASTM C920, Type S, Grade NS, Class 50, Use NT, M, A, G, and O.
      a. Dow Corning 795 or Dow Corning 995, accepted at glass to non-porous materials.
      b. GE Silpruf SCS 2000.
      c. Pecora 895.
      d. Tremco Spectrem 2 or Proglaze SSG.

C. Joints and Cracks Receiving Painted Coating Over Sealant: Verify compatibility with coating system.
   1. Joint Movement Capabilities: Polyurethane and STPe, minimum 50 percent expansion and 50 percent compression in accordance with ASTM C719.
   2. Single Component Polyurethane, ASTM C920, Type S, Grade NS, Class 50, Use NT, M, A, G and O, for acrylic and alkyd paint coatings.
      a. Sika Sikaflex 15LM.
      b. Tremco Dymonic FC/Dymonic 100.
   3. Single Component Silyl-terminated polyether (STPe): ASTM C 920, Type S, Grade NS, Class 50, Use T, NT, M, A, G, and O.
      a. ChemLink DuraLink.
      b. Sonneborn Sonolastic 150 with VLM Technology.

2.5 EXTERIOR JOINT SEALANTS - HORIZONTAL SKY FACING

A. Recessed Joint Fillers: Asphalt impregnated joint filler and as specified Division 32 for paving and other horizontal surfaces.

B. Removable Expansion Joint Caps: Required for installation of joint sealants over asphaltic joint filler. Refer to Division 31.

C. Exterior Paving Joint Sealant Over Joint Filler:
   1. Single Component Silicone, ASTM C920, Type S, Grade P, Class 25, Use T, M; ASTM D5893 Type SL.
      a. Dow Corning 890 SL; Parking Structure SL
      b. Sonneborn Sonolastic SL1, SL2.
      c. Tremco Spectrem 800/900SL.
   2. Parking Structure Sealant SL (Self-Leveling). Two-Component Polyurethane Paving Joint Sealant: Type M.
      a. Sika Sikaflex-2c SL.
      b. Sonnaborn Sonolastic SL 2.
      c. Tremco THC 901/Vulkem 445 SSL.

D. Exterior Green or Damp Concrete Paving:
   1. Single-component, self-leveling, moisture curing, low-modulus sealant for level or slightly sloped surfaces.
      a. ChemLink NovaLink SL or M1 silyl-terminated polyether (STPe) sealant.
      b. Tremco Vulkem 45 SSL or 445 SSL as applicable, polyurethane sealant.

2.6 NON-POROUS MATERIALS ADHERED TO AIR-BARRIER MEMBRANE SYSTEMS

A. Neutral cure, one-part silicone sealant, designed for adhering to horizontal and vertical low energy surfaces including polyethylene, polyolefin, elastomeric liquid-applied air and weather barrier systems, and coated metal flashing systems. Refer to manufacturer's tested systems.
   1. Single Component Silicone: ASTM C920, Type S, Grade NS, Class 25, Use NT, M, G, A, and O.
      a. Dow Corning 758.
      b. Tremco Spectrem 1.
   2. Single Component Silyl-terminated polyether (STPe): ASTM C920, Type S, Grade NS, Class 50, Use NT, M, A, G, and O.
      a. ChemLink DuraLink.
      b. Sonneborn Sonolastic 150 with VLM Technology.

2.7 EXTERIOR BEDDING SEALANT AT HORIZONTAL AND VERTICAL JOINTS

A. Bedding and Threshold Sealants Concealed from UV:
   1. Non-Skinning Butyl Bedding Sealant: Installed over polyethylene backer rod or tape bond-breaker.
      a. Pecora BA 98.
      b. Sikaflex 511.
      c. Tremco Acoustical Sealant or Tremco Curtainwall Sealant.
   2. Consistency for use with gun or knife without paint finish, light gray color.

2.8 INTERIOR JOINT SEALANTS

A. Exposed Joint Sealants - General Use:

1. Paintable Siliconized Acrylic Latex Joint Sealant: ASTM C834.
    a. ChemLink TrimCaulk.
    b. GE RCS20 Siliconized Acrylic Latex.
    c. Pecora AC-20 + Silicone Acrylic Latex.
    d. Sonneborn Sonolac, acrylic latex.
    e. Tremco Tremflex 834.

B. Bathroom, Shower, and Kitchen Sealants:
1. Mildew Resistant Silicone: ASTM C920, Grade NS, Class 25, Use T, M G, A, and O.
    a. Dow Corning 786 Silicone Mildew Resistant Sealant or Dow Corning Tub and Tile.
    b. GE Sanitary SCS 1700.
    c. Tremco Tremsil 200.

C. Acoustical Sealant at Exposed Joints:
1. Nonsag, paintable, nonstaining, latex sealant conforming to ASTM C834. Tested to ASTM E90 for reduction of airborne sound transmission through perimeter joints and openings in building construction at representative assemblies.
    a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
    b. USG, SHEETROCK, Acoustical Sealant.
    c. GE RCS20 siliconized acrylic latex

D. Acoustical Sealant at Concealed Joints:
1. Synthetic Rubber Joint Sealant: Single component, non-skinning, non-hardening, 90 percent solids, acoustical properties conforming to ASTM C919 and ASTM E90.
    a. Pecora, BA-98.
    b. Tremco, Acoustical Sealant.
2. Water Based Siliconized Acrylic Latex:
    a. Pecora, AIS-919.
    b. USG, SHEETROCK, Acoustical Sealant.
    c. GE RCS20 siliconized acrylic latex
3. Install 2 beads under steel stud framing channel and wood plates and into 1/2 inch space between top of floor and bottom of gypsum board and plaster systems.

E. Horizontal Cementitious Joints:
1. Single Component Polyurethane Joint Sealant: ASTM C920, Type S, Grade P, Class 25, Use T.
    a. Sikaflx 1CSL.
    b. Sonneborn Sonolastic SL 1, Tye S, Grade P, Class 25, USe T, M.
    c. Tremco Vulkem 45 SSL.
2. Two Component Polyurethane Joint Sealant: Type M, self-leveling traffic sealant chemical-cure.
    a. Sika Sikaflex-2C SL.
    b. Sonneborn Sonolastic SL2.
    c. Tremco THC-901/ Vulkem 445 SSL.
3. Single-Component, Silyl-terminated polyether (STPe) Joint Sealant: Type S, Grade P self-leveling.
    a. ChemLink NovaLink SL.

F. Concrete Slab Joint Sealant: Industrial quality, two component, semi-rigid epoxy or polyurea, USDA approved, ASTM D2240, minimum Shore A 65-85, matching approximate color of natural concrete finish. Specified for type and quality:
   1. Epoxy Sealant:
      a. W.R. Meadows, Rezi-Weld Flex
      b. Vexcon, Power Coat Epoxy Flexible Joint Sealant
      c. US MIX, US SPEC SR 50 EJF
      d. Dayton Superior, Poxy Fill (J-52)
      e. Edoco Burke, Reflex Joint Filler
   2. Polyurea Sealant:
      a. VersaFlex, SL/75
      b. L&M Construction Chemicals, Joint Tite 750
      c. Dayton Superior, Joint Fill.
      d. Edoco Burke, Joint Fill.
   3. Polyurethane with hardening agent
      a. Sika Sikaflex 2C NS - TG
      b. Dow Corning 795 Silicone Building Sealant.

G. Interior Joint Sealant at Polished Concrete Finish: See Section 03 35 50.

H. Backer Rod: As recommended by sealant manufacturer.

2.9 JOINT SEALANTS SPECIFIED ELSEWHERE

A. Refer to Related Sections, including:
   1. Section 03 30 00 for polyurea and epoxy sealants
   2. Section 03 35 50 for polished concrete joint sealants.
   3. Section 07 84 00 for firestopping sealers
   4. Section 09 21 16 for gypsum board acoustical sealants.
   5. Section 09 30 00 for tile joint sealants.

2.10 PRECOMPRESSED FOAM SEALANT

A. Precompressed Foam Joint Sealant: Self expanding, polyurethane foam tape joint sealant. Size as appropriate for plus and minus 50 percent elongation and compression of joint.
   1. Emseal Joint Systems, BackerSeal, acrylic impregnated urethane foam.
   2. Polytite Manufacturing Corporation, Polytite B, polyurethane foam impregnated with a waterproof polymer sealing compound and have a release agent on the exposed surface.
   3. Sandell Manufacturing, Polyseal.
   4. Tremco, illmod 600.

2.11 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
   1. Open Cell: 40 to 50 percent larger in diameter than joint width.
   2. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

F. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

2.12 COLORS AND FINISHES

A. Sealant colors shall be selected by the Architect from each manufacturer's complete line of preformulated colors. The Architect may select a color for each different condition for the Project.
   1. Joints Separating Materials of Same Color.
   2. Joints Separating Materials of Different Color.
   3. Joint Sealants between Glass and Non-Porous Materials.
   4. Structural Sealant between Glass and Glass and between Glass and Metal.
   5. Joint Sealants between Natural / Unfinished Metals.
   6. Sanded Sealants at Masonry and Concrete Joints.
   7. Colors of Joint Sealants to be painted.

B. Sanded Finish at Concrete and Masonry Joints: Apply sand of color, appearance, and texture matching mortar sand. Completely cover joint sealant.
   1. Provide 5 feet length of mock-up for each type of texture finish for Architect approval. See Part 1 of this Section for mock-up requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.2 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Remove lacquers and protective films from metal surfaces.

C. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

D. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

E. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

F. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

G. Take measures to prevent intrusion of dust, moisture, and other harmful substances into joints during installation.

H. Existing Joints: Remove existing debris and joint sealant, clean with solvent, and prime for new joint sealants as necessary to achieve permanent bonding of new joint sealant as instructed by manufacturer.

3.3 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Perform acoustical sealant application work in accordance with ASTM C919.

D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.
   1. Where not otherwise instructed, conform to following:
      a. Where more than 3/4 inch wide install backer to within 1/2 inch of surface.
      b. Where less than 1/2 inch wide install backer to within 1/4 inch of surface.
      c. Where less than 1/2 inch deep, apply bond breaker tape to bottom of joints to prevent adhesion of sealant to bottom of joint.

E. Install bond breaker backing tape where backer rod cannot be used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

H. Nonsag Sealants: Tool surface as detailed, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

I. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

J. Seal interior joints to make watertight and exterior joints to make watertight and weathertight. Refer to requirements of individual Sections. Include:

1. Exterior double weather seal consisting of pre-compressed foam sealant, backer rod and sealant around windows, doors, wall louvers, and other openings in walls.
2. Interior air/ moisture seal consisting of backer rod and sealant around windows, doors, wall louvers, and other openings in walls.
3. Around windows, relights, doors, wall louvers, and other openings in walls.
4. Joints between dissimilar materials.
5. Horizontal joints, including exterior paving joints over joint filler.
6. At joints in sheet metal, flashing, and trim.
7. At joints in concrete, precast concrete, and cast stone.
8. Expansion joints and control joints at masonry and concrete. Moving cracks and joints subject to movement, except where firestopping is required as specified Section 078400.

K. Sanded Finish at Concrete and Masonry Joints: Apply sand of color, appearance, and texture matching mortar sand.
1. Select fine grain sand with matching color if required. Sand can be obtained from masonry supplier.
2. Mask both adjacent sides of sealant joints surface with masking tape.
3. Prepare and clean joint surfaces.
4. Install sealant joint per sealant manufacturer’s instructions.
5. After tooling, broadcast sand before sealant starts to develop skin (curing).
6. Use sand in a bag by hand or by other means to broadcast sand to completely cover sealant surface.
7. Brush off extra sand with soft brush.
8. Remove extra sand from adjacent surfaces and remove masking tape.
9. Clean up and protect joint until sealant is cured.

L. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.

3.4 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

C. Repair destructive test location damage immediately after evaluation and recording of results.

3.5 CLEANING

A. Clean adjacent soiled surfaces.

3.6 PROTECTION

A. Protect sealants until cured.

3.7 POST-OCCUPANCY

A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at the low temperature in the thermal cycle. Report failures immediately and repair.

END OF SECTION 07 92 00

SECTION 07 95 13

EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Expansion joint cover assemblies for floor, wall, and ceiling surfaces.

B. Related Requirements:
   1. Section 03 10 00 - Concrete Forming and Accessories: Placement of joint cover assembly frames in formwork.
   2 Section 07 62 00 - Sheet Metal Flashing and Trim: Roof expansion and control joint covers.
   3. Section 07 71 00 - Roof Specialties: Roof expansion and control joint covers.
   4. Section 07 92 00 - Joint Sealants: Sealing expansion and control joints using gunnable and pourable sealants.
   5. Section 09 21 16 - Gypsum Board Assemblies: Placement of expansion joint assemblies in gypsum board walls and ceilings.

1.2 REFERENCE STANDARDS

A. A. Reference Standards: Current edition at date of Bid.

B. A. American Society for Testing and Materials (ASTM) International:
   1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
   2. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
   3. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles; 2010.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Installation Templates: For frames and anchors to be embedded in concrete or masonry, furnish templates to relevant installers; include installation instructions and tolerances.

1.4 SUBMITTALS

A. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices and available colors and finish.

B. Shop Drawings: Indicate joint and splice locations, miters, layout of the work, effected adjacent construction and anchorage locations.

C. Samples: Submit two samples 6 inch long, illustrating profile, dimension, color, and finish selected.

D. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Expansion Joint Cover Assemblies:
   1. Balco, Inc.: www.balcousa.com
   2. Construction Specialties, Inc: www.c-sgroup.com.
   3. Emseal, www.emseal.com.
   4. Inpro: www.inprocorp.com.
   5. MM Systems Corp: www.mmsystemscorp.com.
   6. Watson Bowman Acme: www.wbacorp.com
   7. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 EXPANSION JOINT COVER ASSEMBLY APPLICATION

A. EJ-1: 4 inch baffle at roof with secondary seal.
   1. Basis of Design: Construction Specialties, BRJW-400 EJ.

B. EJ-2: 4 inch exterior, vertical wall with secondary seal.
   1. Basis of Design: Construction Specialties, SF-400.

C. EJ-3: 4 inch interior wall and gypsum ceiling.
   1. Basis of Design: Construction Specialties, AFW-400.

D. EJ -4: Baffle only at existing expansion joint.
   1. Basis of Design: Construction Specialties, AFW-400.

2.3 EXPANSION JOINT ASSEMBLIES

A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
   1. Joint Dimensions and Configurations: As indicated on drawings.
   2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
   3. Joint Movement Capability: If not indicated, provide minimum plus/minus 50 percent joint movement capability.
   4. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
   5. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.
   6. Transition: Provide necessary transitions to maintain building envelope closure.

B. Cover In Fire Rated Assemblies: Provide cover assembly having fire rating equivalent to that of assembly into which it is installed.
   1. Accepted Evaluation Agencies: UL, ULS, and Intertek.

2.4 MATERIALS

A. Resilient Seals:
   1. Provide watertight, energy efficient, 2 hour fire rated, exterior and interior joints in vertical-plane walls (above grade).

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.

3.2 INSTALLATION

A. Install components and accessories in accordance with manufacturer's instructions.

B. Align work plumb and level, flush with adjacent surfaces.

C. Rigidly anchor to substrate to prevent misalignment.

3.3 PROTECTION

A. Do not permit traffic over unprotected floor joint surfaces.

3.4 ADJUSTING

A. Adjust joint covers as necessary to accommodate joint movement.

B. Repair or replace work not conforming to specified requirements.

3.5 CLEANING

A. Leave installation clean, free from debris and residue from work of this Section.

END OF SECTION 07 95 13

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Non-fire-rated steel doors and frames.
   2. Steel frames for wood doors.
   3. Fire-rated steel doors and frames.
   4. Thermally insulated steel doors.
   5. Sound-rated steel doors and frames.
   6. Steel glazing frames.

B. Related Requirements:
   1. Section 08 71 00 - Door Hardware.
   2. Section 08 80 00 - Glazing: Glass for doors and borrowed lites.
   3. Section 09 99 00 - Painting and Coating: Field painting.

1.2 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. Reference Standards: Current edition at date of Bid.

C. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.

D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.

E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.

F. American Society for Testing and Materials (ASTM) International:
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
   2. ASTM C1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus; 2011.
   3. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
   4. ASTM E413 - Classification for Rating Sound Insulation; 2010.

G. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014. (ANSI/BHMA A156.115)

H. ICC A117.1 - Accessible and Usable Buildings and Facilities; International Code Council; 2009 (ANSI).

I. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 2007.

J. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.

K. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

L. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.3 SUBMITTALS

A. See Section 01 33 00 for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.
   1. Door and Frame Schedule: Match reference numbers shown on Drawings.
   2. Frame Type Details: Include glass stops, and other accessories.
   3. Door Type Elevations, minimum 3/8 inch per foot scale.
   4. Conditions at Openings:
      a. Show floor threshold conditions and clearances required to clear flooring material.
   5. Door Hardware: Cut-outs, preparation, locations, reinforcement, clearances, and other installation requirements.
   6. Anchorage and accessory items.
   7. Preparation, primer, and paint finishes.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

F. AAMA/WDMA/CSA 101/I.S.2/A440 – North American Fenestration Standard/Specification for windows, doors, and skylights.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
   1. Member of Steel Door Institute (SDI) or Hollow Metal Manufacturers Association (HMMA).

B. Provide steel doors and frames from single manufacturer.

C. Supplier:
   1. Steel doors supplied by a recognized steel door supplier who has been furnishing doors and frames in the same area as the project for a period of not less than 10 years.
   2. Factory direct, authorized, and stocking distributor.
   3. Employ a Certified Door Consultant, certified by the Door and Hardware Institute.

D. Installer:
   1. Trained by steel door manufacturer or local trade union jurisdiction in procedures required for a successful installations, conforming to manufacturer's instructions.
   2. Able to document 5 or more years experience upon request by Architect.

E. Provide steel doors and frames from a local stocking distributor.

F. Maintain at the project site a copy of all reference standards dealing with installation.

1.5 REGULATORY REQUIREMENTS

A. Testing Agencies: Independent third party agency, approved by building code authority having jurisdiction.

B. Fire Rated Door and Frame Assemblies: Conform to IBC including following:
   1. Fire Door Protection Ratings.
   2. Side Swinging and Pivoting Doors.
   3. Smoke and Draft-Control Assemblies.

C. Fire Door and Frame Labels: Conform to IBC.

D. Maximum Transmitted Temperature Endpoint for Doors and Glass: Conform to IBC.

E. Fire Window Assemblies: Conform to IBC.

F. Glazing at Fire Rated Doors and Window Assemblies: Conform to IBC.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store in accordance with NAAMM HMMA 840.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

1.7 WARRANTY

A. Door Manufacturer: Include reinstallation costs due to repair or replacement of defective doors where defect was not apparent prior to hanging.
   1. Steel Doors: Standard 1 year Warranty. Replace doors that have warped, bowed, cupped, twisted, telegraphed core construction, rusted, or not complied with specified tolerances.

1.8 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Steel Doors and Frames:
   1. Assa Abloy Ceco or Curries: www.assaabloydss.com.
   2. De La Fontaine Inc.: www.delafontaine.com.
   3. Republic Doors: www.republicdoor.com.
   4. Steelcraft, an Allegion brand: www.allegion.com.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 DOORS AND FRAMES

A. Recycled Content: Provide materials with sufficient recycled content to meet the overall recycled content goals for the Project specified in Section 01 81 13 – Sustainable Design Requirements.

B. Requirements for All Doors and Frames:
   1. Accessibility: Comply with ICC A117.1 and ADA Standards.
   2. Door Thickness: 1-3/4 inch.
   3. Door Top Closures: Flush with top of faces and edges.
   4. Door Edge Profile: Beveled on both edges.
   5. Door Texture: Smooth faces.
   6. Exterior Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
   7. Interior Glazed Lights: Non-removable stops on secure side; sizes and configurations as indicated on drawings.
   8. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
   9. Provisions for Persons with Disabilities: Fabricate location of jamb stops to accommodate complete closing of door by automatic door closer without exceeding maximum allowable pressure of 5 to 8.5 pounds.
   10. Electrical Boxes: Provide at door and frames receiving magnetic security monitors, specified in Section 087100 or Division 28 Electronic Safety and Security.
   11. Galvanizing for Units in Wet Areas: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness
   12. Finish: Factory primed, for field finishing.

C. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.3 STEEL DOORS

A. Exterior Door - Opaque:
   1. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless. 16 gauge minimum thickness.
   2. Core: Polyurethane. Kraft paper honeycomb cores are not accepted.
   3. Vertical Edge Reinforcement: One piece, continuously arc welded full length to face sheets.
      a. Lock Channel: Full height, 14 gauge steel, beveled 1/8 inch in 2 inch.
      b. Hinge Channel: Full height 12 gauge steel extruded to 7 gauge equivalent, formed and tapered for hinges.
      c. Top and Bottom Channel: 16 gauge steel with flush channel filler cap to close top rail opening. Snap in caps are not accepted.
   4. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
   5. Insulating Value: U-value of 0.37 or less, when tested in accordance with ASTM C1363.
   6. Weatherstripping: Separate, see Section 08 71 00.

B. Exterior Doors - Glazed:
   1. Product: Meet or exceed Curries Metal Door 747T.
   2. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 3, stile and rail. 14 gauge minimum thickness.
   3. Vertical Edge Reinforcement: One piece, continuously arc welded full length to face sheets.
      a. Lock Channel: Full height, 14 gauge steel, beveled 1/8 inch in 2 inch.
      b. Hinge Channel: Full height 12 gauge steel extruded to 7 gauge equivalent, formed and tapered for hinges.
      c. Top and Bottom Channel: 16 gauge steel with flush channel filler cap to close top rail opening. Snap in caps are not accepted.
   4. Glazing: Safety glass as specified in Section 08 80 00.
   5. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A60/ZF180 coating.
   6. Texture: Smooth faces.
   7. Weatherstripping: Separate, see Section 08 71 00.

C. Interior Doors, Non-Fire-Rated:
   1. Product: Meet or exceed Curries Model 707T.
   2. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless. 16 gauge minimum thickness.
   3. Core: Kraftpaper honeycomb.
   4. Vertical Edge Reinforcement: One piece, continuously arc welded full length to face sheets.
      a. Lock Channel: Full height, 14 gauge steel, beveled 1/8 inch in 2 inch.
      b. Hinge Channel: Full height 12 gauge steel extruded to 7 gauge equivalent, formed and tapered for hinges.
   5. Top and Bottom Channel: 16 gauge steel with flush channel filler cap to close top rail opening.
      a. Snap in caps are not accepted.

D. Interior Doors, Fire-Rated:
   1. Product: Meet or exceed Curries Model 707T.

2. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless. 16 gauge minimum thickness.
3. Fire Rating: As indicated on Door and Frame Schedule, tested in accordance with UL 10C ("positive pressure").
    a. Rate of Temperature Rise Across Door Thickness : 250 degrees F.
    b. Provide units listed and labeled by UL (Underwriters Laboratories) - UL (BMD).
    c. Attach fire rating label to each fire rated unit.
4. Core: Mineral board.
5. Thickness: 1-3/4 inch.
6. Glazing: Fire rated safety glass as specified in Section 08 80 00.
7. Vertical Edge Reinforcement: One piece, continuously arc welded full length to face sheets.
    a. Lock Channel: Full height, 14 gauge steel, beveled 1/8 inch in 2 inch.
    b. Hinge Channel: Full height 12 gauge steel extruded to 7 gauge equivalent, formed and tapered for hinges.
8. Top and Bottom Channel: 16 gauge steel with flush channel filler cap to close top rail opening.
    a. Snap in caps are not accepted.

E. Interior Doors, Sound-Rated:
1. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless. 16 gauge minimum thickness.
2. Acoustic Rating of Assembled Door, Frame, and Seals: STC of 35, calculated in accordance with ASTM E413, tested in accordance with ASTM E90.
3. Vertical Edge Reinforcement: One piece, continuously arc welded full length to face sheets.
    a. Lock Channel: Full height, 14 gauge steel, beveled 1/8 inch in 2 inch.
    b. Hinge Channel: Full height 12 gauge steel extruded to 7 gauge equivalent, formed and tapered for hinges.
4. Top and Bottom Channel: 16 gauge steel with flush channel filler cap to close top rail opening.
    a. Snap in caps are not accepted.
5. Sound Seals: Integral, concealed in door and/or frame.
6. Force to Open and Close and Latch: Not more than 5 lbs.

2.4 STEEL FRAMES

A. General:
1. Comply with the requirements of grade specified for corresponding door, except:
    a. ANSI A250.8 - SDI-100 Level 2 and 3 Door Frames: 14 gauge, 0.067 inch, minimum thickness.
    b. Frames for Wood Doors: Comply with frame requirements specified in ANSI A250.8 - SDI-100, Level 2, 16 gauge, 0.053 inch.
    c. Frames for Sound-Rated Wood Doors: Comply with frame requirements in accordance with ANSI/SDI A250.8 (SDI-100), Level 1, 18 gauge, 0.042 inch, minimum thickness.
2. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
3. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
4. Frames Installed Back-to-Back: Reinforce with steel channels anchored to floor and overhead structure.

B. Exterior Door Frames: Fully welded.
   1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
   2. Weatherstripping: Separate, see Section 08 71 00.
   3. Pressed steel frames with 2 inch face, 1/2 inch returns, double rabbet with 5/8 inch stop at doors and windows, unless otherwise indicated on Drawings.
   4. Closure panel on inside of frame, 16 gauge, with dimple bolt hole at anchor points, use putty to conceal anchor points.
   5. Provide thermally broken frame for exterior door frame that is required to meet door assembly U value.

C. Interior Door Frames, Non-Fire-Rated: Fully welded type.
   1. Pressed steel frames with 2 inch face, 1/2 inch returns, double rabbet with 5/8 inch stop at doors and windows, unless otherwise indicated on Drawings.

D. Interior Door Frames, Fire-Rated: Fully welded type.
   1. Fire Rating: Same as door, labeled.
   2. Pressed steel frames with 2 inch face, 1/2 inch returns, double rabbet with 5/8 inch stop at doors and windows, unless otherwise indicated on Drawings.

E. Sound-Rated Door Frames: Fully welded type.

F. Mullions for Pairs of Doors: Fixed, except where removable is indicated, of profile similar to jambs.
   1. See Section 08 71 00 for additional requirements.

G. Frames for Interior Glazing or Borrowed Lights: Construction and face dimensions to match door frames, and as indicated on drawings.

H. Transom Bars: Fixed, of profile same as jamb and head.

2.5 STEEL PLATE

A. Steel Plate Material: ASTM A 83.

2.6 WELDING MATERIAL

A. As specified in Section 05 05 23.

2.7 ACCESSORY MATERIALS

A. Glazing: As specified in Section 08 80 00, factory installed.

B. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

C. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

D. Exterior Rough Opening Flashing: As specified in Section 07 62 00.

E. Joint Sealants: As specified in Section 07 92 00.

F. Anchors: Type to suit application.

G. Exterior Door Head Flashing:
   1. Provide 24-ga stainless steel head flashings integrated into flexible membrane flashing, with upper 4 inch vertical flange, and side flanges extending a minimum 3 inches at each side of opening.
   2. Lap flashing minimum 6 inches and bed on 3 continuous beads of non-skinning butyl sealant.

H. Exterior Door Sill and Threshold Related Flashing:
   1. Provide 24-ga stainless steel metal sill pan flashing with fully-soldered watertight joints, back and end dams. extending 3 inches down the face of vertical concrete footing.
   2. Install at every exterior door rough opening, integrated into flexible flashings membrane and WRB, and bed in continuous beads of non-skinning butyl sealant.
   3. Provide fully watertight door sill pan flashing installation.
   4. All sheet metal flashing laps 6 inches minimum, and bed on 3 continuous beads of non-skinning butyl sealant.

2.8 FINISH MATERIALS

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
   1. Color: Light Gray.

B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

3.2 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

B. Galvanic Protection/Contacting Dissimilar Metals:
   1. Coat or otherwise isolate dissimilar metals as necessary to prevent galvanic action.

3.3 INSTALLATION

A. Install steel frames and doors in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.

1. Follow manufacturer's instructions and Contract Documents.

B. Coordinate frame anchor placement with wall construction, storefront and curtainwall system.

C. Exterior Openings:
   1. Coordinate installation with air/weather barrier installation.
      a. See Section 07 25 00 for air/weather barrier installation.
   2. Prepare substrate of exterior rough openings with manufacturer's recommended primer prior to self-adhered-membrane flashing installation to ensure proper adhesion.
      a. See Section 07 25 00 for primer and self-adhered flashing.
      b. Install self-adhered flexible flashing at exterior rough openings where indicated.
      c. Install wrap flashing in rough opening heads and sills, installed in water-shedding sequence.
   3. Install sealant tape at frame to exterior sheathing, where needed. to provide a water-tight seal where sealant cannot or is not possible to be installed. Use butterfly booth patches at interior and exterior rough opening corners at all corner transitions.
      a. It is mandatory to prime all surfaces to receive sealant tape with manufacturer's recommended primer.
   4. Door Sill/Threshold and Head Flashing:
      a. Coordinate installation with Section 07 62 00 for sheet metal flashing installation.
   5. Fill frames with foam-in-place insulation.

D. Spreader Bars: Remove factory installed spreader bars before installing the frames.

E. Set frames accurately in place, plumb, aligned, and securely braced.
   1. Level the header, square jambs to header, shim under jambs if necessary.
   2. With the frame on line, set wood spreader and fasten jambs to floor through floor anchors.
   3. Install minimum 3 wall anchors at hinge and strike side of each jamb, and not less than one anchor for each 30 inch of frame height. Dap frames with putty flush with frame to make fasteners location invisible.
   4. Install sealant between door frames and wall in accordance with Section 07 92 00.
   5. Where door frames and relite frames are shown next to each other, weld frames together, grind smooth, fill with auto body putty, prime and paint.

F. Coordinate installation of hardware.
   1. The air leakage of door Assembly that are part of the building envelope must comply with AAMA/WDMA/CSA 101//I.S.2/A440 or NFRC 400.
      a. a. Site constructed doors that are weatherstripped or sealed are in accordance with Section 502.4.3.

G. Coordinate installation of glazing.

H. Coordinate installation of electrical connections to electrical hardware items.

I. After installation of anchor through punched and dimpled frames into substrate, tack weld anchor head to frame, grind smooth, fill with auto body putty and prime.

J. Painting specified in Section 09 90 00. Do not paint over fire labels.

3.4 TOLERANCES

A. Clearances Between Door and Frame: As indicated in ANSI/SDI A250.8 (SDI-100).

B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

C. Clearance between Meeting Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.

D. Clearance between Door and Stop: 1/16 inch.

E. Clearance between Door and Thresholds: Maximum 3/4 inch, except 1/4 inch above carpet.

F. Clearance between the Face of the Door and the Stop: 1/16 inch.

3.5 ADJUSTING

A. Adjust for smooth and balanced door movement.

B. Adjust sound control doors so that seals are fully engaged when door is closed.

C. Make final fittings, touch-up, and adjustment of individual components and assemblies for optimal performance prior to acceptance by Owner.

3.6 SCHEDULE

A. Refer to Door and Frame Schedule appended to this section.

END OF SECTION 08 11 13

SECTION 08 14 16

FLUSH WOOD DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Flush wood doors; flush configuration; fire rated, non-rated, and acoustical.

B. Related Requirements:
   1. Section 08 11 13 - Hollow Metal Doors and Frames.
   2. Section 08 80 00 - Glazing.
   3. Section 09 90 00 - Painting and Coating.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at time of Bid.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

C. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

D. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.

E. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association; 2012.

F. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

G. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

H. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.3 SUBMITTALS

A. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

B. Specimen warranty.

C. Samples: Submit three samples of door construction, 8 by 12 inch in size cut. Illustrate approved finish color and gloss level. Submit after initial color approval.

D. Manufacturer's Installation Instructions: Indicate special installation instructions.

E. Warranty, executed in Owner's name.

1.4 QUALITY ASSURANCE

A. Furnish wood doors from single manufacturer for Work of this Contract.

B. Maintain one copy of the specified door quality standard on site for review during installation and finishing.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.5 REGULATORY REQUIREMENTS

A. Testing Agencies: Independent third party agency, approved by building code authority having jurisdiction.

B. Fire Rated Door Assemblies: Conform to IBC..

C. Fire Door Labels: Conform to IBC.

D. Glazing at Fire Rated Doors:
   1. Labeled Fire-Resistive Rated Glazing: Not required to conform to IBC Section 715 when tested to ASTM E119 as part of a fire-resistive-rated wall assembly, as accepted by IBC. Glazing in Fire Doors Assemblies: Conform to IBC.
   3. Labeling of Fire-Protection Rated Glazing: Conform to IBC for label or other identification showing name of manufacturer, test standard, and fire protection rating; issued by an approved testing agency; permanently affixed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.7 WARRANTY

A. See Section 01 77 00 - Closeout Procedures, for additional warranty requirements.

B. Door Manufacturer:
   1. Interior Doors: Provide manufacturer's warranty for the life of the installation.
   2. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

3. Include reinstallation costs due to repair or replacement of defective doors where defect was not apparent prior to hanging.

C. Contractor: Replace or refinish doors where determined by Architect that installation has contributed to rejection or to voiding of manufacturer's Warranty.

1.8 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 DOORS

A. Manufacturers:
1. Marshfield Door Systems, www.marshfielddllrs.com.
2. Oregon Door, www.oregondoor.com.
3. Vancouver Door, www.vancouverdoorco.com.
4. VT Industries, www.vtindustries.com.
5. Substitutions: See Section 01 60 00.

B. All Doors: See drawings for locations and additional requirements.
1. Quality Level: Custom Grade, Standard Duty performance, in accordance with AWI/AWMAC/WI (AWS).
2. Wood Veneer Faced Doors: 5-ply or 7-ply unless otherwise indicated.

C. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
1. Provide solid core doors at all locations.
2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with NFPA 252 or UL 10B - Negative (Neutral) Pressure; Underwriters Laboratories Inc. (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
3. Smoke and Draft Control Doors (Indicated as "S" on Drawings): In addition to required fire rating, provide door assemblies tested in accordance with UL 1784 with maximum air leakage of 3.0 cfm per sq ft of door opening at 0.10 inch w.g. pressure at both ambient and elevated temperatures for "S" label; if necessary, provide additional gasketing or edge sealing.
4. Wood veneer facing with factory transparent finish where indicated on drawings.

2.2 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type structural composite lumber core (SCLC), plies and faces as indicated.

B. Fire Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.3 DOOR FACINGS

A. Veneer Facing for Transparent Finish: White maple, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.

B. Facing Adhesive: Type I - waterproof.

2.4 ACCESSORIES

A. Glazing: 1/4 inch thick laminated safety glass, except fire-rated glass as required by code. Conform to provisions of Section 08 80 00.

B. Glazing Stops (non-rated): Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

C. Glazing Stops (fire-rated):
   1. 45 Minute and Over: ANSI/WDMA IS-1A, Option M4, Metal Vision Frames.
      a. Transparent Finished Doors: Wood veneered to match door veneer and finish.
      b. Opaque Finished Doors: Prime for paint finish.

2.5 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain added urea formaldehyde.

C. Cores Constructed with stiles and rails:
   1. Provide solid blocks at lock edge for hardware reinforcement.
   2. Provide solid blocking for other through-bolted hardware.
   3. Before applying face veneer, abrasively plane glued unit smooth, both sides.
   4. Telegraphing of edges or bleeding through of glue face veneers will result in rejection of door.

D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
   1. Exception: Doors to be field finished.
   2. Bevel doors 1/8 inch in 2 inch at lock and hinge side edge.
   3. Ease edges of doors and stops to approximately 1/16 inch radius.
   4. Cut and fit stops. Install with screws.
   5. Clearances Between Doors and Thresholds:
      a. Door to frame at head and jambs: 1/8 inch.
      b. Between meeting edges of pair of doors: 1/8 inch (1/16 inch per leaf).
      c. Undercuts:

1) Door bottom to noncombustible floor without threshold: 3/4 inch maximum; 1” at locations indicated on door schedule.
2) Door bottom to top of threshold on noncombustible floor: 3/8 inch maximum.
3) Door bottom to rigid floor tile: 5/8 inch.
4) Door bottom to carpet floor covering: 1/2 inch.

F. Provide edge clearances in accordance with the quality standard specified.

2.6 FACTORY FINISHING - WOOD VENEER DOORS

A. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent:
      a. System - 1, Lacquer, Nitrocellulose.
      b. Sheen: Satin.

2.7 FINISHES

A. Sealing: Apply one or two coats of a sanding sealer to exposed wood surfaces against moisture intrusion, including:
   1. Exposed faces and vertical edges prior to application of factory-applied and field-applied finish systems.
   2. Unfinished top and bottom rails.
   3. Hardware cutouts prior to installation of hardware.

B. Finish doors after preparation of door hardware.

C. Doors: Transparent Factory Finish: Satin finish
   1. ANSI/WDMA IS-1A, Finish Selections: TR-6 Catalyzed Polyurethane, Satin finish.
   2. AWS Section 500 Finishing: System 9 and 10 UV Curable Acrylated Epoxy, Polyester.

D. Metal Vision Frames:
   1. Wood Veneered Metal Vision Frames: Factory finish wood veneer matching wood door veneer finish.

E. Door Opaque Finish:
   1. Colors and Stain: Weyerhaeuser tinted clear coating - Honey 26-95.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.2 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Use machine tools to cut or drill for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

E. Coordinate installation of glazing.

3.3 TOLERANCES

A. Conform to specified quality standard for fit and clearance tolerances.

B. Conform to specified quality standard for telegraphing, warp, and squareness.

3.4 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

END OF SECTION 08 14 16

SECTION 08 31 00

ACCESS DOORS AND PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wall access door and frame units.
   2. Ceiling access door and frame units.

B. Related Requirements:
   1. Section 06 10 00 - Rough Carpentry.
   2. Section 09 22 16 - Non-Structural Metal Framing.
   3. Section 09 22 26 - Suspension Systems.
   4. Section 09 21 16 - Gypsum Board Assemblies.
   5. Section 08 71 00 - Door Hardware: Mortise cylinder and core hardware.
   6. Division 21 - Fire Suppression..
   7. Division 22 - Plumbing.
   8. Division 23 - Heating, Ventilating, and Air Conditioning.
   9. Division 26 - Electrical.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

C. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.3 SYSTEM DESCRIPTION

A. Manufactured outward opening metal doors and metal frame construction of types required to accommodate drywall and other finishes as applicable.
   1. Provide as means to access motors, equipment, valves, dampers, and controls behind finished wall and ceiling construction.
   2. Provide fire rated access doors as required to maintain fire-resistive construction.
   3. Verify exact sizes and locations with related Sections and with Architect prior to beginning work or this Section.

1.4 SUBMITTALS

A. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

1.5 QUALITY ASSURANCE

A. Single Source Responsibility: Provide access doors as products of single manufacturer.

1.6 REGULATORY REQUIREMENTS

A. Conform to UL, Warnock Hersey (WHI), or other approved design, for fire rated wall and ceiling assemblies.

1.7 COORDINATION

A. Conform to Section 01 31 00 for coordination with work of other Sections.

B. Coordinate with Divisions 21, 22, 23, and 26 for access doors required for work of those Sections.

1.8 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Babcock-Davis.
   1. Website: www.babcock-davis.com.

B. J.L. Industries (JL)
   1. Website: www.jlindustries.com.

C. Karp Associates, Inc
   1. Website: www.karpinc.com.

D. Larsen's Manufacturing Co.
   1. Website: www.larsensmfg.com.

E. Nystrom, Inc.
   1. Website: www.nystrom.com.

F. The Williams Bros Corp.
   1. Website: www.wbdoors.com.

G. Substitution Requests: Submit for approval under provisions of Section 01 60 00.

2.2 WALL AND CEILING UNITS

A. Wall Access Doors: Factory fabricated door and frame units, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.

1. Material: Steel, hot-dipped zinc or zinc-aluminum-alloy coated.
2. Style: Exposed frame with door surface flush with frame surface.
   a. In Gypsum Board: Use drywall bead type frame.
3. Door Style: Single thickness with rolled or turned in edges.
4. Frames: 16 gauge, 0.0598 inch, minimum.
5. Single Thickness Steel Door Panels: 1/16 inch, minimum.
6. Insulation: Non-combustible mineral or glass fiber.
7. Units in Fire Rated Assemblies: Fire rating as required by applicable code for the fire rated assembly that access doors are being installed.
   a. Provide products listed by ITS (DIR) or UL (FRD) as suitable for the purpose indicated.
   b. Provide certificate of compliance from authority having jurisdiction indicating approval of fire rated doors.
8. Steel Finish: Primed.
9. Hardware:
   a. Hardware for Fire Rated Units: As required for listing.
   b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
   c. Latch/Lock: Cylinder lock operated cam latch, two keys for each unit.
      1) Mortise cylinder and core specified in Section 08 71 00.
   d. Number of Locks/Latches Required: As recommended by the manufacturer for the size of the unit.
   e. Inside Latch Release: Mechanism that allows the panel to be opened from the inside.
   f. Gasketing: Extruded neoprene, around the perimeter of the door panel.
10. Wall Access Door Products:
    a. Fire Rated Access Doors with Exposed 1 Inch Flanges at Concrete and Masonry::
       1) Babcock Davis, B-IT
       2) JL, FD
       3) Karp, KRP-150FR
       4) Larsen's, L-FRAP
       5) Nystrom, IT
       6) Williams, WB-FR
    b. Fire Rated Access Doors with Drywall Flanges:
       1) Babcock Davis, B-IW
       2) JL, FDWB
       3) Karp, KRP-350FR
       4) Larsen's, L-FRAP with optional drywall bead
       5) Nystrom, IW
       6) Williams, WB-FR with drywall bead
    c. Non Fire Rated Doors with Exposed 1 inch Flanges:
       1) Babcock Davis, B-NT
       2) JL Industries, TM
       3) Karp, DSC-214M
       4) Larsen's, L-MPG
       5) Nystrom, NT
       6) Williams, WB-GP
    d. Non Fire Rated Access Door with Drywall Flanges:
       1) Babcock Davis, B-NW
       2) JL Industries, WB
       3) Karp, KDW

4) Larsen's, L-DWC
5) Nystrom, NW
6) Williams, WB-DW

B. Ceiling Access Doors: Non Rated Ceiling Access Doors.
1. Size: Manufacturer’s standard size of 24 inch by 24 inch or 22 inch by 30 inch, for access and maintenance, except as otherwise shown on Drawings.
2. Door: 16 gauge galvanized steel, recess to accept 5/8 inch drywall inset.
3. Frame: 16 gauge galvanized steel.
4. Gasketing: Flame retardant polyurethane.
5. Latch/Lock: [Screwdriver] Key operated cam lock with interior release.
6. Hinge: Concealed pivot with controlled action device.
7. Finish: Manufacturer's shop primer.
8. Access Doors for Gypsum Board Ceiling with Inset Gypsum Board Panel:
a. Babcock Davis, C-RW
b. Karp, Type RDW/CAD,
c. JL Industries, CT
d. Karp, RDW
e. Larsen's, LCPA
f. Nystrom, RW
g. Williams, WB-RDW

2.3 FABRICATION

A. Fabricate units on continuous welded steel construction. Grind welds smooth and flush with adjacent surfaces.

B. Provide attachment devices and fasteners of the type required to secure access doors to the types of support shown.

C. Touch up shop primer and prepare for field paint finish coat.

2.4 FINISH

A. Field paint to match wall or ceiling surfaces as specified in Section 09 90 00.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that rough openings are correctly sized and located.

3.2 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings. Secure rigidly in place.

C. Position units to provide convenient access to the concealed work requiring access.

D. Coordinate with individual Sections, including Divisions 21, 22, 23, and 26 for access doors, as needed, for access to fire suppression, heating, ventilating, air conditioning, electrical, and other equipment.

E. Position units to provide convenient access to concealed work requiring access.

3.3 ADJUSTING

A. Adjust hardware for smooth operation.

END OF SECTION 08 31 00

SECTION 08 43 13

ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Aluminum-framed storefront, with vision glass.
   2. Aluminum doors and frames.
   3. Weatherstripping.
   4. Perimeter sealant.
   5. Structural design of storefront system.

B. Related Requirements:
   1. Section 07 92 00 - Joint Sealers: Perimeter sealant and back-up materials.
   2. Section 08 80 00 - Glazing: Glass and glazing accessories.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. American Architectural Manufacturers Association (AAMA):
   1. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; American Architectural Manufacturers Association; 2012.
   2. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage; American Architectural Manufacturers Association; 2009 (part of AAMA 501).
   3. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; American Architectural Manufacturers Association; 2012.
   4. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.

C. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; American Society of Civil Engineers; 2011.

D. American Society for Testing and Materials (ASTM) International:
   1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
   2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2013.
   3. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.
   4. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
   5. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

6. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
7. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).
8. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).

E. National Fenestration Rating Council (NFRC):
1. NFRC 100 - Procedure for Determining Fenestration Product U-Factors.
2. NFRC 200 - Procedures for Determining Fenestration Product Solar Heat Gain Coefficients and Visible Transmittances at Normal Incidence.
3. NFRC 500 - Procedure for Determining the Condensation Resistance of Fenestration Products.

F. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

1.4 SUBMITTALS

A. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, None - N/A internal drainage details.

B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.

C. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.

D. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.

E. Samples: Submit two samples 12 x 12 inches in size illustrating finished aluminum surface, glass, infill panels, glazing materials.

F. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

G. Report of field testing for water leakage.

H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at the State in which the Project is located.

B. Manufacturer and Installer Qualifications: Company specializing in manufacturing aluminum glazing systems with minimum 3 years of documented experience.

C. Field-verify rough openings with shop drawings before fabrication.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

C. Protect from damage during storage and subsequent handling during installation.

1.7 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.8 WARRANTY

A. Manufacturer: Standard 5 years, non-prorated, full replacement value, full system labor and materials Warranty. Include glass, coatings, and hardware.

1.9 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Kawneer, www.kawneer.com. See below under description of products.
   1. Storefront SF-1:
      a. Product: Encore Thermal Framing System.
      b. Vertical Mullion Dimension: 1 ¾ inch wide by 4 inches deep.
   2. Storefront SF-2:
      a. Product: Encore Thermal Framing System.
      b. Vertical Mullion Dimension: 1¾ inch wide by 6 inches deep.
   3. Storefront SF-3:
      a. Product: Trifab VG 451 Framing System.
      b. Vertical Mullion Dimension: 2 inches wide by 6 inches deep.

B. Other Acceptable Manufacturers: The following manufacturers and products may be accepted based upon ability to meet or exceed specified requirements. Request approval prior bid showing products submitted can meet specified U-Value using specified glass.
   1. Arcadia Inc. www.aracadiainc.com.
   2. United States Aluminum Corp: www.usalum.com.
   3. Oldcastle Building Envelope: www.oldcastlebe.com.

C. Substitutions: See Section 01 60 00.

2.2 STOREFRONT

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Glazing Rabbet: For 1 inch insulating glazing.
   2. Glazing Position: Centered (front to back).
   3. Air Infiltration Test Pressure Differential: 6.24 psf.
   4. Finish: Class II natural anodized.
      a. Factory-finish all surfaces that will be exposed in completed assemblies.
   5. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
   6. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
   7. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
   8. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
   9. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
   10. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

B. Performance Requirements:
   1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
      a. Design Wind Loads: Comply with requirements of ASCE 7.
      b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
   2. Water Penetration Resistance: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8.00 lbf/sq ft.
   3. Air Leakage: Maximum of 0.06 cu ft/min/sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 pounds per square foot pressure differential across assembly.
   4. Overall U-value Including Glazing: 0.37 Btu/(hr sq ft deg F), maximum.
   5. Water Leakage: None, when measured in accordance with ASTM E331 at specified pressure differential.

6. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass and inner sheet of infill panel and heel bead of glazing compound.
7. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
8. Storefront Framing Reinforcement:
    a. Provide necessary engineering to comply with building codes, load restriction, and deflection criteria for use of sun shade on storefront system.
    b. Provide the necessary reinforcement in storefront system to support sun screen.

2.3 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
1. Glazing stops: Applied.

B. Glazing: As specified in Section 08 80 00.

C. Swing Doors: Glazed aluminum.
1. Thickness: 1-3/4 inches.
2. Top Rail: 6 inches wide.
3. Vertical Stiles: 5 inches wide.
4. Bottom Rail: 10 inches wide.
5. Glazing Stops: Square.
6. Glazing: Same as adjacent aluminum-framed storefront glazing, except for safety glazing requirements.
7. Finish Hardware: As specified in Section 08 71 00. Includes but not limited to:
    a. Locksets
    b. Hinges
    c. Automatic power operators
    d. Door closers
    e. Pulls and push plates
    f. Threshold
8. Barrier Free Design: Make provision for automatic door openers and pull not exceeding 5 to 8 pound resistance.
9. Finish: High performance organic coating meeting AAMA 2605. Color as selected by Architect from manufacturer’s full range.
10. Basis of Design: Kawneer North America, 500 Tuffline Entrances.
11. Other Approved Manufacturers/Products: .
    b. Efco, Series D518 Durastile Heavy Duty.
    c. Oldcastle, Rugged Stile.

D. Operable Sash (OV-1) Aluminum project-out awning; finished to match storefront; turn handle latch with manufacturer's standard insect screen.
1. Manufacturer standard unis, complying with AAMA/WDMA/CSA 101/I.S.2/A440, with self-flashing mounting fins, and as follows:

a. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 0.090-inch thickness at any location for main frame and sash members.
b. Thermally Improved Construction: Fabricate window units with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.

2. Window Type: Awning.
3. Minimum Performance Class: AW.
4. Minimum Performance Grade: 90.
5. Thermal Performance: Maximum U value of 0.45 for the complete glazed assemblies including glazing when tested in accordance with NFRC 100 requirements, using glass which matches the glass to be used in the project.
6. Glazing: Same as adjacent aluminum-framed storefront glazing, except for safety glazing requirements.
7. Insect Screen:
   a. Frame: Rolled aluminum frame of rectangular sections; fit with adjustable hardware; nominal size similar to operable glazed unit.
   b. Screens: 14/18 mesh, steel strands.
8. Operable Sash Weatherstripping: Wool pile; permanently resilient, profiled to achieve effective weather seal.
9. Hardware:
   a. Operating Arms: Four-bar, stainless steel.
   b. Locking Handles: Cam type, bronze alloy.
   c. Limiting Device: Stainless steel, key release, limiting device set at 4 inch clear opening.
10. Finish: To match storefront.
11. Basis of Design: Kawneer 8225TL Isolock Window.
12. Other Approved Manufacturers/Products:
    a. Efco, 2700.
    b. Oldcastle, Signature Series 12PF.

E. Sunshades: Shop fabricated, shop finished, extruded aluminum outriggers, louvers, and fascia, free of defects impairing strength, durability or appearance.
1. Sunshade Members: Manufacturer's standard extruded or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
   a. Provide necessary engineering to comply with building codes, load restriction, and deflection criteria for use of sun shade on storefront system.
2. Storefront Framing Reinforcement: Provide the necessary reinforcement in storefront system to support sun screen.
3. Sunscreen location: See Drawings.
4. Basis of Design: Kawneer, Versoleil SunShade – Outrigger System.
   a. Outrigger: 30 inch square.
   b. Fascia: Rectangular.
   c. Blade: Flare.
   d. Finish: Match storefront finishes.
5. Substitutions: See Section 01 60 00.

F. Aluminum Cladding Covers CMP-1:

1. Basis of Design: Mapes Architectural Panels, Mapes-R Insulated Composite Panels, www.mapes.com.
   a. Skins: Custom Kynar
   b. Texture: Smooth.
   c. Panel Size: As indicated on Drawings.
   d. Substrates: 1/8 inch hardboard.
   e. Core: 2# Density polystyrene.
   f. Color: Custom Color.
2. Substitutions: See Section 01 60 00.

2.4 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Structural Steel Sections: ASTM A36/A36M; galvanized in accordance with requirements of ASTM A123/A123M.

C. Fasteners: Stainless steel.

D. Joint Sealant:
   1. Perimeter Sealant: Type Silicone specified in Section 07 92 00.
   2. Factory installed storefront system internal component: Manufacturer's recommended sealant.

E. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

F. Glazing Accessories: As specified in Section 08 80 00.

G. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

2.5 FINISHES

A. Class II Natural Anodized Finish: AAMA 611 AA-M12C22A31 Clear anodic coating not less than 0.4 mils thick.

B. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.

C. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.6 HARDWARE

A. For each door, include weatherstripping, sill sweep strip, and threshold.

B. Other Door Hardware: As specified in Section 08 71 00.

C. Threshold: Extruded aluminum, one piece per door opening, ribbed surface; provide on all doors.

2.7 FABRICATION

A. Mechanically fasten framing members by means of extruded aluminum shear blocks attached to vertical mullions. Screw splines are not acceptable.

B. Cut and fit stick members under shop conditions and tolerances.

C. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

D. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

E. Prepare components to receive anchor devices. Fabricate anchors.

F. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.

G. Arrange fasteners and attachments to conceal from view.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work, and are in accordance with accepted shop drawings.

B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

C. Verify that anchorage devices have been properly installed and located.

D. Verify that openings are dimensionally within allowable tolerances, plumb, level, clean, provide a solid anchoring surface, and are in accordance with accepted shop drawings.

E. Verify that aluminum storefront installation to be in accordance with pertinent codes and regulations, Contract Documents, approved Shop Drawings, and manufacturer's instructions.

F. Verify rough openings are fully flashed watertight, and are ready to accept fenestration assemblies. Verify that sill flashing pans are in-place and properly situated for proper interface with storefront assembly.

3.2 INSTALLATION

A. Install in accordance with Contract Documents, References, Codes, and manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

H. Coordinate attachment and continuity of seal of perimeter air and vapor barrier materials.

I. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

J. Install operating sash.

K. Set thresholds in bed of sealant and secure.

L. Install perimeter sealant in accordance with Section 07 92 00.
   1. Ensure substrates are clean, dry, and of sufficient size for the proper bond and performance of sealant.
   2. Double Weather Seal: Apply sealants, backer rods and precompressed foam for water and weather tight installation, at joints, intersections, and perimeters to surrounding construction.
   3. Interior Air/Moisture Seal: Ensure interior perimeter of fenestration assemblies have continuous and complete air seals. The complete interior air seal is critical for water penetration resistance.
   4. Seal frames to surrounding construction. Remove excess materials as work proceeds to leave exposed surfaces and joints clean and smooth.

M. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

N. Protect finished surfaces as necessary to prevent damage during progress of the Work.

3.3 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for independent testing and inspection requirements. Inspection will monitor quality of installation and glazing.

B. Test installed storefront for water leakage in accordance with AAMA 501.2 and shall not evidence water penetration.
   1. Perform a minimum of two tests in areas as directed by Architect.
   2. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.

3.5 ADJUSTING

A. Adjust operating hardware and sash for smooth operation.

3.6 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Remove excess sealant by method acceptable to sealant manufacturer.

3.7 PROTECTION

A. Protect installed products from damage during subsequent construction.

END OF SECTION 08 43 13

SECTION 08 71 00

DOOR HARDWARE

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Hardware for aluminum, wood, and metal doors and frames.

B. Accessories such as seals, thresholds, and plates.

1. 2 RELATED SECTIONS

A. Section 08 11 13 - Hollow Metal Doors and Frames.

B. Section 08 14 16 - Flush Wood Doors.

C. Section 08 43 13 - Aluminum-Framed Storefronts.

D. Section 08 80 00 – Glazing.

E. Division 28 – Electrical Safety and Security.

1.2 REFERENCES

A. ADA - Americans with Disabilities Act, Accessibility Guidelines for Buildings and Facilities.

B. NFPA 80 - Fire Doors and Windows.

C. NWWDA Industry - Quality Standards.

D. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures.

E. NFPA 252 - Fire Tests of Door Assemblies.

F. UL l0B - Fire Tests of Door Assemblies.

G. UL 305 - Panic Hardware.

1.3 SUBMITTALS

A. Submit in digital (PDF) format to Architect following Contractor's review for coordination and compliance with Contract Documents under provisions of Section 01 30 00. Mark with approval stamp prior to submitting to Architect.

B. Product Data including manufacturer's names and identification of product. Include catalog cuts and/or technical data sheets, manufacturer's parts lists, templates, and other pertinent data as required to indicate compliance with specifications.

C: Shop Drawings: submit complete and detailed with respect to quantities, dimensions, specified performance, and design criteria, materials and similar data to enable Architect to review information as required.

1. Indicate locations and mounting heights of each type of hardware, including Owner-furnished items.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with the following requirements:

1. ADA - Accessibility Guidelines for Buildings and Facilities.

2. NFPA 101, 80 and 252.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified with minimum three years documented experience.

B. Hardware Supplier: Company specializing in supplying commercial door hardware with three years documented experience.

C. Hardware Supplier Personnel: Employ an Architectural Hardware Consultant (AHC) to assist in the work of this section.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable code for requirements applicable to fire rated doors and frames.

B. 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, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

1.8 COORDINATION

A. Coordinate work with owner's locksmith and electrician.

B. Coordinate work with other directly affected sections involving manufacture, fabrication, or installation.

1.9 MAINTENANCE MATERIALS

A. Provide special wrenches and tools applicable to each different or special hardware component.

B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

1.10 PREINSTALLATION CONFERENCE

A. Convene Preinstallation Conference with Owner's Locksmith, Owner's Project Manager, and Architect one week prior to work of this Section.

B. Preinstallation Conference shall coincide with pick-up of prepared hardware as indicated under Item 3.2, below.

1.11 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Butts: McKinney.

B. Lock Sets: Schlage Rhodes Lever.

C. Latch Sets: Schlage Rhodes Lever.

D. Closers and Operators: LCN.

E. Panic Devices: Von Duprin, Precision.

1. See Hardware Types below.

F. Magnetic Holders: Rixson.

G. Stops: lves, Glynn Johnson.

H. Thresholds: Pemko.

I. Smoke Seal: Pemko, Steelcraft.

J. Louvers and Relite Frames at Hollow Metal Doors: Air Louvers.

K. Kick Plates: Ives.

L. Weatherstripping: Pemko, Steelcraft.

M. Automatic Door Bottom: Pemko.

N. Cylinders: Schlage.

O. Cores: Schlage Interchangeable.

2.2 KEYING

A. Keying by Owner.

2.3 ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. ACCEPTABLE MANUFACTURERS

1. Electric Strikes: Hes
2. Power Supplies: Hes
3. Switching Module: Camden
4. Push Button Actuator: Camden
5. Door Contact: Schlage

2.4 FINISHES

A. Finishes: See Door Schedule.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings.

B. Do not proceed with installation of work until unacceptable conditions are corrected.

C. Verify that electric power is available to power operated devices and of the correct characteristics.

3.2 PREPARATION

A. Deliver following hardware items to Owner for preparation and keying by Owner. Label each item by Opening Number as indicated on Door Schedule.

1. Closers

2. Panic Hardware

3. Lever Locksets

4. Keyed Removable Mullions

B. Provide Schedule indicating Opening Numbers, Function, and Hardware included with delivery to Owner.

3.3 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and recommendations for installing products in applications indicated. Bring any conflicts to Architect for review.

B. Adjust and reinforce attachment substrates as necessary for proper installation and operation.

C. Use templates provided by hardware item manufacturer.

D. Drill & Tap new hardware. Do not use self-drilling fasteners.

E. Mounting heights for hardware from finished floor to center line of hardware item:

1. Locksets: 40-5/16 inches.
2. Push/Pulls: 45 inches.
3. Dead Locks: 48 inches.
4. Exit Devices: 40-5/16 inches.

3.4 ADJUSTING AND CLEANING

A. Clean exposed finishes to a dirt-free condition, free of stains, films, and similar foreign substances.

B. Touch-up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored.

C. Adjust hardware for proper operation without binding.

3.5 PROTECTION AND CORRECTION WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching-up with matching materials, and properly adjusting equipment and hardware.

B. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

C. Protect finished Work during construction.

END OF SECTION 08 71 00

SECTION 08 73 01

DOOR HARDWARE TYPES

MANUFACTURERS
SEL – SELECT
CAM – CAMDEN
GLY – GLYNN JOHNSON
PHI – PRECISION
LCN – LCN
SCH – SCHLAGE
PEM – PEMKO
VD – VON DUPRIN
IVE – IVES
MCK – MCKINNEY
HES – HES
ALV – AIR LOUVERS
RIX – RIXSON

HARDWARE SET: A1

Qty	Description	Catalog Number	Finish	Mfr
2	CONT. HINGE	SL 53HD	628	SEL
1	VERTICAL ROD PANIC	2203 LBR CD V1703A	626	PHI
1	VERTICAL ROD PANIC	2202 LBR LD V1701A	626	PHI
2	CLOSER	4111 SH CUSH EDA WMS 140º	628	LCN
1	CYLINDER	20-057-ICX	626	SCH
1	FSIC CORE	23-030	626	SCH
1	SEAL	S88	D	PEM

HARDWARE SET: A2

Qty	Description	Catalog Number	Finish	Mfr
1	CONT. HINGE	SL 53HD	628	SEL
1	LOCKSET	ND96PD	626	SCH
1	ELECT STRIKE	8000	626	HES
1	AUTO OPERATOR	9542 SENIOR SWING	628	LCN
2	PUSH BUTTON ACTUATOR	CM-40/4	US32	CAM
1	WALL STOP	WS407CCV	626	IVE
1	SEAL	S88	D	PEM
1	SWITCHING MODULE	CX-12	BLK	CAM
1	DOOR CONTACT	679-05	BLK	SCH

PROVIDE EXTRA 22-8 CABLE TO ROOM C105

HARDWARE SET: A3

Qty	Description	Catalog Number	Finish	Mfr
2	VERTICAL ROD PANIC	2202 LBR LD V1701A	626	PHI
1	CLOSER	4111 EDA WMS	628	LCN
2	WALL HOLDS	999	689	RIX
1	SEAL	S88	D	PEM

HARDWARE SET: B1

Qty	Description	Catalog Number	Finish	Mfr
3	HINGE	T4B3386 5½X4 NRP	626	MCK
1	MORTISE LOCKSET	L9456 06A	626	SCH
1	INDICATOR	L283-722	626	SCH
1	THUMB TURN	L583-363	626	SCH
1	CLOSER	4111 EDA WMS	ALUM	LCN
1	KICKPLATE	8400 10”X2”LDW B4E CS	626	IVE
1	WALL STOP	WS407CCV	626	IVE
1	SEAL	S88	GRAY	PEM

HARDWARE SET: B2

Qty	Description	Catalog Number	Finish	Mfr
3	HINGE	T4B3386 5½X4 NRP	626	MCK
1	LOCKSET	ND93PD	626	SCH
1	KICKPLATE	8400 10”X2”LDW B4E CS	626	IVE
1	WALL STOP	WS407CCV	626	IVE
3	SILENCERS	SR 64	GRAY	IVE

HARDWARE SET: B2A

Qty	Description	Catalog Number	Finish	Mfr
3	HINGE	T4B3386 5½X4 NRP	626	MCK
1	LOCKSET	ND93PD	626	SCH
1	CLOSER	4111 SH CUSH EDA WMS	ALUM	LCN
1	KICKPLATE	8400 10”X2” LDW B4E CS	626	IVE
1	WALL STOP	WS407CCV	626	IVE
3	SILENCERS	SR 64	GRAY	IVE

HARDWARE SET: B3

Qty	Description	Catalog Number	Finish	Mfr
3	HINGE	T4B3386 5½X4 NRP	626	MCK
1	LOCKSET	ND96PD	626	SCH
1	KICKPLATE	8400 10”X2”LDW B4E CS	626	IVE
1	WALL STOP	WS407CCV	626	IVE
3	SILENCERS	SR 64	GRAY	IVE

HARDWARE SET: B3A

Qty	Description	Catalog Number	Finish	Mfr
3	HINGE	T4B3386 5½X4 NRP	626	MCK
1	LOCKSET	ND96PD	626	SCH
1	OH STOP	100S ADJ	630	GLY
3	SILENCERS	SR 64	GRAY	IVE

HARDWARE SET: B4

Qty	Description	Catalog Number	Finish	Mfr
3	HINGE	T4B3386 5½X4 NRP	626	MCK
1	LOCKSET	ND53PD	626	SCH
1	WALL STOP	WS407CCV	626	IVE
3	SILENCERS	SR 64	GRAY	IVE

HARDWARE SET: B5

Qty	Description	Catalog Number	Finish	Mfr
2	HINGE	T4B3386 5½X4 NRP	626	MCK
1	LOCKSET	ND96PD	626	SCH
1	CLOSER	4111 SH CUSH EDA WMS	ALUM	LCN
1	WALL STOP	WS407CCV	626	IVE
1	SEAL	S88	GRAY	PEM

HARDWARE SET: C1

Qty	Description	Catalog Number	Finish	Mfr
1	AUTO OPERATOR	9542 SENIOR SWING	628	LCN

BALANCE OF HARDWARE EXISTING, COORD. W/ (E) ACCESS CONTROLS, (E) PUSH BUTTON ACTUATOR, PROVIDE EXTRA 22-8 CABLE TO ROOM C105

HARDWARE SET: C2

Qty	Description	Catalog Number	Finish	Mfr
1	ELECT. PANIC	CD33/98NL X 990NL	626	VD
1	ELECT. PANIC	CD33/98EO X 990EO	626	VD
1	SWITCHING MODULE	CX-12	BLK	CAM
2	DOOR CONTACT	679-05	BLK	SCH
1	KEYED MULLION	KR4954	628	VD

PROVIDE EXTRA 22-8 CABLE TO ROOM C105

HARDWARE SET: C3

Qty	Description	Catalog Number	Finish	Mfr
1	ELECT. PANIC	CD33/98NL X 990NL	626	VD
1	ELECT. PANIC	CD33/98EO X 990EO	626	VD
1	AUTO OPERATOR	9542 SENIOR SWING	628	LCN
1	SWITCHING MODULE	CX-12	BLK	CAM
2	DOOR CONTACT	679-05	BLK	SCH
1	KEYED MULLION	KR4954	628	VD

(E) PUSH BUTTON ACTUATOR, PROVIDE EXTRA 22-8 CABLE TO ROOM C105

HARDWARE SET: D1

Qty	Description	Catalog Number	Finish	Mfr
6	HINGE	T4B3386 5½X4 NRP	626	MCK
1	VERTICAL ROD PANIC	2203 LBR LD V1703A	626	PHI
1	VERTICAL ROD PANIC	2202 LBR LD V1701	626	PHI
2	CLOSER	4111 SH CUSH EDA WMS	ALUM	LCN
1	CYLINDER	20-079	626	SCH
1	FSIC CORE	23-030	626	SCH
1	KICKPLATE	8400 10”X2”LDW B4E CS	626	IVE
6	SILENCERS	SR 64	GRAY	IVE

HARDWARE SET: D2FR

Qty	Description	Catalog Number	Finish	Mfr
8	HINGE	T4B3386 5½X4 NRP	626	MCK
1	VERTICAL ROD PANIC	2214 LBR CD V1702A	626	PHI
1	VERTICAL ROD PANIC	2214 LBR LD V1702A	626	PHI
2	CLOSER	4111 EDA WMS	ALUM	LCN
2	WALL HOLDS	999	689	RIX
2	KICKPLATE	8400 10”X2”LDW B4E CS	626	IVE
1	SEAL	S88	GRAY	PEM

HARDWARE SET: F1

Qty	Description	Catalog Number	Finish	Mfr
2	CONT. HINGE	SL 53HD	628	SEL
2	RIM PANIC	98EOLD X 990EO	626	VD
1	KEYED MULLION	KR4954	628	VD
1	CYLINDER	20-079	626	SCH
1	FSIC CORE	23-030	626	SCH
2	CLOSER	4111 EDA WMS	628	LCN
1	THRESHOLD	1665D	ALUM	PEM
1	SEAL	S88	D	PEM
1	WALLSTOP	WS407CCV	626	IVE

HARDWARE SET: F2

Qty	Description	Catalog Number	Finish	Mfr
1	CONT. HINGE	SL 53HD	628	SEL
1	RIM PANIC	NL98LD X 990NL	626	VD
1	(R) ELECT STRIKE	RELOCATE	626	HES
1	CLOSER	4111 EDA WMS	628	LCN
1	CYLINDER	20-079	626	SCH
1	FSIC CORE	23-030	626	SCH
1	DOOR CONTACT	679-05	BLK	SCH
1	DOOR SHOE	217DV	628	PEM
1	THRESHOLD	1665D	ALUM	PEM
1	SEAL	S88	D	PEM
1	WALLSTOP	WS407CCV	626	IVE

HARDWARE SET: F3

Qty	Description	Catalog Number	Finish	Mfr
2	CONT. HINGE	SL 53HD	628	SEL
1	RIM PANIC	EL98LD X 990NL	626	VD
1	RIM PANIC	98EOLD X 990EO	626	VD
1	KEYED MULLION	KR4954	628	VD
2	CLOSER	4111 EDA WMS	628	LCN
2	CYLINDER	20-079	626	SCH
2	FSIC CORE	23-030	626	SCH
1	DOOR CONTACT	679-05	BLK	SCH
2	DOOR SHOE	217DV	628	PEM
1	THRESHOLD	1665D	ALUM	PEM
1	SEAL	S88	D	PEM
2	WALLSTOP	WS407CCV	626	IVE

HARDWARE SET: F4

Qty	Description	Catalog Number	Finish	Mfr
1	CONT. HINGE	SL 53HD	628	SEL
1	RIM PANIC	98EOLD X 990EO	626	VD
1	CLOSER	4111 EDA WMS	628	LCN
1	DOOR CONTACT	679-05	BLK	SCH
1	DOOR SHOE	217DV	628	PEM
1	THRESHOLD	1665D	628	PEM
1	SEAL	S88	D	PEM
1	WALLSTOP	WS407CCV	626	IVE

HARDWARE SET: G

Qty	Description	Catalog Number	Finish	Mfr
3	HINGE	T4B3386 5½X4 NRP	626	MCK
1	RIM PANIC	98CDNL X 990NL	626	SCH
1	CYLINDER	20-079	626	SCH
1	FSIC CORE	23-030	626	SCH
1	KICKPLATE	8400 10”X2”LDW B4E CS	626	IVE
1	WALL STOP	WS407CCV	626	IVE
3	SILENCERS	SR 64	GR	IVE

SECTION 08 80 00

GLAZING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Glass.
   2. Glazing compounds and accessories.

B. Related Requirements:
   1. Section 06 41 00 - Architectural Wood Casework: Cabinets with requirements for glass shelves.
   2. Section 07 25 00 - Weather Barriers.
   3. Section 07 92 00 - Joint Sealants: Sealants for other than glazing purposes.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.

C. American Society for Testing and Materials (ASTM) International:
   1. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
   2. ASTM C1036 - Standard Specification for Flat Glass; 2011e1.
   3. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
   4. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.
   5. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.

D. GANA (GM) - GANA Glazing Manual; Glass Association of North America; 2009.

E. GANA (SM) - GANA Sealant Manual; Glass Association of North America; 2008.

F. ICC (IBC) - International Building Code; 2012.

1.3 SUBMITTALS

A. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

B. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

C. Samples: Submit two samples 12 x 12 inch in size of glass units for each glass type.

D. Certificates: Certify that products meet or exceed specified requirements.
   1. Solar-Control Low E Glass: Document that glass unit manufacturer and specific production location is certified by Low-E coating manufacturer.

E. Manufacturer's Certificate: Certify that sealed insulated glass meets or exceeds specified requirements.

F. Manufacturer’s Instructions: Installation instructions and requirements, special procedures, and perimeter conditions requiring special attention for fire-rated glazing systems.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual and GANA Sealant Manual for glazing installation methods.

B. Perform Work in accordance with GANA Glazing Manual, FGMA Sealant Manual, and GANA Laminated Glazing Reference Manual for glazing installation methods.

C. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience for project of similar scope.

D. Insulating Glass Unit Fabricator: Company whose production location and equipment is certified by the Low-E coating manufacturers.
   1. Low E Coating: Supplied from single coating manufacturer.
   2. Color Rendition: No apparent difference in reflectivity, hue, shade, and visible light transmittance when viewed from outside and inside building.

E. Safety/Fire Rated Glass: Provide manufacturer's identification as to type and thickness. Permanently etch Identification for glazing so as to be visible after glass has been installed.

F. Non Safety and Non Fire Rated Glass: Provide removable labels in lieu of etched labels.

G. Identification: Label each pane of glass and glass unit with type, thickness, quality, and color of glass and with manufacturer's trade name.

H. Source Limitations for Glass: Obtain tinted float glass, coated float glass, laminated glass and insulating glass from single source from single manufacturer for each glass type.

I. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

1.5 REGULATORY REQUIREMENTS

A. Safety Glazing: Conform to IBC 2406 - Safety Glazing and 2408 - Glazing in Athletic Facilities, for locations within doors, windows, and other openings specified by Sections related to work of this Section.

B. Shading Coefficients and U-Factors: Conform to Washington State Non-Residential Energy Code and Seattle Energy Code.

1.6 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 50 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.7 WARRANTY

A. Float and Heat Treated Glass: Provide manufacturer's 10 year Warranty against manufacturing defects such as visual defects and performance defects such as inclusions.

B. Sealed Insulating Glass Units: Provide manufacturer’s 10 year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

1.8 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 GLAZING TYPES

A. GL-1 - Sealed Insulating Glass Units: Vision glazing, with Low-E coating.
   1. Application: All exterior glazing unless otherwise indicated.
   2. Substitutions: Refer to Section 01 60 00 - Product Requirements.
   3. Between-lite space filled with argon.
   4. Thermal Resistance (U-Value): 0.24, maximum.
   5. Total Solar Heat Gain Coefficient: 0.26 minimum and 0.40 maximum.
   6. Total Visible Light Transmittance: 62 percent minimum.
   7. Basis of Design: Guardian Industries Corp: www.sunguardglass.com.
   8. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
      a. Low-E Coating: SunGuard Super Neutral 68 on #2 surface.
      b. Tint: Clear.
      c. Heat Treatment: Heat strengthened to address thermal stress. Temper if required for location of glass as dictated by Code.
   9. Inboard Lite: Annealed float glass, 1/4 inch thick.
      a. Coating: No coating on inboard lite.
      b. Tint: Clear.
      c. Heat Treatment: Heat strengthened to address thermal stress. Temper if required for location of glass as dictated by Code.
   10. Other Approved Manufacturer/Products of Low Emissivity Coatings: Subject to compliance with requirements, one of the following may be incorporated into the Work:
      a. PPG, Solarban 60, clear.
      b. Viracon, VE1-2M, clear.

c. Cardinal, LOE 270 Clear.

11. Total Thickness: 1 inch.

B. GL-2 - Sealed Insulating Glass Units: Safety glazing.
   1. Application: Provide this type of glazing in the following locations:
      a. Glazed lites in exterior doors.
      b. Glazed sidelights and panels next to doors.
      c. Other locations required by applicable federal, state, and local codes and regulations.
      d. Other locations indicated on the drawings.
   2. Type: Same as other vision glazing except use fully tempered float glass for both outboard and inboard lites.

C. GL-3 - Single Vision Glazing:
   1. Application: All interior glazing unless otherwise indicated.
   2. Type: Annealed float glass.
   3. Tint: Clear.
   4. Thickness: 1/4 inch.
   5. Glazing Method: Gasket glazing.

D. GL-5 - Single Safety Glazing:
   1. Application: Provide this type of glazing in the following locations:
      a. Glazed lites in doors, except fire doors.
      b. Glazed sidelights to doors, except in fire-rated walls and partitions.
      c. Other locations required by applicable federal, state, and local codes and regulations.
      d. Other locations indicated on the drawings.
   2. Type: Fully tempered float glass as specified.
   3. Tint: Clear.
   4. Thickness: 1/4 inch.
   5. Glazing Method: Gasket glazing.

E. GL-7 – Tinted Insulated Glazing Units: Match existing.
   1. Application: Locations indicated on the drawings.
   2. Type: Same as GL-1 or GL-2 except:
      a. Outboard Lite Tint To match existing glass.

2.3 EXTERIOR GLAZING ASSEMBLIES

A. Performance Criteria: Select type and thickness of glass to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of glass.
   1. Design Pressure: Calculated in accordance with applicable codes.
   2. Glass thicknesses listed are minimum.

B. Air and Vapor Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier:
   1. In conjunction with vapor retarder and joint sealer materials described in other sections.
   2. To maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

C. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

D. Heat Treatment: Provide as applicable on outboard and inboard lites of exterior glazing assemblies for location of glass and as dictated by Code.

2.4 GLASS MATERIALS

A. Float Glass Manufacturers:
   1. AGC Glass Company North America, Inc.: www.us.agc.com.
   2. Cardinal Glass Industries: www.cardinalcorp.com.
   3. Guardian Industries Corp: www.sunguardglass.com.
   4. Pilkington North America Inc.: www.pilkington.com/na.
   5. PPG Industries, Inc.: www.ppgideascapes.com.
   6. Substitutions: Refer to Section 01 60 00 - Product Requirements.

B. Float Glass: Provide float glass based glazing unless noted otherwise.
   1. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select). Minimum 1/4 inch thickness.
   2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and Kind FT.
      a. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
      b. Roller wave distortion not to exceed 0.003 inch at center glass.
   3. Tinted Types: ASTM C1036, Class 2 - Tinted, color and performance characteristics as indicated.
   4. Thicknesses: As indicated; for exterior glazing comply with requirements indicated for wind load design regardless of thickness indicated.

C. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
   1. Laminated Safety Glass: Comply with 16 CFR 1201 test requirements for Category II.
   2. Plastic Interlayer:
   3. Where fully tempered is specified or required, provide glass that has been tempered by the tong-less horizontal method.
   4. Manufacturers/Laminators:
      a. Hartung Glass Industries. www.hartung-glass.com.
      b. Northwest Glass Industries, www.nwiglass.com.
      c. Oldcastle Building Envelope, www.oldcastle.com.
      d. Viracon, Architectural Glass segment of Apogee Enterprises, Inc.: www.viracon.com.
      e. Substitutions: Refer to Section 01 60 00 - Product Requirements.

2.5 SEALED INSULATING GLASS UNITS

A. Sealed Insulating Glass Units: Types as indicated.
   1. Application: Exterior, except as otherwise indicated.
   2. Durability: Certified by an independent testing agency to comply with ASTM E2190.
   3. Edge Spacers:
      a. Aluminum, bent and soldered corners, unless warm edge spacer is required to meet total unit energy performance requirements.

b. Warm Edge Spacer Manufacturers:
   1) Technoform TGI, www.technoform.com.
   2) Chromatech Ultra, www.rolltech.dk.
   3) Quanex Tri Seal Super Spacer, www.quanex.com.
   4) Substitution: See Section 01 60 00.
4. Edge Seal: Dual seal, with polyisobutylene as primary and silicone secondary sealants.
5. Edge Seal Color: Black.

2.6 GLAZING COMPOUNDS

A. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.

B. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

2.7 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self-adhesive on one face.

C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 to 15 Shore A durometer hardness; coiled on release paper; black color.

D. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; Black color.

E. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.1 GLASS CUTTING

A. Cut to accurate sizes and shapes as required; allow edge clearances and tolerances in accordance with GANA recommendations, unless otherwise indicated. Glazing may be factory installed, as practical.

B. Float, Laminated, and Wire Glass: Cut for clean, accurate edges. Grind and polish edges indicated to be mitered

C. Tempered Glass: Provide factory-cutting and factory-formed edges, including drilled holes, notches, and other special fabrication and finishing techniques.

3.2 GLAZING METHODS

A. Glazing Options: Conform to following, except as otherwise specified or where conflicting with manufacturer's instructions.

3.3 INSTALLATION - EXTERIOR DRY METHOD (TAPE AND GASKET SPLINE GLAZING)

A. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

D. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.

E. Trim protruding tape edge.

F. Take measures for other glazing systems as necessary achieve air barrier, vapor retarder seal to glazing frame, and pressure equalized glazing space.

3.4 INSTALLATION - EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

A. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with butyl sealant.

B. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

D. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.

E. Install removable stops, with spacer strips inserted between glazing and applied stops 1/4 inch below sight lines.
   1. Place glazing tape on glazing pane of unit with tape flush with sight line.

F. Install removable stops, with spacer strips inserted between glazing and applied stops, 1/4 inch below sight line. Place glazing tape on glazing pane or unit with tape flush with sight line.

G. Fill gap between glazing and stop with silicone type sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.

H. Apply cap bead of silicone type sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.5 ADJUSTING

A. Replace glass damaged during construction period at no additional cost to Contract Sum.

3.6 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION 08 80 00

SECTION 09 21 16

GYPSUM BOARD ASSEMBLIES

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Performance criteria for gypsum board assemblies.
   2. Cementitious backing board.
   3. Gypsum wallboard.
   4. Joint treatment and accessories.

B. Related Documents:
   1. Section 06 10 00 - Rough Carpentry: Building framing and sheathing.
   2. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.
   3. Section 07 21 00 - Thermal Insulation: Acoustic insulation.
   4. Section 07 25 00 - Weather Barriers: Water-resistive barrier over sheathing.
   5. Section 07 84 00 - Firestopping: Top-of-wall assemblies at fire rated walls.
   6. Section 07 92 00 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.
   7. Section 09 22 16 - Non-Structural Metal Framing.
   8. Section 09 30 00 - Tiling: Tile backing board.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at time of Bid.

B. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units; 2013.1.

C. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 2013.1.

D. American Society for Testing and Materials (ASTM) International:
   1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.
   2. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2012.
   3. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
   4. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
   5. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2011.
   6. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.

7. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2011.
8. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
9. ASTM C1325 - Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cement Substrate Sheets; 2008b.
10. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
11. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2014a.
12. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
13. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
14. ASTM E413 - Classification for Rating Sound Insulation; 2010.

E. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2013.

F. GA-600 - Fire Resistance Design Manual; Gypsum Association; 2012.

G. ICC (IBC) - International Building Code; 2012.

H. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.3 SUBMITTALS

A. Product Data: Provide data on gypsum board, accessories, and joint finishing system.

B. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing gypsum board application and finishing, with minimum 3 years of documented experience.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original unbroken containers or bundles bearing name of manufacturer and brand.

B. Verify products undamaged before acceptance at Project Site. Do not use products with visible signs of mold growth and damage.

C. 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.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Temperature, Ventilation and Moisture: Conform to NWCB 300-103 and manufacturer's instructions. Maintain temporary controls to regulate heating, ventilating, moisture, and humidity levels. Do not begin taping and finishing until following conditions are achieved.
   1. Building: Fully enclosed and free of standing water. Watertight roofing and wall envelope systems in place.
   2. Temperature: Between 50 and 95 degrees F for minimum 48 hours.
   3. Relative Humidity: Less than 65 percent.
   4. Gypsum Board Moisture Content: 0.4 percent on gypsum scale (12 percent on wood scale).
   5. Wood Substrate Moisture Content: Maximum 16 percent.

B. Lighting: Sufficient temporary lighting to perform work to achieve specified finishes.

1.7 COORDINATION

A. Coordinate with Wall Type Schedule and the following:
   1. Section 06 16 43 for gypsum sheathing.
   2. Section 09 28 00 for backing boards.
   3. Gypsum board systems used in conjunction with work of this Section.

B. Coordinate with Section 09 22 16 for nonstructural metal framing and Section 09 22 26 for suspension systems.

1.8 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 – PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
   1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

C. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:
   1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
   2. Acoustic Attenuation: STC of 50-54 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

D. Fire Rated Assemblies: Provide completed assemblies complying with applicable code.
   1. ICC IBC Item Numbers: Comply with applicable requirements of ICC IBC for the particular assembly.

2. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
3. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.2 BOARD MATERIALS

A. Gypsum Board, General: Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

B. Manufacturers - Gypsum-Based Board:
1. CertainTeed Corporation: www.certainteed.com.
2. Georgia-Pacific Gypsum: www.gpgypsum.com.
3. National Gypsum Company: www.nationalgypsum.com.
4. USG Corporation: www.usg.com.
5. Pabco Gypsum: www.quietrock.com.
6. Substitutions: See Section 01 60 00 - Product Requirements.

C. Gypsum Wallboard: Fire rated, paper-faced gypsum panels as defined in ASTM C1396/C1396M; Type X core, sizes to minimize joints in place; ends square cut.
1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
2. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
3. Thickness:
   a. Vertical Surfaces: 5/8 inch.
   b. Ceilings: 5/8 inch.
   c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
4. Fire Rated Paper-Faced Products:
   a. Georgia-Pacific Gypsum; ToughRock.
   b. National Gypsum Company; Gold Bond Brand Gypsum Wallboard.
   c. Temple-Inland Building Product by Georgia-Pacific; Gypsum Board Fire Resistant Panels Type X and Type TGC.
   d. USG Corporation; Sheetrock Brand Gypsum Panels.

D. Abuse Resistant Wallboard:
1. Application: See Drawings.
2. Surface Abrasion: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
3. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
4. Soft Body Impact: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
5. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
6. Paper-Faced Type: Gypsum wallboard as defined in ASTM C1396/C1396M.
7. Type: Fire resistance rated Type X, UL or WH listed.
8. Thickness: 5/8 inch.
9. Edges: Tapered.
10. Products:
    a. Certainteed, ProRoc Abuse-Resistant Type X.

b. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold Guard Abuse-Resistant.
c. National Gypsum Company; Gold Bond Hi-Abuse XP Gypsum Board.
d. USG, Sheetrock Abuse Resistant, ASTM C1278.
e. Substitutions: See Section 01 60 00 - Product Requirements.

E. Impact Resistant Wallboard:
1. Application: See Drawings.
2. Surface Abrasion: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
3. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
4. Soft Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
5. Hard Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
6. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
7. Paper-Faced Type: Gypsum wallboard as defined in ASTM C1396/C1396M.
8. Type: Fire resistance rated Type X, UL or WH listed.
9. Thickness: 5/8 inch.
10. Edges: Tapered.
11. Products:
a. CertainTeed Corporation; Air Renew Extreme Impact Resistant Gypsum Board
b. Georgia-Pacific Gypsum; DensArmor Plus Impact-Resistant.
c. National Gypsum Company; Gold Bond HI-Impact XP Gypsum Board.
d. USG, Mold Tough WHI Firecode Core.
e. Substitutions: See Section 01 60 00 - Product Requirements.

F. Backing Board For Wet Areas:
1. Application: Surfaces behind tile in wet areas including tub and shower surrounds and shower ceilings.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
3. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
a. Thickness: 5/8 inch.

G. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
1. Application: Vertical surfaces behind thinset tile, except in wet areas.
2. Type X Thickness: 5/8 inch.
3. Edges: Tapered.

H. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Ceilings, unless otherwise indicated.
2. Thickness: 5/8 inch.
3. Edges: Tapered.

I. Exterior Soffit Board: Exterior gypsum soffit board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Ceilings and soffits in protected exterior areas, unless otherwise indicated.
   2. Type X Thickness: 5/8 inch.
   3. Edges: Tapered.
   4. Products:
      a. CertainTeed, Exterior Soffit Gypsum Board.
      b. Georgia-Pacific Gypsum; ToughRock Fireguard C Soffit Board.
      c. National Gypsum, Gold Bond Exterior Soffit Board.
      d. USG, Exterior Gypsum Ceiling Board.

J. Shaftwall and Coreboard: Type X; 1 inch thick by 24 inches wide, beveled long edges, ends square cut.

K. Acoustic Control Board:
   1. Application: Where indicated on Drawings.
   2. Type X Thickness: 5/8 inch.
   3. Edges: Tapered.
   4. Products:
      a. QuietRock ES, or approved.

2.3 ACCESSORIES

A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced.

B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.

C. Reveal Molding and Trim:
   1. Manufacturers:
      a. Fry Reglet
         1) Website: www.fryreglet.com.
      b. Substitution Requests: Submit for approval under provisions of Section 01 25 00.
   2. Reveal Moldings: Aluminum 6063 T5 alloy with chemical conversion coating.
      a. ¾ inch F Reveal Moldings: Fry Reglet, DRMF-625-75, 5/8 inch deep by 3/4 inch wide.
      b. ½ inch Control Joint (Compression Joint): Fry Reglet, DRM-50-50 3-PC, ½ inch deep.
   3. Trim Molding: Aluminum 6063 T5 alloy with chemical conversion coating.
      a. 1 -1/4 inch “L” Trim Molding. Fry Reglet DRML-1250.

D. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.
   1. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
   2. Ready-mixed vinyl-based joint compound.

E. High Build Drywall Surfacer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.

F. Abuse Resistant Finishes:

1. Acrylic, water-based, non-textured, high build, tintable primer and surfacer.

G. Screws for Attachment to Steel Members Less Than 0.033 inch In Thickness, to Wood Members, and to Gypsum Board: ASTM C1002; self-piercing tapping type; cadmium plated for exterior locations.

H. Screws for Attachment to Steel Members From 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws for application of gypsum board to loadbearing steel studs.

I. Exterior Soffit Vents: One piece, perforated, ASTM B221 6063 T5 alloy aluminum, with edge suitable for direct application to gypsum board and manufactured especially for soffit application. Provide continuous vent.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.2 SHAFT WALL INSTALLATION

A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
   1. Install studs at spacing required to meet performance requirements.

B. Shaft Wall Liner: Cut panels to accurate dimension and install sequentially between special friction studs.

3.3 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.4 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

C. Exterior Soffits: Install exterior soffit board perpendicular to framing, with staggered end joints over framing members or other solid backing.

D. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

3.5 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
   1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
   2. At exterior soffits, not more than 30 feet apart in both directions.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

D. Exterior Soffit Vents: Install according to manufacturer's written instructions and in locations shown on the drawings. Provide vent area specified.

3.6 JOINT TREATMENT

A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.

B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
   2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   3. Level 3: Walls to receive textured wall finish.
   4. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
   5. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
   6. Level 0: Temporary partitions.

C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.

D. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.7 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION 09 21 16

SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Metal partition, ceiling, and soffit framing.
   2. Framing accessories.

B. Related Requirements:
   1. Section 05 50 00 - Metal Fabrications: Metal fabrications attached to stud framing.
   2. Section 06 10 00 - Rough Carpentry: Wood blocking within stud framing.

1.2 REFERENCE STANDARDS

A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.

B. Reference Standards: Current edition at date of Bid.

C. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.

E. American Society for Testing and Materials (ASTM) International:
   1. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2013.
   2. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2011.
   3. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2007 (Reapproved 2013).
   4. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
   5. ASTM E413 - Classification for Rating Sound Insulation; 2010.

F. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

G. International Code Council (ICC) Evaluation Services, www.icc-es.org/Evaluation_Reports.

H. Northwest Wall and Ceiling Bureau (NWCB), www.nwcb.org.
   1. NWCB 200-100 - Screws.
   2. NWCB 200-104 - Framing Tolerance.

3. NWCB 200-103 - Friction Fitting and Gap Tolerance of Metal Studs.
4. NWCB 200-500 - Non-Load Bearing Partitions and Lay-In Acoustical Ceilings.

I. Steel Stud Manufacturers Association (SSMA): Product Technical Information, www.ssma.com
1. SSMA ICC-ESR-3064P.
2. SSMA Product Technical Information.
3. SSMA Industry Technical Note 2 - Unsheathed Flange Bracing.

J. Steel Framing Industry Association (SFIA). www.steelframingassociation.org
1. SFIA Technical Guide for Cold-Formed Steel Framing Products.
2. SFIA ICC-ES ESR-2457.

K. Underwriters Laboratories (UL): UL 2079 - Tests for Fire Resistance of Building Joint Systems.

1.3 SYSTEM DESCRIPTION

A. System: Interior metal stud framing systems, plenums, furred ceilings, and soffits used in conjunction with sound insulation, and gypsum board systems.

B. Maximum Allowable Deflection: Design and size components for L/360 deflection at 5 psf loading.

C. Accommodate construction tolerances, deflection of building structural members, and clearance of intended openings.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.

C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

D. Design Data: Published Load table and criteria indicating section properties, height of wall limitations, combined axial and lateral load limitations, load and deflection criteria, and allowable loads for fasteners and welds.

E. Design Calculations: Provide for axially loaded steel studs, including framing requiring approval as required by local building code authority.
1. Provide under direct supervision, sealed and signed, by professional structural engineer licensed in State of Oregon.
2. Meet or exceed Design Requirements specified this Section.

F. Fire and Acoustical Assemblies:
1. Demonstrate equivalency to ICC, UL, GA, WH, and FM tests indicated by Contract Documents.

2. Include ICC Evaluation Services acceptance and UL certification for fire rated deflection track systems.

G. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

H. Evaluation Reports: Submit evaluation reports certified under an independent third party inspection program administered by an agency accredited by IAS to ICC-ES AC98, IAS Accreditation Criteria for Inspection Agencies.

1.5 QUALITY ASSURANCE

A. Manufacturer: Member of Steel Stud Manufacturers Association (SSMA) or Steel Framing Industry Association (SFIA).

B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years experience of comparable scope.
1. Recommended as qualified to perform work of this Project by Northwest Wall and Ceiling Bureau (NWCB), or accepted by Architect.

1.6 REGULATORY REQUIREMENTS

A. Conform to regulatory requirements of Section 01 41 00.

B. Design and Structural Properties: Conform to IBC Chapter 22, IBC Section 1632, AISI/NASPEC standards referenced by IBC, and SSMA ICC-ES 3064P as published by SSMA Product Technical Information or SFIA ICC_ESESR_2457.

C. Fire-Resistive Assemblies: Conform to Underwriters' Laboratories (UL) or other tested design reports acceptable to building code regulatory authority having jurisdiction.

D. Fire-Resistive Deflection Track and Joint System: Conform to IBC Chapter 7 including Section 702 and Section 713 for fire-resistive joint system as tested to UL 2079 or ASTM E1966.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver in unopened containers or bundles, clearly labeled with manufacturer's name, brand, type, gauge/thickness, and grade. Verify undamaged conditions.

B. Store off the ground in dry well-ventilated space to protect from rusting and damage.

1.8 FIELD MEASUREMENTS

A. Verify field measurements with dimensions shown on Shop Drawings and manufacturer’s instructions.

1.9 COORDINATION

A. Section 05 40 00 for load bearing metal wall framing

B. Section 06 10 00 for solid wood backing for wall attached items, including metal fabrications, railings, casework, equipment, ductwork, wall stops and other items as specified by other Sections.

C. Section 08 71 00 for accommodating electric door strikes and other hardware items.

D. Section 07 81 29 for spray-applied fireproofing at steel deck and structural steel framing.

E. Section 07 84 00 for firestopping installations prior to installation of gypsum board systems.

F. Section 09 22 26 for suspended gypsum board ceiling systems.

1.10 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Light Gauge Steel Framing:
   1. Member of Steel Stud Manufacturers Association (SSMA) / Steel Framing Industry Association (SFIA).
   2. Accepted upon condition of satisfactory submittals referencing design requirements and showing conformance to referenced ICC evaluation reports.

2.2 PERFORMANCE / DESIGN CRITERIA

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, and displaying a classification label from, an independent testing agency acceptable to the authority having jurisdiction.
   1. Construct fire-resistance rated partitions in compliance with tested assembly requirements indicated on drawings.
   2. Rated assemblies to be substantiated from applicable testing using proposed products, by Contractor.

2.3 FRAMING MATERIALS

A. Refer to Section 05 40 00 for load bearing members 20 gauge and over.

B. Fire Rated Assemblies: Comply with applicable code and as indicated on drawings.

C. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/360 at 7.5 psf.
   1. Studs: C shaped with flat or formed webs .
      a. Minimum 25 gauge (18 mils), provide higher gauge studs for greater design loads conforming to manufacturer's load table.
      b. Flange: 1-1/4 inch, with 90-degree angle return leg 5/16 inch long.
      c. Webs: Punched for mounting electrical conduit and cold formed channel reinforcement.
   2. Runners: U shaped, sized to match studs, minimum thickness equal to stud gauge except as otherwise indicated for top runners; minimum 1-1/4 inch flange except as otherwise indicated for top runners.
   3. Ceiling Channels: C shaped.
   4. Furring: Hat-shaped sections, minimum 20 gauge, depth of 7/8 inch. Hot-dipped galvanized steel.
   5. Furring: Z furring channels, minimum 20 gauge, depth of 1-1/2 inch. Hot-dipped galvanized steel.
   6. Galvanizing to comply with ASTM A653, G-40 for interior condition and G-60 where subject to moisture exposure and at exterior walls. A-40 galvanealed are not accepted.

E. Loadbearing Studs: As specified in Section 05 40 00.

F. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

G. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
   1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
   2. Material: ASTM A653/A653M steel sheet, SS Grade 50, with G60/Z180 hot dipped galvanized coating.
   3. Provide components UL-listed for use in UL-listed fire-rated head of partition joint systems indicated on drawings.
   4. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 12 feet.

H. Tracks and Runners: Same material and thickness as studs, bent leg retainer notched to receive studs with provision for crimp locking to stud.

I. Furring and Bracing Members: Of same material as studs; thickness to suit purpose; complying with applicable requirements of ASTM C754.

J. Headers and Jambs: Manufacturer’s proprietary shape used to form header beams and jambs, columns or posts, of web depths indicated, unpunched, with stiffened flanges.
   1. Product:
      a. ClarkDietrich Building Systems; Heavy Duty Studs - HDS and Header Bracket - HDSC, or a comparable product.

K. Sheet Metal Backing:

1. Sheet Metal Flat Strap Backing for Light Loads: Use 16 gauge minimum for light loads such as toilet accessories only. Not acceptable for heavy loads.
2. Sheet Metal Clipped Track Backing for Heavy Loads: Provide for heavy loads such as grab bars, handrails, wall-hung cabinets.
   a. Product:
      1) ClarkDietrich Building Systems, Danback Fire Treated Wood Backing Plate D16F or D 24F. www.danback.com.

L. Fasteners: ASTM C1002 self-piercing tapping screws.

M. Sheet Metal Backing: 0.036 inch thick, galvanized.

N. Anchorage Devices: Powder actuated.

O. Acoustic Insulation: As specified in Section 07 21 00.

P. Acoustic Sealant: As specified in 07 92 00.

Q. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic.

2.4 SOUND ISOLATION CHANNEL CLIPS AND CHANNEL SYSTEM

A. Resilient Sound Isolation Clips:
1. 7/8 inch hat channel, mounted to 54 mils (16 gauge clip) with rubber isolator for total 1-5/8 inch depth.
   a. Manufacturers/Product:
      1) PAC International, RSIC-1 Resilient Sound Isolation Clip; www.pac-intl.com.
      2) Kinetic, IsoMax; www.kineticnoise.com.
      3) Substitution: See Section 01 60 00.

B. Sound Isolation Channels:
1. Resilient Channels (RC-1):
   a. 25 gauge (18 mils), 1/2 inch deep, hot-dip galvanized steel.
   b. Pre-punched slotted fastener holes in flange 3/8 inch wide, 3 inch long, spaced 4 inch on center.
   c. Manufacturers/Products:
      1) ClarkDietrich Building Systems; RC-Deluxe; www.clarkdietrich.com.
      2) Substitution: See Section 01 60 00.

2.5 FABRICATION

A. Fabricate assemblies of framed sections to sizes and profiles required.

B. Fit, reinforce, and brace framing members to suit design requirements.

C. Fit and assemble in largest practical sections for delivery to site, ready for installation.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that rough-in utilities are in proper location.

3.2 PREPARATION

A. Meet at project site with the installers of related work including for hollow metal frames, mechanical, and electrical work. Review areas of potential interference and conflicts. Coordinate layout and make provisions for interfacing work.

B. Protect installed finish work of other trades and surfaces to preclude damage from work of this Section.

3.3 INSTALLATION OF STUD FRAMING

A. Comply with requirements of ASTM C754.

B. Extend partition framing to structure where indicated and to ceiling in other locations.

C. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.

D. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs as indicated.
   1. Head of Wall Deflection Track: Install system designed to accept 1 inch deflection to prevent loading of non-load bearing wall framing.
      a. Install at top of wall under structural steel deck and other systems and framing systems subject to deflection.
      b. Firestop or fireproof openings at fire-resistive construction under provisions of Section 07 84 00 or 07 81 29 to close wall/ceiling penetrations through fire-resistive construction.

E. Align and secure top and bottom runners at 24 inches on center, unless otherwise noted in Drawings.

F. At partitions indicated with an acoustic rating:
   1. Provide components and install as required to produce STC ratings as indicated, based on published tests by manufacturer conducted in accordance with ASTM E90 with STC rating calculated in accordance with ASTM E413.
   2. Place one bead of acoustic sealant between runners and substrate, studs and adjacent construction.
   3. Place one bead of acoustic sealant between studs and adjacent vertical surfaces.

G. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.

H. Install studs vertically at 16 inches on center, unless otherwise noted in Drawings.

I. Align stud web openings horizontally.

J. Secure studs to tracks using crimping method. Do not weld.

K. Fabricate corners using a minimum of three studs.

L. Double stud at wall openings, door and window jambs, not more than 2 inches from each side of openings.

M. Coordinate erection of studs with requirements of door frames; install supports and attachments.

N. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.

O. Blocking: Use steel channels secured to studs. Provide blocking for support of plumbing fixtures.

3.4 CEILING AND SOFFIT FRAMING

A. Comply with requirements of ASTM C754.

B. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.

C. Install furring independent of walls, columns, and above-ceiling work.

D. Securely anchor hangers to structural members or embed in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.

E. Space main carrying channels at maximum 72 inch on center, and not more than 6 inches from wall surfaces. Lap splice securely.

F. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.

G. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.

H. Reinforce openings in suspension system that interrupt main carrying channels or furring channels with lateral channel bracing. Extend bracing minimum 24 inches past each opening.

I. Laterally brace suspension system.

3.5 TOLERANCES

A. Maximum Variation From True Position: 1/8 inch in 10 feet.

B. Maximum Variation From Plumb: 1/8 inch in 10 feet.

END OF SECTION 09 22 16

SECTION 09 22 26

SUSPENSION SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Interior suspended ceiling framing systems for support of screw attached interior gypsum board ceilings.

B. Related Sections:
   1. Section 06 10 00 - Rough Carpentry
   2. Section 09 21 16 - Gypsum Board Assemblies
   3. Section 09 22 16 - Non-Structural Metal Framing
   4. Division 21 - Fire Suppression
   5. Division 23 - Heating, Ventilating, and Air Conditioning
   6. Division 26 - Electrical

1.2 SYSTEM DESCRIPTION

A. Steel Channel Ceiling Suspension System: Cold-formed steel main support channels, lateral support channels and furring channels supported by hanger wire to structural support.

B. Pre-engineered Suspended Tee Bar Suspension System: Curved and flat ceiling interlocking main tees and cross tees as option to steel channel ceiling suspension system.

1.3 REFERENCES

A. Reference Standards: Current edition at date of Bid.

B. American Society for Testing and Materials (ASTM) International:
   1. ASTM A568 - General Requirements for Steel, Sheet, Carbon and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled.
   2. ASTM C635 - Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
   3. ASTM C636 - Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
   4. ASTM C645 - Standard Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Track) and Rigid Furring Channels for Screw Application for Gypsum Board.
   5. ASTM A653 - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.
   6. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum.
   7. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

8. ASTM C1002 - Specification for Steel Drill Screws for the Application of Gypsum Board.

C. Ceiling and Interior Systems Contractors Association (CISCA): Ceiling Systems Installation Handbook.

D. National Association of Architectural Metal Manufacturers (NAAMM):
1. NAAMM ML/SFA 920 - Guide Specifications for Metal Lath and Furring.

E. Northwest Wall and Ceiling Bureau (NWCB), Tel (206) 524-4243 (Bob Drury and Terry Kastner).
1. NWCB 400-102 - Suspended Ceilings.
2. NWCB 400-200 - Suspended Gypsum Board or Cement Board Ceilings.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Product Data: Manufacturer’s catalog cuts describing standard framing systems, components, finishes, product criteria, load charts, and limitations.

C. Manufacturer's Instructions: Include installation instructions, rough-in dimensions, special procedures, and perimeter conditions requiring special attention.

D. Design Data: Seismic sway bracing in conformance to Code, and ICC Evaluation Services Evaluation Report or approval for steel framing systems showing load and deflection criteria, correlated to gypsum board materials specified.

1.5 QUALITY ASSURANCE

A. Suspended Gypsum Board Installations: Perform work of this Section and Section 09 29 00 by or under direct supervision of single installer.

1.6 QUALIFICATIONS

A. Installer: Company specializing in work of this section with minimum 3 years documented experience. Recommended by Northwest Wall and Ceiling Bureau prior to submitting Bid, or accepted by Architect.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of Section 01 40 00 for referenced Codes, ordinances, and other regulatory requirements.

B. Framing Systems: Listed by ICC ES Evaluation Report for structural design properties.

1.8 COORDINATION

A. Conform to Section 01 31 0 for coordination with work of other Sections.

B. Section 09 22 16 for tying into metal framing systems.

D. Section 06 10 00 for tying into wood framing systems.

E. Division 21, Division 23, and Division 26 for location, installation, support, and access to equipment and fixtures including fire sprinkler systems, lighting fixtures, and other required penetrations.

1.9 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Steel Channel Ceiling Suspension System: As specified this Section.

B. Pre-Engineered Tee Bar Ceiling Suspension System:
1. Armstrong World Industries, Drywall Grid Systems
   a. Website: www.armstrong.com.
2. USG Corporation, Drywall Suspension System
   a. Website: www.usg.com.
3. Chicago Metallic Corp., Drywall Grid System
   a. Website: www.chicagometallic.com.

C. Substitution Requests: Submit for approval under provisions of Section 01 60 00.

2.2 MATERIALS

A. Cold Rolled Steel: ASTM C645, conforming to ASTM A568 Grade 33 or ASTM A653 Grade 33.
1. Typical: Galvanized ASTM A653 G40.
2. Exterior Installations: Galvanized ASTM A653 G 60.
3. Swimming Pool Areas and other High Humidity Areas: Galvanize ASTM A653 G90.

2.3 STEEL CHANNEL CEILING SUSPENSION SYSTEM

A. Main Support Carrying Channels: Cold-rolled steel, 16 gauge (0.053 inch) by 1-1/2 inch deep.

B. Intermediate Lateral Support Runners: Cold-rolled steel, 16 gauge (0.053 inch) by 3/4 inch deep.

C. Furring Channels: Hat channels, 2-9/16 inch wide by 7/8 inch deep, minimum [20 (0.033 inch)] gauge, rolled formed steel, and as required by loading and deflection tolerances [, except 18 gauge minimum at exterior installations].

2.4 TEE BAR CEILING SUSPENSION SYSTEM

A. Straight Main Tees: 1-1/2 inch face width, 1-1/2 inch high by 144 inch long. Integral reversible splice with knurled face.

B. Cross Tees: 1-1/2 inch high, 48 inch long, 1-1/2 wide face. Integral reversible splice with knurled face. Quick release for positive locking and removal without need for tools.

C. Furring Channels (as applicable): 7/8 inch high, 48 inch ling, 1-7/16 inch face.

2.5 ACCESSORIES

A. Hanger Wire:
   1. Minimum 12 gauge galvanized soft annealed wire, as accepted by ICBO Evaluation Report ER-4071 and NWCB 400-200 recommendations.
   2. Minimum 9 gauge galvanized soft annealed wire at double layer gypsum board, equipment loading, and as required to limit deflection to L/360.

B. Tie Wire: 18 gauge galvanized soft annealed steel wire.

C. Furring Channel Clips: Manufacturer's standard galvanized wire, designed to attach furring channels to 1-1/2 inch cold rolled channels.

D. L-Type Runners: Minimum 24 gauge, 1 inch by 1 inch cold rolled galvanized steel.

E. Channel Molding: Minimum 24 gauge, 1-1/2 inch by 1 inch cold rolled galvanized channel.

F. Fastening Devices at Ceiling for Suspension: Conform to ASTM C754 and as instructed by manufacturer and NWCB.

G. Screw Type Fasteners: ASTM C1002 and C954, self-drilling, self-tapping framing screws, designed for gauge of framing.

H. Extruded Aluminum Trim: Extruded aluminum channel trim profiles, factory applied custom color coating.
   1. Armstrong Axiom.
   2. USG Compasso.

2.6 ACOUSTICAL ISOLATION HANGERS

A. Manufacturers:
   1. Target Enterprises, ARH-1
      a. Website: www.gtsinteriorsupply.com.
   2. Mason, W30
      a. Website: www.mason-industries.com.
   3. Kinetics Noise Control, SRH
      a. Website: www.kineticsnoise.com.

B. Acoustical Isolation Hangers: Spring and neoprene, suspended ceiling isolation hanger unit with 1.0 inch static deflection. Designed to separate and isolate hanger wires between structural ceiling and suspended ceiling support system, where noted as required in Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify conditions ready to receive work of this Section before beginning.

B. Verify that work above ceiling suspension systems is complete, including fire protection, mechanical and electric systems, and installed in manner that will not adversely affect layout and installation of work of this Section.

3.2 STEEL CHANNEL CEILING SUSPENSION SYSTEM

A. Conform to manufacturer's instructions and provisions of Contract Documents.

B. Carrying Channel Runners:
   1. Secure 1-1/2 cold rolled channel with hanger wire to overhead construction.
   2. Space hanger wire and carrying channels not to exceed 4 foot on center each way, except where intermediate spacing is required to meet loading capacity and deflection tolerances.

C. Furring Channels: Wire tie or clip hat channels to carrying channel runners spaced at 16 inch on center.

D. Install L-channel at perimeter of suspension system to provide continuous support for fastening gypsum board and plaster ceiling finishes.

E. Install additional carrying channels and furring channels to accommodate duct work, lighting fixtures, and other ceiling penetrations where needed for intermittent support.

3.3 TEE-BAR CEILING SUSPENSION SYSTEM

A. Install in accordance with manufacturer's instructions and provisions of Contract Documents. Where in conflict, verify with Architect before beginning work.

B. Conform to ASTM C636, CISCA installation standards, NWCB recommendations, UL Fire Resistance Directory, and other Regulatory Requirements for code compliance.

3.4 FLAT CEILINGS

A. Space main tees at maximum 48 inch on center.

B. Support from hanger wire directly to structure above.

C. Space at maximum 48 inch on center.

D. Space cross tees at maximum 16 inch on center and as required to conform to UL.

E. Accessories: Install wall angles, channel molding, furring channel, attachment clips, transition clips, splice clips, as instructed by manufacturer for system assembly.

F. Install additional hanger wire, main tees, cross tees, and accessories as necessary to stabilize and complete system assembly
   1. Maintain visually acceptable gypsum board planes and corners free of telegraphing and visual surface defects.
   2. Accommodate duct work, lighting fixtures, and other ceiling penetrations where needed for intermittent support.

3.5 CONTROL JOINTS

A. Install control joints with framing members broken or spliced at spans exceeding 50 lineal foot or exceeding 2500 square foot overall if not indicated on Drawings.

B. Do not contact abutting construction such as walls and columns.

C. Seal with foam tape or joint sealant.

3.6 FIRE-RATED ROOF/CEILING ASSEMBLIES

A. Provide tents above light fixtures, conforming to ICBO or UL approved, tested assemblies.

3.7 INSTALLATION TOLERANCES:

A. Maximum Variation From Level: 1/8 inch in 12 feet.

B. Maximum Deflection for Suspension System: L/360 of span.

END OF SECTION 09 22 26

SECTION 09 30 00

TILING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Tile for floor applications.
   2. Tile for wall applications.
   3. Ceramic accessories.
   4. Ceramic trim.
   5. Non-ceramic trim.

B. Related Requirements:
   1. Section 07 92 00 - Joint Sealants.
   2. Section 09 21 16 - Gypsum Board Assemblies: Tile backer board.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. American National Standard:
   1. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile - Version; 2013.1.

C. American Society for Testing and Materials (ASTM) International:
   1. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
   2. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2011.

D. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation - Version; 2013.1.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.4 SUBMITTALS

A. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.5 QUALITY ASSURANCE

A. Maintain one copy of and ANSI A108/A118/A136.1 and TCNA (HB) on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum 5 years of documented experience.

C. Installer Qualifications: Company specializing in performing tile installation, with minimum of 5 years of documented experience.

1.6 PERFORMANCE REQUIREMENTS

A. Dynamic Coefficient of Friction: Provide flooring materials with the following values as determined by testing according to ANSI 137.1 DCOF Standard:
   1. On wet interior surface to be walked on when wet:
      a. On level surface: DCOF > 0.42.
      b. On incline surface: DCOF > 0.45.

B. Accessibility Requirements: State of Washington, WAC 51-50-1000, Chapter 10 Means of Egress and WAC 51-50-1100, Chapter 11 Accessibility.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.8 FIELD CONDITIONS

A. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

1.9 COORDINATION

A. Coordinate with Section 03 30 00 for sloping of concrete slab to floor drains or concrete depression for tile setting beds.

B. Coordinate with Division/Section 22 for plumbing penetrations and installations.

1.10 EXTRA MATERIALS

A. Submit extra materials to Owner. Obtain Owner's signed receipt from authorized representative.

B. Provide minimum one full carton for each tile type, color and size. Label containers to show manufacturer/product and where used.

C. Tile Penetrating Sealer: Minimum one gallon in manufacturer's container, unopened, clearly labeled with manufacturer's logo and instructions for use.

D. Maintenance Cleaning Agent: 5 gallons in manufacturer's unopened container, clearly labeled with manufacturer's logo and instructions for use.

1.11 WARRANTY

A. Systems Warranty: Manufacturer’s 10 year Systems Warranty for mortars and grouts.

1.12 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
   1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
   2. Obtain waterproof membrane and crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.

2.2 PRODUCT, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
   1. Provide tile complying with Standard grade requirements.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.3 TILE

A. Manufacturers: All products by the same manufacturer.
   1. American Olean Corporation: www.americanolean.com.

2. Dal-Tile Corporation: www.daltile.com.
3. Substitutions: See Section 01 60 00 - Product Requirements.

B. CT – 1 Wall Tile 1 (TBD).
1. Daltile: Natural Hues.

C. CT -2 Wall Tile 2 (TBD)
1. Daltile: Natural Hues.

D. CT- 3 Wall Tile 3 (TBD)
1. Daltile: Natural Hues.

E. CT-4 Floor Tile (TBD).
1. Daltile: Natural Hues Abrasive Finish.

2.4 TRIM AND ACCESSORIES

A. Ceramic Accessories: Glazed finish, same color and finish as adjacent field tile; same manufacturer as tile.

B. Ceramic Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.
1. Applications:
   a. Open Edges: Bullnose.
   b. Inside Corners: Jointed.
   c. Floor to Wall Joints: Cove base.
2. Manufacturers: Same as for tile.

C. Trim: As indicated, style and dimensions to suit application, for setting using tile mortar or adhesive.
1. Applications:
   a. Open edges of wall tile.
   b. Open edges of floor tile.
   c. Wall corners, outside and inside.
   d. Transition between floor finishes of different heights.
   e. Floor to wall joints.
   f. Borders and other trim as indicated on drawings.
2. Manufacturer:
   a. Schluter-Systems: www.schluter.com.
      1) Slope transition to lower surface conforming to ADA requirement:
         (a) Hard surface transitions: Schlüter-Schiene (Solid stainless steel).
         (b) Carpet transitions: Schlüter-Reno-TK (Solid stainless steel).
      2) Level transition, expansion joints and control joints:
         (a) Edge protection: Schlüter SCHIENE-M
         (b) Inside corner wall to wall and wall to floor transition: Schlüter DILEX-EKE.
         (c) Floor expansion joints: Schlüter-DILEX-KS
         (d) End conditions: Schlüter Dilex-BWA
         (e) Over expansion joints: Schlüter Dilex-BWS

3) Metal edge trim (Type 1): Schlüter, Schiene, EB finish (Brushed stainless steel)
4) Metal edge trim (Type 2): Schlüter, Quadec, EB finish (Brushed stainless steel)
5) Cove trim: Schlüter, Dilex AHK, ACGB finish (Brush chrome anodized aluminum)
6) Tile to tile outside corner trim: Schlüter, Rondec, EB finish (Brushed stainless steel) with end caps

b. Substitutions: See Section 01 60 00 - Product Requirements.

D. Interior expansion joints, joint sealant, and backer material:
1. Conform to TCNA, EJ171. Match colors and textures of grout (sanded and unsanded).
2. Joint Sealants: Silicone sealant and backer as specified Section 079200.

2.5 SETTING MATERIALS

A. Provide setting materials made by the same manufacturer as grout.

B. Latex-Portland Cement Mortar Bond Coat (Thinset): ANSI A118.4.
1. Applications: Use this type of bond coat where indicated and where no other type of bond coat is indicated.
2. Products:
a. Bostik Tile-Mate 760 with Hydroment 447 Flex-A-Lastic Mortar Admixture; www.bostik.com.
b. Custom, MegaLite Modified Thin-Set Mortar; www.custombuidingproducts.com..
c. LATICRETE International, Inc.; LATICRETE 254 Platinum: www.laticrete.com.
d. Mapei; KERABOND Dry Set Mortar with MAPEI 300 KERALASTIC Liquid Polymer Additive, www.mapei.com.
e. Substitutions: See Section 01 60 00 - Product Requirements.

2.6 GROUTS

A. Standard Grout: ANSI A118.6 standard cement grout.
1. Applications: Use this type of grout where indicated .
2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
3. Products:
a. Custom Prism SureColor; www.custombuildingproducts.com.
b. LATICRETE International, Inc.; PermaColor Grout: www.laticrete.com.
c. Mapei, Ultracolor Plus; www.mapei.com.
d. Substitutions: See Section 01 60 00 - Product Requirements.

B. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
1. Applications: Where indicated.
2. Products:
a. Bostik Inc.; EzPoxy 100% Solids Commercial Epoxy, Colored Epoxy Setting and Grout System: www.bostik-us.com.
b. Custom, CEG-Lite 100% Solid Commercial Epoxy Grout (water cleanup); www.custombuildingproducts.com.
c. LATICRETE International, Inc.; LATICRETE SPECTRALOCK PRO Premium Grout: www.laticrete.com.

d. Mapei, Heavy Commercial and Industrial, Kerapoxy IEG; www.mapei.com.
e. Substitutions: See Section 01 60 00 - Product Requirements.

C. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.
1. Applications: Between tile and plumbing fixtures.
2. Product: See Section 07 92 00.

D. Tile and Grout Cleaner: For stained tile and grout. A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
1. Manufacturer/Product: Aqua Mix, Heavy Duty Tile & Grout Cleaner.
2. Substitutions: See Section 01 60 00 - Product Requirements.

E. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
1. VOC Requirements: Meet the VOC requirements of South Coast Air Quality Management District, SCAQMD, Rule 1113.
2. Composition: Water-based formula.
3. Products:
a. Aqua Mix Inc., Sealer's Choice Gold, water-based penetrating sealer (47 g/l).
b. Custom Building Products, TileLab Grout & Tile Sealer (33 g/l.
c. TEC Guard All – Invisible Penetrating Sealer.
d. Substitutions: See Section 01 60 00 - Product Requirements.

2.7 ACCESSORY MATERIALS

A. Mesh Tape: 2-inch wide self-adhesive fiberglass mesh tape.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.

D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within the following limits:
1. Moisture Emission Rate: Not greater than 3 lb per 1000 sq ft per 24 hours, test in accordance with ASTM F1869.
2. Alkalinity (pH): Verify pH range of 5 to 9, test in accordance with ASTM F710.

E. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

3.3 INSTALLATION - GENERAL

A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1A thru A108.13, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Maintain pattern continuous around corners and wall ends. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles coved and external angles bullnosed.

F. Install ceramic accessories rigidly in prepared openings.

G. Install non-ceramic trim in accordance with manufacturer's instructions.

H. Sound tile after setting. Replace hollow sounding units.

I. Keep control and expansion joints free of mortar, grout, and adhesive.

J. Keep expansion joints free of adhesive or grout. Apply sealant to joints.

K. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

L. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

M. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

N. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.4 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over exterior concrete substrates, install in accordance with TCNA (HB) Method F102, with standard grout.

B. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
   1. Use uncoupling membrane under all tile unless other underlayment is indicated.
   2. Where waterproofing membrane is indicated, install in accordance with TCNA (HB) Method F122, with latex-Portland cement grout.
   3. Where epoxy bond coat and grout are indicated, install in accordance with TCNA (HB) Method F131.

3.5 INSTALLATION - WALL TILE

A. Over cementitious backer units install in accordance with TCNA (HB) Method W223, organic adhesive.

B. Over gypsum wallboard on wood or metal studs install in accordance with TCNA (HB) Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.
   1. Where mortar bed is indicated, install in accordance with TCNA (HB) Method W222, one coat method.
   2. Where waterproofing membrane is indicated other than at showers and bathtub walls, install in accordance with TCNA (HB) Method W222, one coat method.

C. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

D. Over metal studs without backer install in accordance with TCNA (HB) Method W241, mortar bed, with membrane where indicated.

3.6 EXPANSION JOINTS AND JOINT SEALANTS

A. Conform to TCNA EJ171 for expansion joint, isolation joint, perimeter joint construction joint, contraction joint, and generic movement joint systems, and provisions of Contract Documents.

B. Install joint sealant and backer rod or bond breaker tape conforming to TCNA EJ171 guidelines.

C. Install continuous control joint around floor perimeters between tile at floor and wall and where tilework abuts other restraining surfaces as necessary to allow independent differential expansion and contraction between floor and wall planes.

D. Install continuous control joint at inside corners of tile faced abutting walls to allow independent differential movement between wall planes.

E. Install sealant at joints at built-in plumbing fixture perimeters of meeting tile.

F. Seal around pipes and other penetrations through tile.

G. Provide expansion/control joints where indicated on Drawings, and as follows:
   1. Interior: 20 feet to 25 feet in each direction.
   2. Exterior: 8 feet to 12 feet in each direction.
   3. Interior tilework exposed to direct sunlight or moisture: 8 feet to 12 feet in each direction.

3.7 CLEANING

A. Clean tile and grout surfaces.

3.8 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION 09 30 00

SECTION 09 51 00

ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Suspended metal grid ceiling system.
   2. Acoustical units.

B. Related Requirements:
   1. Section 07 21 00 - Thermal Insulation: Acoustical insulation.
   2. Division 21 - Fire Suppression Systems
   3. Division 22 - Plumbing
   4. Division 23 - Heating, Ventilating, and Air Conditioning
   5. Division 26 - Electrical

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. ASCE/SEI 7 - Minimum Design Loads for Buildings and Other Structures.

C. American Society for Testing and Materials (ASTM) International:
   1. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.
   2. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 2013.
   3. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2014.
   4. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.

D. Ceiling and Interior Systems Contractors Association (CISCA): Conform to applicable publications. ww.cisca.org.
   1. CISCA - Acoustical Ceilings Use & Practice.
   2. CISCA - Ceiling Systems Handbook.
   3. CISCA - Recommendations for Direct-hung Acoustical Tile and Lay-in Panel Ceilings - Seismic Zones 0-2.
   4. CISCA - Guidelines for Seismic Restraint for Direct-hung Suspended Ceiling Assemblies - Seismic Zones 3 & 4.

E. Northwest Wall and Ceiling Bureau (NWCB), www.nwcb.org.
   1. NWCB 400-101 - Ceiling Systems
   2. NWCB 400-102 - Suspended Ceiling Systems
   3. NWCB 400-401 - Suspension Systems for Acoustical Lay-In Ceilings

F. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.4 SUBMITTALS

A. Product Data: Provide data on suspension system components and acoustical units.

B. Manufacturer's Installation Instructions: Indicate special procedures.

1.5 QUALITY ASSURANCE

A. Fire-Resistive Assemblies: Complete assembly listed and classified by UL (FRD) for the fire resistance indicated.

B. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Installer Qualifications: Company specializing in work of this Section with minimum 5 years documented experience installing commercial quality work of comparable scope.

E. Single Source Responsibility: Acoustical ceiling panels/tiles and ceiling suspension assemblies.
   1. Perform work by or under direct supervision of same installer.
   2. Provide tee bar ceiling grid and acoustical ceiling panels by same manufacturer.

1.6 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: UL Labeled Class A Rated, Flame spread 0-25, tested to ASTM E1264.

B. Acoustical Ceiling System: Conform to IBC Section 808.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original, unopened, protective packaging with manufacturer's labels indicating brand name, pattern, size, and thickness attached and legible.

B. Store cartons and bundles at required temperature and humidity.

C. Do not begin installation until sufficient materials are received to complete the space.

1.8 FIELD CONDITIONS

A. Do not begin installation until gypsum board, painting, and other wet work is dry.

B. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.9 COORDINATION

A. Division 21 for sprinkler system heads located at acoustical ceilings.

B. Division 23 for mechanical penetrations and locations, including grilles and diffusers.

C. Division 26 for electrical penetrations and locations including lighting fixtures, fire detection equipment, and exit signs

1.10 EXTRA MATERIALS

A. Acoustical Ceiling Panels/Tiles: Furnish minimum one full carton of each type, size, and color installed.

B. Deliver extra materials to Owner, packaged for storage at project closeout. Obtain receipt.

1.11 WARRANTY

A. Mineral Fiber Acoustical Ceiling Panels: Manufacturer standard 15 year Warranty against sag, warping, and mold.

B. Ceiling Grid System: Manufacturer standard 15 year Warranty against corrosion, rust, and manufacturing defects.

1.12 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acoustic Panels:
   1. Armstrong World Industries, Inc.: www.armstrong.com.
   2. USG: www.usg.com.
   3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Suspension Systems:
   1. Same as for acoustical units.

2.2 ACOUSTICAL UNITS

A. Acoustical Units - General: ASTM E1264, Class A.
   1. Units for Installation in Fire-Rated Suspension System: Listed and classified for the fire-resistive assembly as part of suspension system.

B. Acoustical Tile Type ACT-1: Painted mineral fiber, ASTM E1264 Type III, with the following characteristics:
   1. Size: 24 by 48 inches.
   2. Thickness: 7/8 inches.
   3. Edge: Beveled tegular.
   4. Surface Color: White.
   5. Basis of Design:
      a. Armstrong, Fine Fissure, High NRC, Product No. 1757.

C. Acoustical Tile Type ACT-2: Same as ACT-1, except:
   1. Size: 24 by 24 inches.
   2. Thickness: 7/8 inches.
   3. Basis of Design:
      a. Armstrong, Fine Fissure, High NRC, Product No. 1756.

2.3 SUSPENSION SYSTEM(S)

A. Design Requirements:
   1. System Design: Prefinished metal modular grid suspension system designed to secure acoustical ceiling panels and integral mechanical and electrical components.
      a. Components: Lock together in a positive manner.
      b. Install to conceal plenum space above acoustical ceiling system and to allow access.
      c. Make provisions for vertical as well as horizontal suspension systems.
   2. Non-Fire Rated Grid: ASTM C635 Heavy Duty Classification (double web steel) exposed Tee with die cut components.
   3. Seismic Lateral Design for Seismic Categories D, E, & F:
      a. Conform to IBC Section 1613 including ASCE/SEI 7 Section 9.6.2.6, for 2 inch closure angle with one end of ceiling grid attached to angle and other end with 3/4 inch clearance of grid to wall and with freedom to slide on closure angle. Other designs, as accepted by Regulatory Authority having local jurisdiction.
      b. Conform to IBC Section 803.9 and ASCE/SEI 7 Section 9.6.2.6.2.2, including requirement for independent support from structure above for light fixture and mechanical services installed into acoustical lay-in panel ceiling systems.
      c. Conform to ASCE/SEI 7 Section 13.5.6.2.2.d for ceiling areas exceeding 2,500 square feet. Provide a seismic separation joints or structural analysis.
   4. Minimum Design Components: Meet or exceed NWCB 400-401 and CISCA Guidelines for Zones 3 & 4 for Seismic Design Categories D, E, or F as defined by Structural Notes.
   5. Main Runners and Cross Runners Pull out Tension: Minimum 180 pounds or twice the actual load whichever is greater, conforming to CISCA Guidelines for Seismic Zones 3 & 4.

B. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.

C. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
   1. Profile: Tee; 15/16 inch wide face.
   2. Construction: Double web.
   3. Finish: White painted.
   4. Basis of Design:
      a. Armstrong, Prelude XL 15/16" Exposed Tee.

2.4 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Hanger Wire: Conform to NWCB 400-401, CISCA, and ASTM C 636.
   1. 12 gauge supported at 4 foot centers. Other spacing as supported by stamped structural calculations.
   2. Galvanized soft-annealed, mild steel.
   3. Pre-stretched, yield stress load of at least 3 times design load.

C. Lateral Seismic Force Bracing: Conform to NWCB 400-401and CISCA Guidelines for Seismic Restraint for Direct-hung Suspended Ceiling Assemblies (Zone 3-4), in Seismic Category D, E, and F.

D. Perimeter Moldings: Same material and finish as grid.
   1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
   2. At Concealed Grid: Provide exposed L-shaped molding.

E. Perimeter Trim at Clouds and Other Floating Edges: Extruded aluminum profiles, factory applied color coating same as grid system, nominal height as indicated on Drawings by 3/4 inch deep channel.
   1. Armstrong Axiom Classic Trim.
   2. USG Compasso.

F. Clip angles and Fasteners: As instructed by manufacturer for installing tee bar directly to structural steel deck ceiling at downward accessible acoustical panel ceiling systems.

G. Acoustical Isolation Hangers: Mason Industry, W30, www.mason-industries.com, specified for type and quality.
   1. Spring and neoprene, suspended ceiling isolation hanger unit with 1.0 inch static deflection.
   2. Designed to separate and isolate hanger wires between structural ceiling and suspended ceiling support system.]

H. Seismic Separation Joint: Commercial quality cold rolled hot dipped galvanized steel, stamped, unfinished, two piece unit w/slots.
   1. Armstrong SJC Seismic Joint Clip.

I. Other Accessories and components: Manufacturer's tee-clips, bracing angles, and as required to complete and reinforce system.

J. Acoustical Insulation: Specified in Section 07 21 00.

K. Gypsum Board: Fire rated type; 5/8 inch thick, ends and edges square, paper faced.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.
   1. Field measure to verify actual conditions, and verify that layout of grid system does not interfere with other work.
   2. Verify that mechanical and electrical work in plenum space above ceiling is complete and that locations of equipment and light fixtures are located and installed.

C. Ceiling installer shall be responsible for verifying with other trades that components to be installed within the ceiling system (recessed light fixtures, etc.) have adequate clearances to be installed where shown on reflected ceiling plans.
   1. Conflicts in the field shall be brought to the attention of the General Contractor and Architect prior to start of ceiling installation.
   2. If ceiling is installed prior to notification of conflicts, the installer shall bear the costs of remediation as determined by the Architect.

3.2 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.

D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

E. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

F. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

G. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

I. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

J. Do not eccentrically load system or induce rotation of runners.

K. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.
   2. Overlap and rivet corners.

L. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.

M. Install light fixture boxes constructed of gypsum board above light fixtures in accordance with fire rated assembly requirements and light fixture ventilation requirements.

3.3 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install units after above-ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

F. Cutting Acoustical Units:
   1. Make field cut edges of same profile as factory edges.

G. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.

3.4 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

C. Maximum deflection for suspension system, including components, hangers, fastening devices, lighting fixtures, ceiling grilles and acoustical panels maximum L/360 of span.

3.5 ADJUSTING

A. Replace damaged units. Touch up minor scratches and spots to match finish with paint recommended by manufacturer.

END OF SECTION 09 51 00

SECTION 09 65 00

RESILIENT FLOORING AND BASE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Resilient tile flooring.
   2. Resilient base.
   3. Installation accessories.

B. Related Requirements:
   1. Section 03 30 00 - Cast-In-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.
   2. Section 03 54 00 - Cast Underlayment.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. American Society for Testing and Materials (ASTM) International:
   1. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2010)e1.
   2. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012)e1.

1.3 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

B. Shop Drawings: Indicate seaming plan.

C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

D. Concrete Testing Standard: Submit a copy of ASTM F710.

E. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of sub-floor is acceptable.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store all materials off of the floor in an acclimatized, weather-tight space.

B. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

C. Protect roll materials from damage by storing on end.

1.5 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.6 WARRANTY

A. Manufacturer: Standard 5 year defect and wear warranty including labor costs for first 3 years and material costs for full 5 years.

1.7 EXTRA STOCK

A. Maintenance Materials: Obtain written receipt when delivered to Owner's Representative. Vinyl Composition Tile: Furnish one carton for each color specified plus one additional carton for each additional 5,000 sf of each color.

1.8 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 TILE FLOORING

A. Vinyl Composition Tile: Homogeneous, with color extending throughout thickness.
   1. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
   2. Size: 12 by 12 inch.
   3. Thickness: 0.125 inch.
   4. Manufacturers:
      a. Armstrong World Industries: www.armstrong.com.
         1) VCT-1: Armstrong Standard Excelon 51861 Soft Warm Grey.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 RESILIENT BASE (RB)

A. Resilient Base: Cove, Type TV Vinyl.
   1. Height: 4 inch.
   2. Length: Roll.
   3. Color: Coffee Bean 04.
   4. Manufacturers:
      a. Flexco; www.flexcofloors.com.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

2.3 FLOOR REDUCER AND TRANSITION ADAPTER STRIPS

A. Carpet Reducer Strips to Resilient Flooring: ADA compliant rolling reducers. Use between carpet and Resilient Flooring:
   1. Roppe, 65, 66, or 67 - Tile Carpet Joiner.
   2. Johnsonite, CTA-XX-H.
   4. BurkeMercer, 152 -Carpet to Resilient Transition.

B. Carpet Reducer Strips to Ceramic Tile: ADA compliant rolling reducers Vinyl reducer adapter.
   1. Roppe, 159 – Carpet to tile joiner.
   2. Johnsonite, CTA-XX-K Carpet to Tile Adapter .
   3. BurkeMercer: 153 Carpet to Tile Reducer.

C. Other Conditions: Suitable for purpose, ADA compliant rolling type as instructed by manufacturer and as accepted by Architect.

2.4 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Primers, Adhesives, and Seaming Materials: Waterproof; types recommended by flooring manufacturer.
   1. Provide only products having lower volatile organic compound (VOC) content than required by the more stringent of the South Coast Air Quality Management District Rule No.1168 and the Bay Area Air Quality Management District Regulation 8, Rule 51.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

B. Verify that floor surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
   1. Verify that concrete slabs comply with ASTM F710 and the following:
      a. Substrates are dry and free of curing compounds, sealers, hardeners and other materials that are incompatible with adhesives bond,
      b. Adhesion Tests: Perform testing by Owner’s special inspector to verity acceptable substrate conditions, conforming to manufacturer’s Warranty provisions, prior to installing work of this Section.
         1) Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.

2) Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:
   (a) Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
   (b) Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.

2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

D. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.

B. Prohibit traffic until filler is cured.

3.3 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install in accordance with manufacturer's instructions.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Fit joints tightly.

E. Set flooring in place, press with heavy roller to attain full adhesion.

F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.

H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.4 TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless manufacturer's instructions say otherwise.

3.5 RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.6 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's instructions.

3.7 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION 09 65 00

SECTION 09 68 00

CARPETING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Carpet.
   2. Accessories.

B. Related Requirements:
   1. Section 03 54 00 - Cast Underlayment.
   2. Section 09 65 00 – Resilient Flooring and Base.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute; 2009.

C. CRI (GLA) - Green Label Testing Program - Approved Adhesive Products; Carpet and Rug Institute; Current Edition.

1.3 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet with minimum three years documented experience.

B. Installer Qualifications: Company specializing In installing carpet with minimum three years experience.

1.5 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

B. Maintain minimum 70 degrees F ambient temperature 24 hours prior to, during and 24 hours after installation.

1.6 WARRANTY

A. Manufacturer: Standard Warranty against edge ravel, delamination of secondary back adhesion, not less than 11 pound tuft bind, and no more than 10 percent face yarn loss by weight of carpet.

1.7 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Carpet: Broadloom.
   1. Tandus Flooring, www.tandus.com.
      a. Product: Antron Legacy Nylon, 18 oz/sy. Face Weight with ER3 Backing.
      b. Style: Runway II.
      c. Color: Blue Velvet.
   2. Substitution: See Section 01 60 00.
B. Walk-off Matt:
   1. Basis of Design: Matsinc – “Connexus Super Nop 52,” or approved.
   2. Surface mount, glue down application.
   3. Solution-dyed polypropylene fiber, 93 ounces per square yard total weight; 52 ounces per square yard pile weight. ½-inch thickness.
   4. Color as selected from manufacturer’s standard line.

2.2 ACCESSORIES

A. Sub-Floor Filler: Type recommended by carpet manufacturer.

B. Tackless Strip: Carpet gripper, of type recommended by carpet manufacturer to suit application, with attachment devices.

C. Carpet Reducer: See Section 096500.

D. Adhesives - General: Compatible with materials being adhered; maximum VOC content of 50 g/L; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable.

E. Seam Adhesive: As recommended by manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

B. Verify that floor surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet.

C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for carpet flooring installation by testing for moisture and pH.
   1. Verify that concrete slabs comply with ASTM F710 and the following:
      a. Substrates are dry and free of curing compounds, sealers, hardeners and other materials that are incompatible with adhesives bond,
      b. Adhesion Tests: Perform testing by Owner's special inspector to verity acceptable substrate conditions, conforming to manufacturer's Warranty provisions, prior to installing work of this Section.
         1) Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
         2) Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:
            (a) Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
            (b) Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.
   2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

D. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Remove debris and clean floor in conformance with manufacturer's instructions

B. Repair subfloor ridges and bumps.
   1. Fill minor holes and cracks over 1/8 inch thick with polymer-modified cementitious underlayment.
   2. Fill depressions and low spots where floor is not level using cementitious underlayment specified Section 03 54 16 or subfloor filler.
   3. Grind ridges or rough areas that may telegraph through carpet.

C. Feather substrate with cementitious underlayment or do such work as necessary for carpet to carpet transition alignment at top surface.

D. Clear debris and deposits from surfaces. Remove adhesives and contaminants from existing concrete floors. Vacuum substrate immediately prior to carpet installation.

E. Apply floor adhesive as instructed by manufacturer to seal concrete surface and make suitable for carpet adhesion.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions, CRI 104, and provisions of Contract Documents.

3.4 CARPET LAYOUT AND FITTING

A. Install carpet tile from same dye lot within each continuous carpet floor area. Remove and replace carpet within continuous areas differing in appearance.

B. Lay out and fit to maintain pattern, texture, and direction of pile within each floor area prior to installation.

C. Extend carpet to cover complete flooring area of each room, including alcoves and closets, unless otherwise indicated.
   1. Install under open-bottomed obstructions, removable flanges, and furnishings.
   2. Center broadloom edges and seams under doors at door jambs.

D. Make cutouts and terminations as needed for complete and finished appearance.

E. Measure area, snap chalk lines, and determine starting point for uniform layout of carpet tile to reduce cutting and eliminate piece less than 1/4 size of full carpet tile width where possible.

F. Cut carpet evenly and accurately to fit neatly at walls, columns, and projections.

G. Cut and join carpet ends in serpentine pattern as necessary to conceal carpet pattern.

H. Do not bridge building expansion joints with continuous carpeting.

3.5 CARPET REDUCER STRIPS

A. Carpet Reducer Strips: Install at carpet edges transitioning to hard flooring surfaces.

3.6 FIELD QUALITY CONTROL

A. Adhesion Tests: Perform testing by Owner’s special inspector to verify acceptable substrate conditions, conforming to manufacturer’s Warranty provisions, prior to installing work of this Section.

1. Moisture Emissions of Concrete Substrate: Verify moisture emissions within range as specified in Section 03 30 00 and as acceptable to manufacturer.
2. Alkalinity of Concrete Substrate: Verify pH factor within range as specified Section 03 30 00 and as acceptable to manufacturer.
3. Notify Owner and Architect in the event of moisture emissions and alkalinity levels exceed the range acceptable to manufacturer.

3.7 ADJUSTING

A. Remove mismatched, non-uniform, and damaged carpet tile and replace with new matching adjacent carpet tile.

B. Remove spots, soiling, and stains or replace with new carpet tile where carpet cannot be put back into new condition.

C. Remove protruding face yarn using sharp scissors.

3.8 CLEANING

A. Remove and dispose of debris and unusable scraps.

B. Vacuum carpet using HEPA filter vacuum cleaner. Replace and dispose of vacuum bags when bag is half full.

3.9 PROTECTION

A. Take measures to protect carpet from soiling and damage prior to Owner occupation.

B. Replace permanently soiled or damaged carpet.

END OF SECTION 09 68 00

SECTION 09 84 13

ACOUSTICAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wall panels and installation components.

1.2 REFERENCES

A. Test Methods:
   1. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
   2. ASTM E 84/CAN/ULC S102 Standard Test Method for Surface Burning Characteristics of Building Materials.
   3. CAN/ULC S102 Standard Test Method for Surface Burning Characteristics of Building Materials.
   4. NFPA 265 (UBC 8-2) Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls

1.3 SUBMITTALS

A. General: Submit according to Section 01 33 00 “Submittal Procedures.”

B. Product Data: Submit manufacturer’s technical data for panel core material, fabric covering, surface covering, and accessories as required.

C. Samples:
   1. Panel Core: Minimum 8 inch x 8 inch sample of panel core material.
   2. Surface Covering: Minimum 3 inch x 3 inch samples of manufacturer’s standard finishes for co-polymer surface covering.
   3. Submit Fabric Sample: 8 inch x 8 inch sample.

D. Certifications: Manufacturer’s certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry Factory Mutual Laboratory classification of NRC.

E. Shop Drawings: Submit shop drawings confirming required dimensions and fasteners for proper installation at each site location. Indicate name of school, specific wall location, and locations of existing items.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver panels to project site in original, unopened packages and store in fully enclosed space, protected against damage from moisture, direct sunlight, and surface contamination.

B. Store panels on flat, stable, dry surface. Do not store on edge.

C. Install panels at room temperature and with stabilized moisture content.

D. Handle panels carefully to avoid damaging edges.

1.5 PROJECT CONDITIONS

A. Suited to environmental conditions as required by manufacturer for successful installation.

1.6 WARRANTY

A. Manufacturer: Submit warranty executed by manufacturer, agreeing to repair or replace acoustical panels that fail due to manufacturer's defects in material or workmanship.
   1. Warranty Period: Three (3) years from date of Substantial Completion.

B. Installer: Submit warranty executed by contractor, agreeing to repair or replace acoustical panel that fail due to installation defects.
   1. Warranty Period: One (1) year from date of Substantial Completion.

1.7 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide panel core material and fabric surface covering from single source manufacturers as indicated for each material.

B. Installer Qualifications: Minimum three (3) years demonstrated installation experience of fabric-covered acoustical panels. Provide documentation substantiating experience prior to commencement of work.

C. Fire Performance Characteristics: Identify with appropriate markings of applicable testing and inspecting organization.
   1. Surface Burning Characteristics: As follows, tested per ASTM E 84, Class A with Flame Spread Rating of 25 or less.

D. Coordination of Work: Coordinate acoustical wall work with other Owner-designated contractors, if any.

1.8 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 - PRODUCTS

2.1 ACOUSTICAL WALL PANEL MANUFACTURER

A. Acoustical Wall Panel: AWP-1.
   1. Wall Technology, Inc. A-100 Series Acoustical Panels, or approved.
      a. Address: 800 Gustafson Road, Ladysmith, WI 54848
      b. Phone: (800) 359-3312
   2. Panel Core Material.
      a. Composition: Semi-rigid acoustical fiberglass
      b. Treatments: Factory protection against rot, fungi, and moisture absorption.
      c. Density: 6-7 pcf
      d. Thickness: 2-inch, unless otherwise indicated on Drawings
      e. Size: As indicated on Drawings
      f. Edge Profile: Square, resin-hardened, unless otherwise indicated on Drawings
      g. NRC: 1.05 Minimum per ASTM C423

B. Acoustical Wall Panel: AWP-2.
   1. Wall Technology, Inc. Rebound Panels, or approved.
      a. Address: 800 Gustafson Road, Ladysmith, WI 54848
      b. Phone: (800) 359-3312
   2. Panel Core Material:
      a. Composition: Semi-rigid acoustical fiberglass
      b. Treatments: Factory protection against rot, fungi, and moisture absorption.
      c. Density: 6-7 pcf
      d. Thickness: 2-inch, unless otherwise indicated on Drawings
      e. Size: As indicated on Drawings
      f. Edge Profile: Square, resin-hardened, unless otherwise indicated on Drawings
      g. NRC: .95 Minimum per ASTM C423 (Panel rating with surface covering)
      h. Surface Cover: 1/16" resilient perforated co-polymer face sheet

C. Fabric.
   1. Surface wrap: 100% post-consumer recycled polyester fabric, weighing approximately 16 ounces per lineal yard, plus or minus .05 ounces; 66 inch minimum usable width.
      a. Manufacturer: Guilford of Maine, or approved.
      b. Pattern: FR701 2100.
      c. Color: FR-1 and FR-2 as indicated on Drawings and as selected by Architect from manufacturer's standards.
      d. Colorfastness to light (AATCC 16 Option 3): 40 hours.
      e. Colorfastness to crocking (AATCC 8): #3 wet and #4 dry.

D. Accessories:
   1. Fabric Adhesive: Non-staining, non-pigmented adhesive as recommended by fabric manufacturer.
   2. Fasteners: Provide Fasteners as follows per existing substrate. See Drawings for fastener spacing – verify with manufacturer recommendations.
      a. Panel Anchors: Rotofast "Standard Anchors," or approved.
         1) Gypsum Wallboard: Provide self-drilling, zinc-coated wall anchors and #8 screws compatible with panel anchor as recommended by manufacturer, Simpson "Sure Wall," "HWA," or approved. Do not exceed allowable load capacities for wall anchors.
         2) Wood: Provide screws compatible with panel anchor as recommended by manufacturer.
      b. Spot Adhesive: Liquid Nails PL200, Chemrex 200, or approved.
         1) Approved locations only.
      c. Field verify existing substrate prior to installation. Notify Architect if conditions do not suit specified anchors.

2.2 ACOUSTICAL WALL PANEL FABRICATION

A. Fabrication:
   1. AWP-1: Apply fabric cover directly over face and edges of panel and return approximately 2-inches on to back of panel to provide full finished edge. Attach

fabric facing to cores to produce installed panels free from waves, wrinkles, sags, blisters, seams, and adhesive.

2. AWP-2: Laminate surface cover over face. Attach fabric cover directly over face and resinhardened edges of panel to produce installed panels free from waves, wrinkles, sags, blisters, seams, and adhesive.

B. Provide fully tailored corners.

C. Provide factory-manufactured notches and edges, unless otherwise noted on Drawings. Coordinate with existing items and clearance requirements for electrical devices – provide 2-inch minimum clearance from devices. Verify factory requirements for notch sizes, coordinate with Architect.

D. Where adhesive fasteners are required, provide chemically hardened resin spots at panel back.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect installation areas to ensure that areas are suited to commencement of work. Wall surface must be dry and free from dirt, grease, loose paint, or any foreign matter that interferes with fasteners. Do not proceed with installation until unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of conditions.

3.2 PREPARATION

A. Measure each wall area and establish layout of acoustical units - coordinate panel layout with existing conditions and mechanical and electrical fixtures.

3.3 INSTALLATION

A. Secure panels per manufacturer’s recommendations with fasteners as approved for existing substrate. Where fastening adhesive is used, secure panels for tight fit until adhesive cures. Comply with working-time requirements for adhesives.

B. Install panels level and plumb, parallel to existing surfaces for optimal appearance. Align edges with other panels and fit adjoining work accurately at borders and penetrations.

1. Maximum gap between existing substrate and panels: 1/16 inch

C. Fabric cover shall not show signs of concealed fasteners or penetrations as required for installation.

D. Where field cutting of panels is approved, perform work in neat and orderly manner. Re-apply fabric cover directly over face and edges of panel and return approximately 2-inches on to back of panel to provide full finished edge. Attach fabric facing to cores to produce installed panels free from waves, wrinkles, sags, blisters, seams, and adhesive.

3.4 ADJUSTING AND CLEANING

A. Clean panels upon completion of installation to remove dust or foreign materials using manufacturer accepted method. Lightly stretch fabric to remove wrinkles.

B. Remove traces of adhesive and construction waste from existing surfaces. Patch existing surfaces as required by Work.

C. Replace damaged and broken panels.

END OF SECTION 09 84 13

SECTION 09 90 00

PAINTING AND COATING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Surface preparation.
   2. Field application of paints, stains, varnishes, and other coatings.
   3. Materials for backpriming woodwork.
   4. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
      a. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
      b. Exposed surfaces of steel lintels and ledge angles.
      c. Mechanical and Electrical:
         1) In finished areas, paint all insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
         2) In finished areas, paint shop-primed items.
         3) On the roof and outdoors, paint all equipment that is exposed to weather or to view, including that which is factory-finished.
         4) Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
         5) Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
   5. Do Not Paint or Finish the Following Items:
      a. Refer to Finish Schedule for rooms or areas not required to be field painted.
      b. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
      c. Items indicated to receive other finishes.
      d. Items indicated to remain unfinished.
      e. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
      f. Non-metallic roofing and flashing.
      g. Stainless steel, anodized aluminum, bronze, terne, and lead items.
      h. Marble, granite, slate, and other natural stones.
      i. Floors, unless specifically so indicated.
      j. Ceramic and other tiles.
      k. Brick, architectural concrete, cast stone, integrally colored plaster and stucco.
      l. Glass.
      m. Acoustical materials, unless specifically so indicated.
      n. Concealed pipes, ducts, and conduits.
      o. Substrates with specified factory-applied colored finishes and normally unfinished substrates:

1) Includes: Door hardware, electrical switch plates, fabrics, tackboards, porcelain enameled metal fabrications, and lighting fixtures.
2) Exception: Wire mold and other normally prefinished items mounted on surfaces receiving coatings: Paint out to match and blend with field surface.

p. Inaccessible materials permanently enclosed behind building construction and structural components.

6. Finishes and colors.

B. Related Sections Include but not limited to the following:
1. Section 03 30 00 - Cast-In-Place Concrete.
2. Section 04 20 00 - Unit Masonry.
3. Section 05 12 00 - Structural Steel Framing.
5. Section 05 50 00 - Metal Fabrications: Shop-primed items.
6. Section 06 16 43 - Gypsum Sheathing: Soffits.
7. Section 06 20 00 - Finish Carpentry.
8. Section 07 84 00 - Firestopping.
9. Section 07 92 00 - Joint Sealants
10. Section 08 11 13 - Hollow Metal Doors and Frames.
11. Section 08 14 16 - Flush Wood Doors
12. Section 08 31 13 - Access Doors and Frames.
13. Section 09 21 16 - Gypsum Board Assemblies.
14. Division 22 - Plumbing.
15. Division 23 - Heating, Ventilating, and Air Conditioning.
16. Division 26 - Electrical.
17. Section 21 05 53 - Identification for Fire Suppression Piping and Equipment: Color coding scheme for items to be painted under this section.
18. Section 22 05 53 - Identification for Plumbing Piping and Equipment: Color coding scheme for items to be painted under this section.
19. Section 23 05 53 - Identification for HVAC Piping and Equipment: Color coding scheme for items to be painted under this section.
20. Section 26 05 53 - Identification for Electrical Systems: Color coding scheme for items to be painted under this section.

1.2 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.

B. Painting:
1. DFT: Dry Film Thickness.
2. WFT: Wet Film Thickness.

1.3 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

C. American Society for Testing and Materials (ASTM) International:
   1. ASTM D523 - Standard Test Method for Specular Gloss.
   2. ASTM D6763 - Standard Guide for Testing Exterior Wood Stains.
   3. ASTM D5324 - Standard Guide for Testing Water-Borne Architectural Coatings.
   4. ASTM D6386 - Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Hardware Surfaces for Painting.
   5. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2012.
   6. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

D. GreenSeal GS-11 - Paints; 2013.

E. SSPC (PM1) - Good Painting Practice: SSPC Painting Manual, Vol. 1; Society for Protective Coatings; Fourth Edition.

1.4 SUBMITTALS

A. Product Data: Provide complete list of all products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
   4. Manufacturer's installation instructions.

B. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.

C. Manufacturer's Instructions: Indicate special surface preparation procedures.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Paint and Coatings: 1 gallon of each color; store where directed.
   3. Label each container with color in addition to the manufacturer's label.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum 10 years experience.
   1. Employ full time locally available technical field representative, testing equipment, and services as necessary to perform inspections and to determine compliance with manufacturer’s instructions and provisions of Contract Documents.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 10 continuous years documented experience and approved by manufacturer, in commercial quality projects of similar type and scope.

1. Employ qualified journeymen painters with apprentices under direction of qualified journeymen, conforming to trade regulations.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

D. Take special safety precautions against hazards from toxic and flammable materials.

E. Place paint and solvent contaminated cloths and materials, subject to spontaneous combustion, in containers and remove from job site each day.

1.7 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.

F. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

G. Ventilation: Maintain continuous air exchange ventilation. Move moisture, odors, and fumes from painting to outside of building.

1.8 EXTRA STOCK

A. Maintenance Materials:
   1. Minimum one gallon of each paint and coating type and color.
   2. Identify each container as to manufacturer, product, color name, and number with minimum 5 inch press type. Tape over with clear tape.
   3. Include manufacturer instructions and MSDS for each product submitted

4. Turn over to Owner prior to project completion. Obtain signed receipt.

1.9 WARRANTY

A. Manufacturer: 5 year materials Warranty.

B. Defects to be included in the warranties are failures due to any of the following:
   1. Adhesion of primer to initial sub-surface and adhesion of coatings within the paint system.
   2. Cracking, crazing, pin-holing or other deterioration of coatings within the paint system.
   3. Color retention less than 99 per cent.
   4. Gloss retention less than 99 per cent or surface hazing.
   5. Improper installation of paint products including film thickness less than required specified thickness.

1.10 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Paints:
   1. Benjamin Moore & Co: www.benjaminmoore.com.
   2. Forrest Paint, www.forrestpaint.com
   3. PPG Architectural Finishes, Inc.: www.ppgaf.com.
   4. Sherwin-Williams Company: www.sherwin-williams.com.
   5. Rodda Paint Company/Cloverdale Paint; www.roddapaint.com.
   6. Tnemec Company; www.tnemec.com.
   7. Wasser High Tech Coating; www.wassercoatings.com.

B. Primer Sealers: Same manufacturer as top coats.

C. Block Fillers: Same manufacturer as top coats.

2.2 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
   1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
   2. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

4. Supply each coating material in quantity required to complete entire project's work from a single production run.
5. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

B. Performance Criteria:
   1. Surface Preparation: Conform to MPI Architectural Painting Specifications Manual, SSPC, manufacturer's instructions, and provisions of this Section for work as needed to prepare substrates to be free of conditions that may impair adhesion and uniformity.
      a. Remove bond breakers, dust, foreign matter, and surface irregularities.
      b. Prepare to prevent bleed-through of substrate material.
   2. Paint System Application: Conform to MPI Architectural Painting Specifications Manual, and manufacturer's instructions.
      a. Paint Grade: Conform to Premium Grade, except as otherwise specified.
         1) Minimum one primer coat and two finish coats, except as otherwise specified.
         2) Additional coats as necessary to cover with no holidays or other surface imperfections.
      b. Dry film thickness (DFT) and wet film thickness (WFT), as instructed by manufacturer.

C. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

D. Volatile Organic Compound (VOC) Content:
   1. Provide coatings that comply with the most stringent requirements specified in the following:
      a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
   2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

E. Flammability: Comply with applicable code for surface burning characteristics.

F. Gloss and Sheen Levels: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
   1. Conform to Gloss and Sheen Level as tested in accordance with ASTM D523, regardless of that stated by manufacturer product data and shown on paint containers.

GLOSS AND SHEEN LEVELS		GLOSS @ 60 DEGREES	SHEEN @ 85 DEGREES
Gloss Level 1	Matt or Flat	Maximum 5 units	Maximum 10 units
Gloss Level 2	Low Sheen/Velvet	Maximum 10 units	10 to 35 units
Gloss Level 3	Eggshell	10 to 25 units	10 to 35 units
Gloss Level 4	Satin	20 to 35 units	Minimum 35 units
Gloss Level 5	Semi-Gloss	35 to 70 units	(N/A)
Gloss Level 6	Gloss	70 to 85 units	(N/A)
Gloss Level 7	High Gloss	More than 85 units	(N/A)

2.3 ACCESSORY MATERIALS

A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin application of coatings until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Arrange for adequate lighting, temporary heat, and ventilation.

D. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

F. Test shop-applied primer for compatibility with subsequent cover materials.

G. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Plaster and Stucco: 12 percent.
   2. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
   3. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
   4. Concrete Floors and Traffic Surfaces: 8 percent.

H. The start of application shall mean the Contractor and Applicator fully accept conditions and substrates for the successful performance of the coating systems.

3.2 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
   1. Conform to: Where in conflict the most stringent shall apply.
      a. MPI - Architectural Painting Specification Manual, Surface Preparation.
      b. SSPC- Surface Preparation Procedures.
      c. Manufacturer instructions.

d. Contract Document provisions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Concrete Surfaces Receiving Translucent Stained Coatings:
1. High Temperature/High Volume Water Blast: Apply180 degree water at 2500 psi and 5 gallon per minute.
2. Remove dirt, loose material, sand particles, loose mortar, scale, laitance, powder, stains, rust, oil, grease, efflorescence, grease, and other bond breakers.
3. Allow concrete 28 day curing period before beginning work.

F. Hot-Dipped Galvanized Steel Treatment: Conform to ASTM D6386 for preparation of galvanized surfaces prior to application of primers and other coatings directly to galvanized surfaces.
1. Newly Galvanized Steel:
   a. Within 48 hours of galvanizing, and before zinc oxide or zinc hydroxide formations on surface, clean surfaces of oil and grease.
   b. Smooth high spots and rough edges by sanding or sweep blasting.
   c. Apply zinc-phosphate treatment or other acceptable adhesion promoter.
2. Partially weathered Galvanized Steel:
   a. Test for and remove chromatic conversion coatings that may have been applied at factory.
   b. Clean surfaces of oil and grease. Smooth high spots and rough edges by sanding or sweep blasting.
   c. Remove wet storage stain using a mild ammonia solution, rinse with water, and air blow dry.
   d. Apply paint coating within 30 minutes before zinc oxides begin to reform or apply zinc-phosphate treatment or other acceptable adhesion promoter.
3. Weathered Galvanized Steel:
   a. After 1-1/2 to 2 years following formation of a hard zinc-carbonate surface, clean surfaces of oil, grease, and loose particles.
   b. Smooth high spots and rough edges by sanding or sweep blasting.
      1) Scuff and brighten using 3M metal finish pad to remove zinc oxidation.
      2) Clean to remove surface contamination, conforming to MPI #25, Etching Cleaner or SSPC-SP-1 Solvent Cleaning and Manufacturer's priming instructions.
4. Verify preparation with manufacturer.

G. Zinc Coat Galvanized Ferrous Metal for Dryfall Coatings and Dryfall Paint at Interior Overhead Ceilings:
1. Rust-Inhibitive (not flash rust-inhibitive), Low-Temperature Cure Dryfall Coatings: Conform to MPI preparation surface preparation methods including solvent cleaning, test for chromate passivation, and etching cleaner.
2. Dryfall Paint (None Rust-Inhibitive): Conform to MPI preparation surface preparation methods including solvent cleaning, test for chromate passivation, and etching cleaner.

H. Uncoated, Ungalvanized, and Existing Ferrous Metals: Power tool clean and prepare in accordance with SSPC-SP-3. Prime by end of same work day and before forming of visible rust.

1. Remove oil, grease, and other foreign substances by lacquer thinner, conforming to SSPC SP-1.
2. Lightly scuff sand with 120 grit paper to break surface sheen without scratching or scaring surface.

I. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-SP 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).

J. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

K. Surfaces Not Previously Shop Primed:
1. Remove Rust and Scale: Power tool clean and prepare, conforming to SSPC-SP-3. Apply prime coat when thoroughly dry and before forming of visible rust.
2. Oil and Grease: Solvent clean, conforming to SSPC-SP-1, before applying finish coat.

L. New Pre-primed and Prefinished Metals: Solvent clean in accordance with SSPC-SP-1.

M. Interior Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

N. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.

O. Priming Wood:
1. Prior to installation, prime all sides of wood, including concealed faces of panels, moldings, siding, and other thin wood, plywood, and panel material subject to warping and bowing.
2. Prime cut ends of wood elements prior to installation.
3. Apply 2 coats of sealer, primer, or suitable finish system to balance finish on exposed face.

P. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.

Q. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with clear sealer.

R. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

S. Mechanical and Electrical Work: Remove dirt, grease, and oil from metal and insulating coverings.

T. Surfaces Not Specified by MPI, SSPC, or Manufacturer’s Instructions: Verify with Architect for surface preparation procedures.

U. Protection:
1. Take measures to protect surfaces not receiving work of this Section including protection from overspray, adjacent surfaces and downwind surfaces.

a. Provide drop cloths, shields, and protective equipment.
b. Repair or replace damaged surfaces caused by failure to provide suitable protection.

2. Remove or mask electrical outlets and switch plates, mechanical diffusers, escutcheons, registers, surface hardware, fittings, fastenings, and other items not receiving coating system.
3. Remove door hardware from doors and frames in preparation for painting.
4. Correct minor defects and clean substrate surfaces included under work of this Section.
5. Remove coatings that exhibit surface defects or unsuitable surface adhesion.

3.3 RECOATING SURFACE PREPARATION

A. Prepare existing coated substrates as needed to make suitable for work of this Section. Proceed as for new work following initial preparation conforming to MPI - Architectural Painting Specification Manual, Surface Preparation, SSPC- Surface Preparation Procedures, manufacturer instructions, and Contract Document provisions.
   1. All glossy surfaces are to be dulled and cleaned of foreign material prior to priming and finishing.

B. Concrete and Masonry:
   1. Remove and clean existing deteriorated painted surface down to sound substrate, suitable for new coatings.
   2. Remove old paint, chalking, laitance, and efflorescence down to bare substrate.
   3. Fill holes and cracks with suitable filler.
   4. For substrates not being recoated, match coloration of material being filled.

C. Metal:
   1. Remove and clean existing deteriorated painted surface down to sound substrate, suitable for new coatings.
   2. Feather edges to prevent telegraphing of surface blemishes through painted surface.
   3. Conform to this Section and Section 09 97 13 for rust removal and touch-up primer.
   4. Prime as necessary to prevent bleed-through of rust.

D. Wood, Prior to Recoating:
   1. Remove and clean existing deteriorated painted surface down to sound substrate, suitable for new coatings.
   2. Sand thick and sharp edges to make feather edge transitions needed to prevent telegraphing through finished paint surface.
   3. Fill and patch checks, blemishes, and deteriorated surfaces.

E. Gypsum Board and Gypsum Based Products:
   1. Fill small holes, crack and dent; sand, and spot prime.
   2. Remove unsound coatings and bond breakers.
   3. Apply bonding agent where patching compound overlaps existing painted surfaces.
   4. Sand and feather edge transitions to eliminate photographing through finished paint surface.
   5. Remove excessive paint build-up to make sharp corners and edges.

3.4 APPLICATION

A. Conform to manufacturer's instructions, MPI - Architectural Painting Specification Manual, and provisions of Contract Documents.
   1. Conform to MPI Premium Grade, including application of two finish coats over prepared and primed substrates.

B. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.

C. Apply products in accordance with manufacturer's instructions.

D. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

E. Apply primer and each finish coat in slightly different hue as means to verify multiple coat coverage.

F. Conform to manufacturer’s instructions for wet film and dry film thickness of coatings.
   1. Apply coatings at manufacturers’ specified application rates. Do not thin coatings.
   2. 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. Apply as many additional coats for complete coverage and for acceptable finished appearance, free of holidays and color irregularities.
   4. Verify wet film thickness (WFT) by use of wet film gauge during application.
   5. Test dry film thickness (DFT) using Tooke or other accepted measuring device

G. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

H. Apply each coat to uniform appearance.

I. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide, free of holidays and color irregularities.

J. Sand wood and metal surfaces lightly between coats to achieve required finish.

K. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

L. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

M. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.5 PATCHING

A. Repair surfaces damaged during construction activities. Touch-up and refinish as necessary for finished appearance prior to Substantial Completion and Owner occupancy.

3.6 REPLACEMENT OF HARDWARE AND MISCELLANEOUS ITEMS

A. Reinstall items previously removed for painting, including hardware, electrical plates.

3.7 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection.

B. Owner will provide field inspection.
   1. Independent Field Inspection and Testing: Conform to Quality Assurance provisions specified this Section and provision of Section for Painting Inspection Services.

C. Dry Film Thickness Testing:
   1. Contractor shall touch up and restore painted surfaces damaged by testing.
   2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

D. Manufacturers Field Services: Conduct inspection services by manufacturer’s local technical field representative.
   1. Attend Pre-Construction Conference, view mock-ups, make intermittent site visits, make final site visit at project completion.
   2. Verify conformance to manufacturer’s instructions and provisions of Contract Documents for products and procedures.
   3. Provide technical assistance to help achieve high quality results.
      a. Verify mil thickness with wet film gauge, in selected locations.
      b. Test surfaces with Tooke or approved dry film gauge, for total DFT in selected areas.
   4. Promptly notify Architect of suspected non-conforming work and other irregularities

3.8 ADJUSTING

A. Take measures as necessary and as instructed by Architect to repair, prepare, and recoat systems not conforming to Contract Document provisions.

3.9 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

B. As Work proceeds, promptly remove spilled, and splattered paint and coating products so as not to damage surfaces.

C. Maintain premises free from unnecessary accumulation of tools, equipment, surplus materials, and debris.

D. At conclusion of work, thoroughly clean paint and coatings from surfaces not designated to be painted.
   1. Do not scratch or damage surfaces.
   2. Verify chemical compatibility of cleaners to materials to be cleaned.

E. Leave premises neat, clean and free from debris and residue from work of this Section.

F. Do not dump paint, stains, chemicals and clean/wash painting equipment anywhere in the landscaping around the building, site, or property, including the adjoining property.

G. Control and dispose of unused painting and coating system products and waste as require by environmental laws.

3.10 PROTECTION

A. Protect finished coatings until completion of project.
   1. Touch-up damaged coatings after Substantial Completion.

3.11 FINISHES AND COLORS

A. Field Painting Product Systems and Gloss Levels: As scheduled in this Section.

B. Paint and Stain Colors: Listing of paint manufacturer's color does not constitute acceptance of paint manufacturer or product.
   1. P-1 – light to medium pastel, as selected by Architect.
   2. P-2 – light to medium pastel, as selected by Architect.
   3. P-3 – light to medium pastel, as selected by Architect.
   4. P-4 – light to medium pastel, as selected by Architect.

C. Gloss and Sheen Levels: As scheduled this Section, and as follows for gypsum board finishes.
   1. Ceilings: Level 2 (Low sheen).
   2. Walls: Level 3 (Eggshell).
   3. Wet Areas (restrooms, janitorial): Level 5 (Semi-Gloss).
   4. See also Paint Coating Schedule for additional materials and coating requirements.

END OF SECTION 09 90 00

PAINTING AND COATING SCHEDULE

1.1 GENERAL

A. Conform to manufacturer's instructions, and provisions of Contract Documents. Where in conflict, assume requirements that are more stringent and verify with Architect.

1.2 EXTERIOR PAINTING SCHEDULE

A. Exterior Concrete: Water based latex type pigmented coating for interior and exterior concrete.
   1. Benjamin Moore, Ultra Spec EXT Flat N447 <40 g/l post tint / Coronado: Supreme 100% Acrylic Flat 8 Line <50 g/l VOC
   2. PPG Architectural Coatings, Speed Hide 100% Arcylic Flat, 6-610XI, <50 g/l VOC
   3. Rodda 511101 CoverCoat AC911 Ext Acrylic Velvet Flat
   4. S-W, A-100, Exterior Latex Flat, A6W16 (49 g/l VOC)

B. Ferrous Metal and Ferrous Metal Subject to Moisture Exposure: Include exterior surfaces of doors and frames at exterior walls, handrails, and other metal surfaces.
   1. Pre-Treatment: SSPC 6 or higher with angular 1-3 mil surface profile. Field Applied Etching Cleaner not required.
   2. Primer:
      a. PPG Amercoat PSX 700, Two component Polysiloxane.
      b. Carboline, Carbozinc 859 Zinc Rich Epoxy 3-5 mils DFT
   3. Two Coats, Epoxy Polysiloxane (Gloss Level 6).
      a. PPG, Amercoat PSX 700 - Two-component Epoxy Polysiloxane.
      b. Carboline, Carboxane 2000 Polysiloxane 4-7 mils DFT
      c. Tnemec, Endura Shield Series 740 UVX

C. Exterior Galvanized and Shop Primed Ferrous Metal: Include interior and exterior surfaces of doors and frames at exterior walls, handrails, and other galvanized metal surfaces.
   1. Pre-Treatment, Preparation, and Shop Primers for Ferrous Metals and Aluminum: As specified under work of Section 055000 and pre-primed metal under work of related Sections.
   2. Pre-Treatment for Steel Doors and Frames: As specified Section 081113.
   3. Field Applied Etching Cleaner: Use in lieu of SP-1 Solvent Cleaning, specified under preparation. Not required for shop primed ferrous metal.
      a. Benjamin Moore, not required
      b. PPG Architectural Coatings, Prep 88 HD Cleaner / Etcher
      c. Rodda Paint, Cloverdale 78100 ClovaClean Surface Conditioner
      d. S-W, Sherwin-Williams, Clean & Etch
   4. Primer: Do not apply alkyd primers or coatings directly to galvanized surfaces. Optional for shop primed ferrous metal.
      a. Benjamin Moore, Benjamin Moore Industrial, Acrylic Metal Primer, P04/Corotech v175 Waterborne Bonding Primer
      b. PPG Architectural Coatings, Pitt-Tech Int/Ext Primer Finish DTM, 90-712
      c. Rodda Paint, Metal Master WB Acrylic Primer, 508901
      d. S-W, Pro Industrial Pro-Cryl Universal Acrylic Primer (<100 g/l VOC)
      e. Tnemec, Uni-Bond, Self-Crosslinking Acrylic, Corrosion-Resistant Primer Series 115
   5. Two Coat, Acrylic Semi-Gloss Finish (Gloss Level 5):
      a. Benjamin Moore, Super Spec HP DTM Acrylic Latex, P29/Coronado Corotech DTM Acrylic Semi-Gloss Enamel V331
      b. PPG Architectural Coatings, Pitt-Tech Plus Int/ Ext Semi Gloss DTM, 90-812
      c. Rodda Paint, Multi Master DTM Acrylic Semi-Gloss Enamel 548901
      d. S-W Pro Industrial High Performance Semi-Gloss Acrylic B66 Series (<50 g/L VOC)

e. Tnemec, Enduratone, HDP Acrylic Polymer, Semi-Gloss, Series 1029 Series 30 Series 1081

D. Exterior Dressed Lumber Smooth Wood and Wood Trim - Paint Finish:
1. Alkyd or Acrylic Primer:
   a. Benjamin Moore, Super Spec Exterior Latex Primer 169/ Coronado 5-11 Grip n Seal Exterior Latex Stain Blocker 116
   b. PPG Architectural Coatings, Seal Grip Int /Ext Alkyd Universal Primer 17-941 NF
   c. Rodda, First Coat Acrylic Primer 501601
   d. S-W, Multi-Purpose Latex Primer B51-450 Series (50 g/L VOC)
2. Two Coat Acrylic - Low Sheen Finish (Gloss Level 2):
   a. Benjamin Moore, Ultra Spec EXT Satin Exterior N448 / Coronado Supreme Acrylic Latex Satin House Paint 408 Line
   b. PPG Architectural Coatings, Speed Hide 100% Acrylic Satin, 6-2045XI
   c. Rodda, CoverCoat AC 909 Satin Ext. Acrylic Latex, 521101.
   d. S-W, A-100 Exterior Satin Latex 82W510 (49 g/L VOC)

1.3 INTERIOR PAINTING SCHEDULE

A. Interior Ferrous Metal - Paint Finish:
1. Shop Primer Coat: Refer to Section 055000 for metal shop fabrications.
2. Touch-Up / Field Primer: White or Gray color. Red primer not accepted.
   a. Benjamin Moore, Super Spec HP Acrylic Metal Primer, P04 / Coronado Corotech Acrylic Metal Primer V110
   b. PPG Architectural Coatings, Pitt Tech Int/ Ext Primer Finish DTM, 90-724
   c. Rodda Paint, Metal Master Primer, 508901
   d. S-W, Pro Industrial Pro-Cryl Universal Primer B66W310 (<100 g/l VOC)
   e. Tnemec, Uni-Bond DF, Self-Crosslinking Hydrophobic Acrylic, Series 115 (140 g/l VOC)
3. Two Coat, Acrylic Semi-Gloss Finish (Gloss Level 5):
   a. Benjamin Moore, Super Spec HP Acrylic DTM SG P29/ Coronado Corotech Acrylic Semi-Gloss Enamel V331
   b. PPG Architectural Coatings, Pitt Tech Plus Int/Ext DTM Semi Gloss, 90-1210
   c. Rodda Paint, 548901 Multi Master DTM Semi Gloss Enamel.
   d. S-W, Pro Industrial High Perfomance Acrylic Semi-Gloss, B66 Series (<50 g/L VOC)
   e. Tnemec, Enduratone, HDP Acrylic Polymer, Semi-Gloss, Series 1029 (<94 g/l VOC)

B. Interior Paint Finished Wood and Hardboard:
1. Acrylic Primer:
   a. Benjamin Moore, Moorcraft Super Spec Latex Enamel Undercoater & Primer Sealer, 253 / Coronado Grip & Seal Acrylic Undercoat 116-11
   b. PPG Architectural Coatings, Seal Grip Int/ Ext Acrylic Universal Primer, 17-921
   c. Rodda, Unique II 100% Acrylic Enamel Undercoater 502001
   d. S-W, PrepRite ProBlock Int/Ext Latex Primer Sealer White B51 Series (96 g/l VOC)
2. Two Coat Acrylic Flat Finish (Gloss Level 1):
   a. Benjamin Moore, Super Hide Zero Flat 356/ Coronado Super Kote 5000 Latex flat Wall 28 Line
   b. PPG Architectural Coatings, Speedhide Interior Latex Flat, 6-70
   c. Rodda Paint, 513601 Master Painter Ultra Low VOC Flat.
   d. S-W, ProMar 200 Zero VOC Flat, B30-2600
3. Two Coat Acrylic Satin Finish (Gloss Level 4):
   a. Benjamin Moore, Ultra Spec 500 Semi-Gloss N539
   b. PPG Architectural Coatings, Ultra-Hide 150 Interior Lo Lustre Paint, 1433G
   c. Rodda, Master Painter Low Gloss, 533101

   d. S-W, ProMar 200 Interior Latex Semi-Gloss, B31W02651
4. Two Coat Acrylic Semi-Gloss Finish (Gloss Level 5):
   a. Benjamin Moore, Ultra Spec 500 Semi-Gloss N539/ Coronado SuperKote 5000 Acrylic Semi-Gloss Enamel 32 Line
   b. PPG Architectural Coatings, Speedhide Interior Latex Semi Gloss, 6-500
   c. Rodda, Cloverdale 542001 Unique II Semi-Gloss Enamel
   d. S-W, Pro Industrial High Performance Semi-Gloss Acrylic B66 Series (<50 g/L VOC)

C. Interior Clear Transparent Finished Wood: Three-Coat Finish. Sanding sealer and Stain as instructed by manufacturer to match Architect's sample.
1. Satin (Gloss Level 4)
   a. Benjamin Moore Stays Clear, Satin, 423 / Coronado: LenMar Aqua Plastic Urethane Acrylic Varnish Satin 1WB.1427
   b. PPG Architectural Coatings, Olympic Interior WB Satin Polyurethane Clear, 42784
   c. Rodda, Cloverdale 59314 Waterborne Alkyd Varnish Satin.
   d. S-W, Minwax Polycrylic Water-Based Protective Finish Satin Clear (275 g/l VOC)

D. Interior Wood Panels for Electrical and Data Backboards – Paint Finish: Leave one plywood grade stamp and fire rating label unpainted and visible.
1. Pigmented fire retardant coating, (Gloss Level 1) (Matt) (ULC rated).
2. Two Coats:
   a. Benjamin Moore, Coronado Insl-x Fire Retardant Paint LFR-1100
   a. PPG Architectural Coatings, Flame Control Intumescent Fire Retardant/ Glidden Professional Safecoat, Interior Flat Intumescent Fire Retardant
   b. Rodda Paint, Muralo 1500 Intumescent Latex Fire Retardant.
   c. S-W, Flame Control, Flat Intumescent Fire Retardant

E. Interior Gypsum Board and Plaster - Low Odor (Low VOC) Paint:
1. Primer
   a. Benjamin Moore, Ultra Spec 500 Interior Primer N534/ Coronado Super Kote 5000 Latex Primer Sealer 40-11
   b. PPG Architectural Coatings, Speedhide Latex Sealer QD, 6-2
   c. Rodda Paint, 502701 Roseal II 0 VOC Interior Latex Wallboard Sealer
   d. S-W Contractor's 152 Pro Primer Interior Latex, B28WF0152 (<50 g/L VOC)
2. Flat (Gloss Level 1):
   a. Benjamin Moore, Super Hide Zero VOC Flat 355/ Coronado Super Kote 5000 Latex flat Wall 28 Line
   b. PPG Architectural Coatings, Speedhide Interior Zero VOC Flat, 6-4110
   c. Rodda Paint, 513601 Master Painter Ultra Low VOC Flat Wall Paint.
   d. S-W ProMar 200 Zero VOC Int Latex Flat, B30-2600 Series
3. Eggshell (Gloss Level 3):
   a. Benjamin Moore Super Hide Zero VOC Eggshell 357 Coronado Super Kote 5000 Latex Eggshell 30 Line
   b. PPG Architectural Coatings, Speedhide Interior Zero VOC Egg shell, 6-4310
   c. Rodda Paint, Cloverdale 90783 Horizon Interior Pearl Latex Wall Paint.
   d. S-W ProMar 200 Zero VOC Int Latex Eg-Shel, B20-2600 Series
4. Satin (Gloss Level 4):
   a. Benjamin Moore,. Super Hide Zero VOC Semi-Gloss 358/ Coronado Super Kote 5000 Interior Latex Satin 1160
   b. Kelly-Moore Acryplex Interior Satin Enamel 1640, (<100 g/l VOC)
   c. PPG Architectural Caotings, Mannor Hall Int. Pearl Acrylic, 85-6
   d. Rodda Paint, 533101 Master Painter Low Gloss.
   e. S-W ProMar 200 Zero VOC Int Latex Semi-Gloss, B31-2600 Series.
5. Semi-Gloss (Gloss Level 5):

a. Benjamin Moore, Ultra Spec 500 Interior Gloss N539/ Coronado: Super Kote 5000 Interior Latex Semi-Gloss 32 Line
b. PPG Architectural Coatings, Speedhide Interior Zero VOC Semi Gloss 6-4510
c. Rodda Paint, 543601 Master Painter Ultra Low VOC Semi Gloss Enamel
d. S-W ProMar 200 Zero VOC Int Latex Semi-Gloss, B31-2600 Series

F. Interior Gypsum Board - Utility Areas: Includes walls and ceilings of areas subject to moisture such as toilet rooms, janitor closets, and other utility areas subject to moisture.
1. Acrylic Primer:
a. Benjamin Moore, Ultra Spec 500 Interior Primer N534/ Coronado Super Kote 5000 Latex Primer Sealer, 40-11
b. PPG Architectural Coatings, Speedhide Int. Latex Sealer QD, 6-2
c. Rodda Paint, 502701 Roseal II 0 VOC Wall Board Primer
d. S-W, ProMar 200 Zero VOC Primer B28 Series
2. Two Coat Acrylic Semi-Gloss Finish (Gloss Level 5):
a. Benjamin Moore, Ultra Spec 500 Interior Semi Gloss N539/ Coronado Super Kote 5000 Acrylic Semi-Gloss Enamel 32 Line
b. PPG Architectural Coatings, Speedhide Int Latex Semi Gloss, 6-500
c. Rodda Paint, 543601 Master Painter Ultra Low VOC Semi-Gloss Enamel.
d. S-W, ProMar 200 Zero VOC Semi-Gloss, B31-2600

1.4 EXPOSED MECHANICAL AND ELECTRICAL WORK IN FINISHED SPACES

A. Ferrous Metal Ducts, Exposed Piping, and Conduit (Except Stainless Steel): As specified this Section for ferrous metal - paint finish.

B. Exposed Galvanized Ducts, Piping, and Conduit:
1. Acrylic Primer: Gray color. Red primer not accepted.
a. Benjamin Moore, Super Spec HP Acrylic Metal Primer P04 / Coronado Insul-x Aqualock Primer
b. PPG Architectural Coatings, Pitt Tech Int / Ext Primer Finish DTM, 90-712
c. Rodda Paint, 508901 Metal Master Primer
d. S-W, DTM Primer/Finish, B66W1 (<150 g/l VOC)
e. Tnemec, Uni-Bond DF, Self-Crosslinking Waterborne Acrylic, Series 115. (<140 g/l VOC)
2. Two Coat Acrylic Semi-Gloss Finish (Gloss Level 5):
a. Benjamin Moore, Super Hide Zero VOC Semi-Gloss 358 / Coronado Super Kote 5000 Semi-Gloss 32 Line
b. PPG Architectural Coatings, Speedhide Int Latex Semi Gloss, 6-500
c. Rodda Paint, 548901 Multi Master DTM Semi Gloss Enamel
d. S-W ProMar 200 Zero VOC Int Latex Semi-Gloss, B31-2600 Series

C. Inside of Ducts, Where Visible from Room:
1. Same treatment as specified for galvanized and ferrous metal surfaces.
2. Two Coat Acrylic Flat Finish: As specified this Section for each materials. Dull black color.

END OF SECTION

SECTION 10 11 01
VISUAL DISPLAY BOARDS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Marker boards.

B. Related Requirements:
   1. Section 06 10 00 – Rough Carpentry.
   2. Section 06 20 00 – Finish Carpentry.
   3. Section 09 21 16 – Gypsum Board Assemblies.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. ANSI A208.1 - American National Standard for Particleboard; 2009.

C. American Society for Testing and Materials (ASTM) International:
   1. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2009a.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Provide work of this Section under direction of a single manufacturer, supplier, or fabricator.

1.4 COORDINATION

A. Conform to Section 01 31 00 for coordination with work of other Sections.

B. Coordinate with Section 06 10 00 and Section 09 22 16, for solid continuous wall backing behind gypsum board finishes to support work of this Section.

1.5 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Visual Display Boards:
   1. Best-Rite Deluxe Porcelain Steel Markerboard.

2.2 VISUAL DISPLAY BOARDS

A. Markerboards: Porcelain enamel on steel, laminated to core.
   1. Color: White.
   2. Metal Face Sheet Thickness: 28 gauge.
   3. Core: 7/16-inch thick MDF, laminated to face sheet, made with binder containing no urea formaldehyde.

4. Size: As indicated on drawings.
5. Frame: Extruded aluminum, with concealed fasteners.
6. Frame Finish: Anodized, natural.
7. Accessories: Full-length accessory tray with dura-safe rubber end caps. No map rail.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify conditions ready to receive work of this Section before beginning.

B. Verify installation of wood or sheet metal backing for support of visual display boards.

C. Verify substrate surfaces structurally sound, smooth, clean and dry.

3.2 INSTALLATION

A. Conform to manufacturer's instructions and provisions of Contract Documents.

B. Install continuous wall mounted mounting rails or clips, and bottom clip angles with screws into solid backing. Locate as necessary to prevent bowing or sagging of panels.

C. Set plumb, level and true and in alignment with other units and adjacent construction.

3.3 CLEANING

A. Upon completion, clean marker board surfaces. Leave free form defects at time of final acceptance.

3.4 ADJUSTING

A. Reinstall maker boards out of alignment or not plumb.

END OF SECTION 10 11 01

SECTION 10 11 46
VISUAL DISPLAY FABRICS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Field installed tackable wall surfaces.

B. Related Sections:
1. Section 06 10 00 - Rough Carpentry
2. Section 06 20 00 - Finish Carpentry
3. Section 09 21 16 - Gypsum Board Assemblies
4. Section 09 22 16 - Non-Structural Metal Framing

1.2 REFERENCES

A. Reference Standards: Current edition at date of Bid.

B. American Society for Testing and Materials (ASTM) International:
1. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

A. Product Data: Published descriptive literature for each specified visual display surface type.

B. Samples: 6 inch by 6 inch samples of each type and color specified.

C. Manufacturer's Instructions: Include mounting instructions, limitations, and conditions requiring special procedures.

1.4 QUALITY ASSURANCE

A. Fabricator and Installer Qualifications: Company specializing in work of this Section with not less than 5 years documented experience.

1.5 DELIVERY, STORAGE. AND HANDLING

A. Deliver in protective packaging, clearly labeled with manufacturers name and product.

B. Do not deliver until building is fully enclosed and environmentally conditioned.

1.6 COORDINATION

A. Conform to Section 01 31 00 for coordination with work of other Sections.

B. Coordinate with Section 09 22 16 for gypsum board finishes to support work of this Section.

C. Coordinate with Section 09 90 00 for paint finishes of this Section.

1.7 WARRANTY

A. Tackable Wall Surface: Full repair or replacement warranty for 5 years, against color fading, crazing, cracking, and flaking of surface.

1.8 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 TACKABLE WALL SURFACE MANUFACTURER

A. Conwed Designscape | Wall Technology Respond® TK/AC Acoustical Panels, or approved.
   1. Construction: Single core of dimensionally stable mineral fiber board.
   2. Core Mineral Fiber Density: 16.8 pcf and 22 pcf.
   3. Core Materials: Maximum 0.1 percent hygrometric expansion from 50 - 90 percent RH.
   4. Recycled Content: For mineral fiber board, 50 percent total; 32 percent pre-consumer recycled content, 18 percent post-consumer recycled content.
   5. Core Thickness and Density: 5/8 inch, 22 pcf.
   6. Manufacturing Tolerances: Standard +/- 1/16 inch for width and length.
   7. Width: As noted on Drawings.
   8. Length: As noted on Drawings.
   9. Edge Profile: Square.
   10. Corners: Square.
   11. Finish: Manufacturer, pattern and color as noted under 2.3 below; applied directly over face and edges of panel and returned to back of panel to provide full finished edge; corners fully tailored.
   12. Mounting Type: Adhesive / Resin (perimeter adhesive).
   13. Flammability (ASTM E 84): Panel components shall have a Class “A” rating per ASTM E 84.
   14. Acoustical Performance: Values below are for panels mounted in accordance with ASTM C 423 (Type D5 Mounting) and vary by panel thickness and finish.

2.2 MOUNTING SYSTEMS

A. Tackable Wall Fabric Adhesives: As recommended by manufacturer.

2.3 FINISHES

A. Tackable Wall Surfaces:
   1. TWP-1: Koroseal Wallcoverings, Desert Sand. Color: As selected by Architect from manufacturer’s standards.

PART 3 EXECUTION

3.1 EXAMINATION

A. INSTALLATION
   1. Secure panels per manufacturer’s recommendations with fasteners as approved for existing substrate. Where fastening adhesive is used, secure panels for tight fit until adhesive cures. Comply with working-time requirements for adhesives.
   2. Install panels level and plumb, parallel to existing surfaces for optimal appearance. Align edges with other panels and fit adjoining work accurately at borders and penetrations.
   3. Maximum gap between existing substrate and panels: 1/16 inch

4. Fabric cover shall not show signs of concealed fasteners or penetrations as required for installation.
5. Where field cutting of panels is required, perform work in neat and orderly manner. Re-apply fabric cover directly over face and edges of panel and return approximately 2-inches on to back of panel to provide full finished edge. Attach fabric facing to cores to produce installed panels free from waves, wrinkles, sags, blisters, seams, and adhesive.

3.2 ADJUSTING AND CLEANING

A. Clean panels upon completion of installation to remove dust or foreign materials using manufacturer accepted method. Lightly stretch fabric to remove wrinkles.

B. Remove traces of adhesive and construction waste from existing surfaces. Patch existing surfaces as required by Work.

C. Replace damaged, broken, wrinkled, and blistered panels.

END OF SECTION 10 11 46

SECTION 10 14 00

SIGNAGE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Room and door signs.

1.2 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. ICC A117.1 - Accessible and Usable Buildings and Facilities; International Code Council; 2009 (ANSI).

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Include published literature to describe manufactured products and components. Include installation instructions where applicable.

C. Shop Drawings: Show layout, dimensions, letter font and style, materials, finishes, mounting details, anchoring methods, support systems, components, fittings, and parts required for complete installation, for each sign.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.5 FIELD CONDITIONS

A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.

B. Maintain this minimum temperature during and after installation of signs.

1.7 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 SIGNAGE APPLICATIONS

A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.

B. Room and Door Signs: Provide a sign at each opening identified in Drawings.
   1. Sign Type: Flat signs with engraved panel media as specified.
   2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
   3. Character Height: Match existing.
   4. Sign Size: As indicated on Drawings.
   5. Office Doors: Identify with room numbers to be determined later, not the numbers shown on the drawings; in addition, provide "window" section for replaceable occupant name.
   6. Conference and Meeting Rooms: Identify with room numbers to be determined later, not the numbers shown on the drawings.
   7. Service Rooms: Identify with room names and numbers to be determined later, not those shown on the drawings.
   8. Rest Rooms: See Drawings.

2.2 SIGN TYPES

A. Flat Signs: Acrylic Signage media without frame.
   1. Edges: Square.
   2. Corners: Square.
   3. Wall Mounting of One-Sided Signs: Tape adhesive.

B. Color and Font: Unless otherwise indicated:
   1. Character Font: To match existing.
   2. Character Case: Upper case only.
   3. Background Color: To match existing.
   4. Character Color: To match existing.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install neatly, with horizontal edges level.

C. Locate signs where indicated:
   1. Room and Door Signs: Locate on wall at latch side of door with centerline of sign at 60 inches above finished floor. Review mounting heights and locations with Architect during submittal review.
   2. If no location is indicated obtain Owner's instructions.

D. Protect from damage until Substantial Completion; repair or replace damage items.

END OF SECTION 10 14 00

SECTION 10 14 63

ELECTRONIC MESSAGE SIGNAGE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Exterior aluminum reader board mounted on steel poles with concrete footing.

B. Related Sections:
1. Section 03 10 00 - Concrete Forming
2. Section 03 30 00 - Cast-In-Place Concrete
3. Section 05 50 00 - Metal Fabrications

C. Alternate: Refer to Section 01 23 00 for possible effect upon Work of Section.

1.2 REFERENCES

A. Reference Standards: Current edition at date of Bid.

B. American Society for Testing and Materials (ASTM) International:
1. ASTM A36 - Specification for Carbon Structural Steel.
2. ASTM A123 - Specification for Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products
3. ASTM A500 - Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
4. ASTM A501 - Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
5. ASTM B209 - Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
6. ASTM B221 - Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.3 SUBMITTALS

A. Submit under provision of Section 01 33 00.

B. Shop Drawings: Dimensioned elevations, framing layout, and details, illustrating, components, joints, fastening, anchoring, finishes, lettering layout, graphics, and as necessary for completion.

C. Product Data: Published literature describing physical characteristics of manufactured materials and products, user manuals and Training Guide.

D. Sample Warranty: Meet or exceed provisions specified by this Section.

1.4 QUALITY ASSURANCE

A. Provide manufacturing, fabrication, and installation under single source responsibility.

1.5 QUALIFICATIONS

A. Sign Manufacturer/Fabricator/Installer:
1. Company specializing in work of this Section, regularly engaged for minimum 5 year period in fabrication site signs of type and scope specified by this Section.

2. Accomplished technician skilled in sign graphics and letter design as necessary to achieve consistent and optically correct appearance.

1.6 DELIVERY STORAGE AND HANDLING

A. Conform to manufacturer's/fabricator’s instructions.

B. Do not deliver to site until immediately prior to installation.

C. Deliver sign in protective packaging bearing identifying labels as to manufacturer/fabricator and contents.

D. Store and handle away from construction activities and as necessary to prevent marring, staining, denting, and other damage.

1.7 COORDINATION

A. Section 05 50 00 for structural steel framing for support of exterior readerboard.

B. Section 03 30 00 for cast-in or built-in anchors and mounting hardware cast into concrete foundation. Provide templates to locate anchor bolts and mounting hardware by other Sections.

1.8 WARRANTY

A. Manufacturer/Fabricator: Provide 5 year Warranty against defective workmanship and installation.

1.9 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer/Product: Optec, full color, RGB LED Sign, www.optec.com.
1. I.D. Sign:
   a. Painted aluminum cabinet, approximate size 15" x 120"
   b. Double Sided with School name and Logo.
   c. Internally illuminated with high output fluorescent lamps.
2. LED Display:
   a. Painted aluminum cabinet, approximate size 21" x 120"
   b. 16 mm, 3-Lines.
   c. Double Sided Display.
   d. 16 x 144 matrix RGB LED displays.
3. Support:
   a. Steel Poles with Concrete Footings
   b. 11'-6" Overall Height.
4. Covers:
   a. Provide hinged Lexan covers, both sides of ID and LED signs.

B. Substitution: Conform to provisions of Section 01 60 00.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify conditions ready to receive work of this Section before beginning.

3.2 INSTALLATION

A. Install in accordance with provisions of Contract Documents. Where in conflict with more suitable methods, verify with Architect before beginning work.

B. Install level, plumb, aligned with adjacent construction, and as indicated for height and location.

C. Make welded connections, except where mechanical or other connections are necessary.

3.3 TOLERANCES

A. Sign Face Panel and Exposed Components: Free of warps, buckles, distortions, opening up of joints, and signs of stress at welds and connections.

B. Installation: Plumb, level, and true. Maximum to 1/8 inch variation between top and bottom of sign.

3.4 ADJUSTING

A. Repair damaged signs and finishes to conceal evidence of corrective work, or replace with new, as instructed by Architect.

B. Make repairs and adjustments for fabrication not conforming to specified requirements as instructed by Architect.

3.5 CLEANING

A. Leave premises clean, free from residue due to work of this Section.

B. Clean sign face and exposed components using water, soft cloth, mild detergent to prevent scratching and damage to finish.

3.6 PROTECTION

A. Protect signs from damage during Work of this Contract, prior to Owner occupancy.

3.7 TRAINING

A. Provide web based training with onsite assistance for sign operation.

END OF SECTION 10 14 63

SECTION 10 21 13.19

PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Phenolic toilet compartments.
   2. Urinal screens.

B. Related Requirements:
   1. Section 06 10 00 – Rough Carpentry.
   2. Section 10 28 00 – Toilet, Bath and Laundry Accessories.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. American Society for Testing and Materials (ASTM) International:
   1. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
   2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

C. American National Standards (ANSI): ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities.

D. National Electrical Manufacturer’s Association (NE MA): NEMA LD3 - High Pressure Decorative Laminate

1.3 ADMINISTRATIVE REQUIREMENTS

1.4 SUBMITTALS

A. See Section 01 33 00 - Administrative Requirements, for submittal procedures.

B. Manufacturer’s product data and installation instructions.

D. Shop drawings indicating location, dimension, and details for each condition.

E. Material samples: Two (2) each minimum 3”x3” square samples for each color from manufacturer’s standard options.

1.5 QUALIFICATIONS

A. Manufacturer and Installer: Company specializing in work of this Section with minimum 5 years documented experience performing commercial work.

1.6 REGULATORY REQUIREMENTS

A. ADA Requirements: Conform to IBC Chapter 11, ICC/ANSI A117.1, and provisions of regulatory authority having jurisdiction.

B. Fire Rating: IBC Section 803.1 Class B, tested to ASTM E84.
   1. Flame Spread Index: Less than 75.
   2. Smoke Developed: Less than 450.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver in manufacturer's original unopened protective packaging clearly labeled as to brand name, contents, color, stock number, and order number on each package.

B. Verify undamaged condition before acceptance at Site

C. Store products in original packaging, flat, dry, well ventilated, under protective cover.

1.8 COORDINATION

A. Conform to Section 01 31 00 for coordination with work of other Sections.

B. Section 01 61 00 for solid lumber backing and Section 09 22 16 for solid framing for support of work of this Section.

C. Section 10 28 13 for sanitary napkin dispenser cutouts, toilet paper holders, grab bars, and other accessories mounted to toilet partitions.

1.9 WARRANTY

A Manufacturer: Minimum 25 year Warranty against defects in materials and workmanship, including warping and delamination of partition panels.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Phenolic Toilet Compartments:
   1. Bobrick, www.bobrick.com.
   2. Substitutions: See Section 01 60 00.

2.2 PHENOLIC TOILET COMPARTMENTS

A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid phenolic core panels with integral melamine finish, floor-mounted headrail-braced.

B. Doors:
   1. Thickness: 3/4 inch.
   2. Width: 24 inch, in-swing.
   3. Width for Handicapped Use: 36 inch, out-swinging.
   4. Height: 58 inch.

C. Panels:
   1. Thickness: 3/5 inch.
   2. Height: 58 inch.

D. Pilasters:
   1. Thickness: 1 inch.
   2. Width: As required to fit space; minimum 3 inch.

E. Screens: Without doors; to match compartments; mounted to wall with two panel brackets .

2.3 ACCESSORIES

A. Pilaster Shoes: Formed ASTM A666, Type 304 stainless steel with No. 4 finish, 4 in high, concealing floor fastenings.
   1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.

B. Head Rails: Hollow anodized aluminum, 1 x 1-1/2 inch size, with anti-grip profile and cast socket wall brackets.

C. Pilaster Brackets: Polished stainless steel.

D. Wall Brackets: Continuous type, polished stainless steel.

E. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.

F. Hardware: Polished stainless steel:
   1. Pivot hinges, gravity type, adjustable for door close positioning; two per door. Minimum 8 inch tall.
   2. Door Latch: Slide type with exterior emergency access feature.
   3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
   4. Coat hook with rubber bumper; one per compartment, mounted on door.
   5. Provide door pull for outswinging doors.

2.4 FABRICATION

A. Conform to following and ICC/ANSI A117.1for ambulatory accessible and wheelchair accessible compartments.

B. Type: Floor mounted, overhead braced.

C. Toilet Compartment Dimensions:
   1. Bottom of Panel: 12 inch above floor.
   2. Top of Panel: 70 to 72 inch above floor.
   3. Compartment Width: As shown on Drawings, except no less than 34 inches on center.

D. Toilet Compartment Doors: Minimum 24 inch wide, swing-in, except minimum 36 inch wide swing out doors at accessible compartments. Doors to stand slightly open when not in use.

E. Stabilizer Bars: 3 inch wide by 1 inch phenolic panel lateral bracing between compartments, mounted continuously across front of toilet compartments and fastened into pilasters.

F. Pilasters: Cover floor mounted anchoring devices with pilaster shoe. Make maximum width to suit installation clearances. 8 to 12 inches preferred.

2.5 URINAL SCREEN FABRICATION

A. Flush Type Screens: 18 inch wide by 42 inch high panels, wall mounted with specified mounting brackets and fasteners with security heads.

2.6 FINISHES

A. Toilet Partitions: Bobrick

B. Color: As selected from manufacturer’s standards.

C. Partition edge: Black or brown phenolic core, polished smooth, eased.

D. Stainless Steel: No. 4 Satin finish.

E. Aluminum: Clear Anodized.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

3.2 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.3 TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.

B. Maximum Variation From Plumb: 1/8 inch.

3.4 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

END OF SECTION 10 21 13.19

SECTION 10 26 01

WALL AND CORNER GUARDS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Corner guards.

B. Related Requirements:
   1. Section 061000 - Rough Carpentry Blocking for wall and corner guard anchors.
   2. Section 092116 - Gypsum Board Assemblies.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. American Society for Testing and Materials (ASTM) International:
   1. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Conform to provisions of Section 01 65 00 and manufacturer's instructions to prevent damage of materials and finishes.

B. Deliver in manufacturer’s protective packaging with manufacturer identifying labels intact.

1.4 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Corner Guards - Surface Mounted: Extruded one-piece unit without splices, installed with adhesive.
   1. Material: Type 304 stainless steel, No. 4 finish.
   2. Thickness: 16 gauge, 0.06 inch.
   3. Width of Wings: 1 1/2 inches.
   4. Styles: Provide 90 degree corners and wall end protectors.
   5. Products:
      a. InPro Corporation Stainless Steel Surface Mount Corner Guards, 180.
      b. The C/S Group, CO-8.
      c. Pawling Corporation, Pro-Tek CG-50.

d. Koroseal, Stainless Steel.
e. Balco, Inc., Stainless Steel.
f. Substitution: See Section 01 60 00.

2.2 FABRICATION

A. Fabricate components with tight joints, corners and seams.

B. Pre-drill holes for attachment.

C. Form end trim closure by capping and finishing smooth.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.

B. Verify that field measurements are as indicated on Drawings.

3.2 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.

B. See Drawings for height and locations.

3.3 TOLERANCES

A. Maximum Variation From Required Height: 1/4 inch.

B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

END OF SECTION 10 26 01

SECTION 10 28 00

TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Accessories for toilet rooms and utility rooms.
   2. Electric hand/hair dryers.
   3. Grab bars.

B. Related Requirements:
   1. Section 09 30 00 - Tiling.

C. Product installed in this Section, Furnished by Other Sections: See Section 01 11 00.

1.2 REGULATORY REQUIREMENTS

A. ADA Requirements: Conform to IBC Chapter 11, ICI /ANS A117.1, and provisions of regulatory authority having jurisdiction.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver in original unopened protective packaging. Maintain protective covers on accessories until installation is complete.

B. Store in original protective packaging to prevent soiling, physical damage, and wetting.

1.4 COORDINATION

A. Section 01 11 00 for items furnished by Owner and installed by Contractor (OFCI). Obtain receipt for items delivered by Owner for installation.

B. Section 06 10 00 for required backing at wood and steel stud framing. Coordinate backing for grab bars capable of supporting minimum 300 pound load.

C. Division 26 for electrical power supply for electric hand dryer.

PART 2 PRODUCTS

2.1 TOILET ROOM ACCESSORIES

A. Soap Dispenser: Owner Furnish Contractor Install (OFCI).
   1. Product: Gojo 5150.

B. Toilet Paper Dispenser: OFCI.
   1. Product: Georgia Pacific 56784.

C. Paper Towel Dispenser: OFCI.
   1. Product: Georgia Pacific 58489.

D. Sanitary Napkin Dispenser: OFCI.
   1. Product: Coastwide NSDNIW.

E. Toilet Seat Cover Dispenser: OFCI.
   1. Product: Bobrick B-221.

F. Grab Bars: Stainless steel, nonslip grasping surface finish.
   1. Standard Duty Grab Bars:
      a. Push/Pull Point Load: 250 pound-force, minimum.
      b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
      c. Length and Configuration: As indicated on drawings.
      d. Manufacturers: Bobrick, ASI, Bradley or approved.

G. Undersink Pipe Insulation
   1. Manufacturer: Truebro IPS Corporation
      a. Lav Guard 2, model and accessories as required for each application.

2.4 UTILITY ROOM ACCESSORIES

A. Mop and Broom Holders and Hooks: 18 gauge satin finished shelf stainless steel shelf, 4 anti-slip mop holders with spring loaded rubber cams to grip 7/8 inch to 1-1/4 inch diameter handles, and 5 stainless steel hooks. 44 inches wide.
   1. Product:
      a. Bobrick B-239x44

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.

3.2 PREPARATION

A. Deliver inserts and rough-in frames o site for timely installation.

B. Provide template and rough-in measurements as required.

3.3 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.4 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION 10 28 00

SECTION 10 44 00

FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fire extinguisher cabinets.
   2. Accessories.

B. Related Requirements:
   1. Section 06 10 00 - Rough Carpentry.
   2. Section 09 21 16 – Gypsum Board Assemblies.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.3 SUBMITTALS

A. See Section 01 33 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate cabinet physical dimensions.

C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.4 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

1.5 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Fire Extinguisher Cabinets and Accessories:
   1. Basis of Design:

a. Larsen's Manufacturing, Architectural Series - Full Clear Glass Door, www.larsensmfg.com.
   1) Non Rated - Fully Recessed: Model 2409-R1

2. Other Approved Manufacturers:
   a. JL Industries/Activar Construction Building Products Group, www.activarcbp.com
3. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 FIRE EXTINGUISHER CABINETS

A. Cabinet Metal: Formed galvanized steel sheet; 0.036 inch thick base metal.

B. Door Metal and Trim: Formed aluminum; 0.036 inch thick.

C. Cabinet Configuration: Rcessed type.
   1. Sized to accommodate accessories.
   2. Exterior nominal dimensions of 13 inch wide x 27-1/2 inch high x 5 inch deep.
   3. Trim: Returned to wall surface, with 5/16” projection, 2-1/2 inch wide face.

D. Cabinet Configuration: Surface type.
   1. Sized to accommodate accessories.
   2. Exterior nominal dimensions of 13 inch wide x 27-1/2 inch high x 6 inch deep.

E. Door: 0.036 inch thick, reinforced for flatness and rigidity; locked with full glass access. Hinge doors for 180 degree opening with continuous piano hinge. Provide nylon catch.

F. Door Glazing: Glass, clear, ¼ inch thick tempered. Set in resilient channel gasket glazing.

G. Cabinet Mounting Hardware: Appropriate to cabinet. Pre-drill for anchors.

H. Weld, fill, and grind components smooth.

I. Finish of Cabinet Exterior Trim and Door: Bake enamel, color as selected..

J. Finish of Cabinet Interior: White baked enamel.

2.3 ACCESSORIES

A. Extinguisher Brackets: Formed steel, chrome-plated.

B. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Secure rigidly in place.

C. Place extinguishers in cabinets.

END OF SECTION 10 44 00

SECTION 10 51 10

METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes double-tier wardrobe lockers and benches.

1.2 SUBMITTALS

A. General: Submit according to provisions of Section 01 33 00.

B. Product Data - Manufacturer's printed data including materials, accessories, construction, finishes, assembly, and installation instructions for lockers and benches.

C. Shop Drawings: Layout and dimensions of metal lockers and benches. Indicate relationship to adjoining surfaces. Show locker elevations and details, fillers, trim, base, and accessories. Include locker numbering sequence. Indicate installation and anchorage requirements.

D. Samples for Initial Color Selection: Manufacturer's color charts showing available colors.

E. Maintenance Instructions: Instructions for cleaning lockers and for adjusting, repairing, and replacing locker doors and latching mechanisms.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver lockers when spaces to receive them are clean, dry, and ready for installation.

B. Protect lockers from damage during delivery, handling, storage, and installation.

1.4 ALTERNATES

A. Refer to Section 01 23 00 for possible effect upon Work of this Section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Salsbury Industries, or approved.

2.2 LOCKERS

A. Triple-tier standard metal lockers.

B. Unit Width: 12 inches.

C. Unit Height: 6 feet.
1. 78 inches with legs.

D. Unit Depth: 15 inches.

E. Unit Color: Powder Coated Manufacturer’s Standard as selected.

F. Steel Construction: 16 gauge.

2.3 ACCESSIBLE SHELVING

A. ADA-Compliant Lockers (Recessed Handles with Multi-Point Latch):
1. Additional shelf at maximum 48 inches above the floor for unobstructed

forward and side reach.

2. Locker Compartment Bottom: Minimum of 15 inches above the floor or an extra shelf placed 15 inches above the floor for unobstructed forward and side reach.
3. Handicapped symbol attached to door.

B. Standard Hardware Features:
1. Padlock hasp.
2. One (1) top-mounted, two-pronged stainless steel coat hook.
3. Two (2) wall-mounted, single-prong stainless steel coat hooks.
4. Horizontal venting.
5. Five knuckle door hinges.

2.4 ACCESSORIES

A. Base panels – 6 inches (152 mm) high:
1. Front base.
2. End base.

B. Finished end panels:
1. Single end panel for end of unit rows.

C. Engraved name/number plates.

D. Locker unit legs: 6 inches high in same color as locker unit.

E. Locker bases: 0.0625-inch thick steel sheet.

2.5 CONSTRUCTION

A. Locker Doors: Steel specially formed for added strength and rigidity and to ensure tight joints at fastening points.
1. Door: 16 gauge - .060-inch thick steel.
2. Ventilation: Vents provided in Salsbury Industries' standard louver pattern top and bottom.
3. Multi-Point Latch: Full channel formation of adequate depth to fully conceal lock bar on lock side, channel formation on hinge side, right angle formations across top and bottom.

B. Locker Body: Solid steel specially formed for added strength and rigidity and to ensure tight joints at fastening points.

C. Hinges: Hinge: 0.074-inch thick sheet steel, double spun, full loop, tight pin, projection welded to door frame and securely fastened to the door.
1. Two (2) 2-inch high five-knuckle hinges.

D. Optional factory assembly of locker bodies using heavy duty steel rivets.

2.6 FABRICATION

A. Fabricate lockers square, rigid, and without warp, with metal faces flat and free of dents or distortion. Make exposed metal edges free of sharp edges and burrs, and safe to touch. Weld frame members together to form a rigid, 1-piece structure.
1. Form locker body panels, doors, shelves and accessories from 1-piece steel sheet unless otherwise indicated.

2.7 FINISHES

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designating finishes.

B. Finish steel surfaces and accessories, except prefinished stainless-steel and chrome-plated surfaces.

C. Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary protective covering prior to shipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install metal lockers complete with accessories according to manufacturer's recommendations. Install plumb, level, rigid, and flush.

B. Assemble knock-down lockers with standard fasteners according to manufacturer's recommendations with no exposed fasteners on door faces and face frames.

C. Anchor lockers at intervals recommended by manufacturer but no greater than 36 inches. Install anchors through back-up reinforcing plates where necessary to avoid metal distortion, using concealed fasteners.

D. Install sloping top units to lockers using concealed fasteners. Provide hairline joints and concealed splice plates.

E. Install finished end panels to conceal exposed ends of non-recessed lockers.

F. Install locker benches in compliance with manufacturer's instructions.

3.2 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust doors and latches to operate easily without binding. Verify that integral latching devices are operating properly.

B. Clean interior and exposed exterior surfaces and polish stainless-steel and nonferrous metal surfaces.

C. Protect lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit locker use during construction.

D. Touch up marred finishes, or replace locker units that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION

SECTION 11 31 00

RESIDENTIAL APPLIANCES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Kitchen appliances.

B. Related Requirements:
   1. Section 06 41 00 - Architectural Wood Casework.
   2. Section 22 10 05 - Plumbing Piping: Plumbing connections for appliances.
   3. Section 26 27 17 - Equipment Wiring: Electrical connections for appliances.

1.2 REFERENCE STANDARDS

A. UL (EAUED) - Electrical Appliance and Utilization Equipment Directory; Underwriters Laboratories Inc.; current edition.

B. US Department of Energy, Office of Energy Efficiency and Renewable Energy: www.eere.energy.gov/buildings/appliance_standards.

C. United States Environmental Protection Agency: www.epa.gov

1.3 SUBMITTALS

A. Product Data: Manufacturer's data indicating dimensions, capacity, and operating features of each piece of residential equipment specified.

B. Copies of Warranties: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.4 CLOSEOUT SUBMITTALS

A. Submit under provisions of Section 01 77 00.

B. Operation and Maintenance Data.

1.5 QUALITY ASSURANCE

A. Energy Ratings: Provide residential appliances that carry labels indicating energy-cost analysis (estimated annual operating costs) and efficiency information as required by the FTC Appliance Labeling Rule.
   1. Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

C. Electric Appliances: Listed and labeled by UL and complying with NEMA standards.

D. Gas Appliances: Bearing design certification seal of AGA.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Conform to provisions of Section 01 65 00 and manufacturer's instructions.

B. Do not deliver to site until ready for installation.

C. Verify free from damage before acceptance.

1.7 COORDINATION

A. Conform to Section 01 31 00 for coordination with work of other Sections.

B. Section 06 41 00 for casework openings for under counter refrigerators, ranges, and other built-in appliances.

C. Division 22 and Division 26 for Mechanical and Electrical connections and power.

1.8 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide manufacturer’s standard warranty on refrigeration system of refrigerators.

C. Provide manufacturer’s standard warranty on magnetron tube of microwave ovens.

PART 2 PRODUCTS

2.1 KITCHEN APPLIANCES

A. Provide Equipment Eligible for Energy Star Rating: Energy Star Rated.

B. Refrigerator: Free-standing, side-by-side, and frost-free.
   1. Capacity: Total minimum storage of 18 cubic ft; minimum 15 percent freezer capacity.
   2. Energy Usage: Minimum 20 percent more energy efficient than energy efficiency standards set by DOE.
   3. Exterior Finish: Porcelain enameled steel, Black.
   4. Manufacturers: LG, Whirlpool, Kenmore, or approved.

C. Microwave: Countertop.
   1. Capacity: 0.7 cubic ft.
   2. Power: 700 watts.

3. Features: Include turntable and 2-speed exhaust fan.
4. Exterior Finish: Black.
5. Manufacturers: Frigidaire, GE, Kenmore, or approved.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify utility rough-ins are provided and correctly located.

B. Verify casework specified Section 06 41 00 for clearances and tolerances

3.2 PREPARATION

A. Coordinate roughed-in plumbing and electrical connections with work of Division 22 - Plumbing and Division 26 - Electrical.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Anchor built-in equipment in place.

3.4 ADJUSTING

A. Adjust equipment to provide efficient operation.

3.5 CLEANING

A. Remove packing materials from equipment and properly discard.

B. Wash and clean equipment.

END OF SECTION 11 31 00

SECTION 12 21 13

METAL HORIZONTAL LOUVER BLINDS

PART 1 GENERAL

1.1 SUMMARY

A. Provide aluminum horizontal louver blinds at interior face of exterior windows.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.

B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include samples range if variation of finish is anticipated.

1.3 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 MATERIALS

A. Manufacturers: Bali, Levelor, Graber, Hunter Douglas or approved.

B. Horizontal Blinds:
1. Operation: Tilting and lifting mechanisms. Full height wands
2. Slats: Aluminum.
3. Slat Width: 1 inch
4. Color: From manufacturer's standard, non-premium colors.
5. Controls Side: verify with Architect prior to ordering

PART 3 EXECUTION

3.1 INSTALLATION

A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.

B. Restore damaged finishes and test for proper operation. Clean and protect work from damage.

END OF SECTION 12 21 13

SECTION 12 93 00

SITE FURNISHINGS

PART 1 GENERAL

1.1 WORK INCLUDED

A. Benches
B. Bicycle Racks

1.2 COORDINATION

A. Coordinate with other trades affected by and affecting work of this Section.

1.3 REVIEWS AND OBSERVATIONS

A. Request visit by Owner's Representative 72 hours in advance of the following:
   1. Contractor to mark locations on paving for all furnishings in this section for approval prior to installation.

1.4 DELIVERY, STORAGE AND HANDLING

A. Delivery and Storage: The contractor is responsible for delivery of materials to the project site at time of use. Materials to be stored in a protected location and in a manner that protects them from damage.

1.5 ENVIRONMENTAL/SITE WORKING CONDITIONS

A. Weather: Do no work when inclement weather may cause surfaces to be wet or cold beyond application parameters or where damage may occur.

PART 2 PRODUCTS

2.1 BENCHES

A. Manufacturer: DuMor, Inc.
B. Model: 57-40 PL; 4 foot length
   Model: 57-80 PL; 8 foot length
C. Color and Finish: Black Powder Coat; Cedar Plastic

2.2 BICYCLE RACKS

A. Manufacturer: Radius Pipe Bending
B. Model: RPB Hoop Style Round 36" height X 24" Width
C. Color: Black

PART 3 EXECUTION

3.1 GENERAL

A. Layout: Identify required lines, levels, grades, finish elevations, equipment heights, vertical and horizontal clearances, alignments, intersecting lines. Layout all work if this Section including required layout inspections prior to commencing work.

B. Inspection and Verification: Prior to commencing work of this Section, inspect site and ensure site and existing and surrounding conditions are as indicated in documents and are ready to receive work of this Section.

C. Discrepancies: Do not commence work until all unsatisfactory conditions have been corrected. Commencing work of this Section denotes acceptance of existing conditions.

D. Tolerances: Perform work true to location and alignment. All vertical elements plumb and square with adjacent construction. All horizontal elements in alignment and parallel, 90 degrees, or specific shown angle to adjacent construction.

E. Notice: Notify Owner's Representative 72 hours in advance prior to installing work.

3.2 ASSEMBLY AND INSTALLATION

A. Benches and Bicycle Racks:
   1. Permanently affix to the concrete paving by surface mount installation according to manufacturer's instructions, local codes and regulations. Contractor is to provide all required hardware needed for installation.

3.2 CLEANING

A. Remove scraps and debris and clean all surfaces, including other work. Clean, repair and touch-up or replace products or finishes which have been soiled, discolored or damaged by work of this section.

END OF SECTION 12 93 00

SECTION 21 05 00

COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, fittings, sleeves, escutcheons, seals, and connections for sprinkler systems.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 21 05 53 - Identification for Fire Suppression Piping and Equipment: Piping identification.

C. Section 21 13 00 - Fire Suppression Sprinklers: Sprinkler systems design.

1.03 REFERENCE STANDARDS

A. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; The American Society of Mechanical Engineers; 2013.

B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; The American Society of Mechanical Engineers; 2010.

C. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; The American Society of Mechanical Engineers; 2011.

D. ASME B16.4 - Gray Iron Threaded Fittings; The American Society of Mechanical Engineers; 2011.

E. ASME B16.5 - Pipe Flanges and Flanged Fittings; The American Society of Mechanical Engineers; 2013 (ANSI/ASME B16.5).

F. ASME B16.11 - Forged Steel Fittings, Socket-welding and Threaded; The American Society of Mechanical Engineers; 2011.

G. ASME B16.25 - Buttwelding Ends; The American Society of Mechanical Engineers; 2012.

H. ASME B36.10M - Welded and Seamless Wrought Steel Pipe; The American Society of Mechanical Engineers; 2004.

I. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014).

J. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

K. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984 (Reapproved 2009).

L. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2013.

M. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.

N. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; American Welding Society; 2011-AMD 1.

O. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2011 w/Errata.

P. AWWA C606 - Grooved and Shouldered Joints; American Water Works Association; 2011 (ANSI/AWWA C606).

Q. NFPA 13 - Standard for the Installation of Sprinkler Systems; National Fire Protection Association; 2013 (Errata 2014).

R. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.

B. Product Data: Provide manufacturers catalogue information. Indicate valve data and ratings.

C. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

D. Project Record Documents: Record actual locations of components and tag numbering.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.06 WARRANTY

A. See Section 01 77 00 - Closeout Procedures, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 FIRE PROTECTION SYSTEMS

A. Sprinkler Systems: Conform to NFPA 13.

B. Welding Materials and Procedures: Conform to ASME BPVC-IX.

2.02 ABOVE GROUND PIPING

A. Steel Pipe: schedule 40, black, in all sizes.
   1. Steel Fittings.
   2. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings and ASME B16.4, threaded fittings.
   3. Malleable Iron Fittings: ASME B16.3, threaded fittings and ASTM A47/A47M.
   4. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
   5. Mechanical Formed Fittings: Carbon steel housing with integral pipe stop and O-ring pocked and O-ring, uniformly compressed into permanent mechanical engagement onto pipe.

2.03 PIPE HANGERS AND SUPPORTS

A. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Carbon steel, adjustable swivel, split ring.

B. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.

2.04 MECHANICAL COUPLINGS

A. Rigid Mechanical Couplings for Grooved Joints:
   1. Dimensions and Testing: Comply with AWWA C606.
   2. Minimum Working Pressure: 300 psig.
   3. Housing Material: Fabricate of ductile iron conforming to ASTM A536.
   4. Housing Coating: Factory applied orange enamel.
   5. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.

6. Bolts and Nuts: Hot dipped galvanized or zinc electroplated steel

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and foreign material, from inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.

B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

C. Install piping to conserve building space, to not interfere with use of space and other work.

D. Group piping whenever practical at common elevations.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Pipe Hangers and Supports:
   1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   2. Place hangers within 12 inches of each horizontal elbow.
   3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
   5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

G. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

H. Provide sleeves when penetrating footings, walls, and partitions and seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required.
   1. Aboveground Piping:
      a. Pack solid using mineral fiber conforming to ASTM C592.
      b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.
   2. All Rated Openings: Caulk tight with fire stopping material conforming to ASTM E814 in accordance with Section 07 84 00 to prevent the spread of fire, smoke, and gases.

I. Escutcheons:
   1. Install and firmly attach escutcheons at piping penetrations into finished spaces.
   2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
   3. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.

J. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.03 CLEANING

A. Upon completion of work, clean all parts of the installation.

B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION

SECTION 21 05 48

VIBRATION AND SEISMIC CONTROLS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Equipment support bases.

B. Vibration isolators.

C. Seismic restraints for suspended components and equipment.

1.02 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2011.

B. FEMA E-74 - Reducing the Risks of Nonstructural Earthquake Damage: A Practical Guide; 2011.

C. NFPA 13 - Standard for the Installation of Sprinkler Systems; National Fire Protection Association; 2013 (Errata 2014).

1.03 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.

B. Product Data:
   1. Provide manufacturer's product literature documenting compliance with PART 2 PRODUCTS.
   2. Include seismic rating documentation for each restraint component accounting for horizontal, vertical, and combined loads.

C. Shop Drawings:
   1. Include selections from prescriptive design tables that indicate compliance with the applicable building code.
   2. Clearly indicate the load and capacity assumptions selected. Include copies of any calculations.
   3. Include the calculations that indicate compliance with the applicable building code for seismic controls and the manufacturer's requirements.
   4. Include the seal of the Professional Structural Engineer registered in the the State in which the Project is located, on the drawings and calculations which at a minimum include the following:
      a. Seismic Restraint Details: Detailed drawings of seismic restraints and snubbers including anchorage details that indicate quantity, diameter, and depth of penetration, edge distance, and spacing of anchors.

D. Manufacturer's Instructions: Indicate installation instructions with special procedures and setting dimensions.

1.04 QUALITY ASSURANCE

A. Perform design and installation in accordance with applicable codes.

B. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and registered and licensed in the State in which the Project is located.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

D. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of experience.

PART 2 PRODUCTS

2.01 SEISMIC RESTRAINTS FOR SUSPENDED COMPONENTS AND EQUIPMENT

A. Products to be listed in accordance with the requirements of NFPA 13.

B. Cable Restraints:
   1. Wire Rope: Steel wire strand cables sized to resist seismic loads in all lateral directions.
   2. Protective Thimbles: Eliminates potential for dynamic cable wear and strand breakage.
   3. Size: Based on the lesser of cable capacity or anchor load taking into account bracket geometry.
   4. Connections:
      a. Use overlapping wire rope U clips, cable clamping bolts, swaged sleeves or seismically rated tool-less wedge insert lock connectors.
      b. Internally brace clevis hanger bracket cross bolt to prevent deformation.
   5. Vertical Suspension Rods: Attach required bracing of sufficient strength to prevent rod buckling from vertical compression forces utilizing series of attachment clips.

C. Rigid Restraints:
   1. Structural Element: Sized to resist seismic loads in all lateral directions and carry both compressive and tensile loading.
   2. Size: Based on the lesser of cable capacity or anchor load taking into account bracket geometry.
   3. Connections: Internally brace clevis hanger bracket cross bolt to prevent deformation.
   4. Static Support System: Anchorage capable of carrying additional tension loads generated by the vertical component of the rigid brace compression which is additive to any static load requirements on the system.
   5. Vertical Suspension Rods: Attached required bracing of sufficient strength to prevent rod buckling from vertical compression forces utilizing series of attachment clips.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Install in accordance with manufacturer's instructions.

B. Comply with the requirements of NFPA 13, Washington Building Code as currently adopted, and ASCE 7.

3.02 INSTALLATION - SEISMIC

A. Comply with the following:
   1. Install in accordance with manufacturer's instructions.
   2. ASCE 7.
   3. FEMA E-74.
   4. NFPA 13.
   5. Washington Building Code as currently adopted.

B. Provide end of line restraint.

C. Piping:
   1. Provide seismic bracing.
   2. Provide supports, braces, and anchors to resist gravity and seismic design forces.

3. Pipes and Connections Constructed of Ductile Materials (copper, ductile iron, steel or aluminum and brazed, welded or screwed connections):
    a. Provide transverse bracing at spacing not more than 40.0 feet on center.
    b. Provide longitudinal bracing at spacing not more than 80.0 feet on center.
4. Provide lateral restraint for risers at not more than 30 feet on center or as required for horizontal runs, whichever is less.
5. Use of proprietary restraint systems with a certificate of compliance, verified and listed by an accredited inspection body is acceptable (pending shop drawing approval), as an alternative to project specific seismic bracing design.
6. Re-use of Existing Hangers:
    a. Re-using existing hangers at locations of seismic bracing are to be judged on a case-by-case basis by the registered project design professional.
    b. Unless otherwise shown on the drawings, it is assumed all hangers supporting new piping, located at a seismic brace, will be new.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect isolated equipment after installation and submit report. Include static deflections.

END OF SECTION

SECTION 21 05 53

IDENTIFICATION FOR FIRE SUPPRESSION PIPING/EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe Markers.

1.02 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.

1.03 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.

B. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Piping: Pipe markers.

2.02 PIPE MARKERS

A. Color: Conform to ASME A13.1.

B. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

C. Color code as follows:

D. Fire Quenching Fluids: Red with white letters.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive identification materials.

3.02 INSTALLATION

A. Install plastic pipe markers in accordance with manufacturer's instructions.

END OF SECTION

SECTION 21 13 00

FIRE SUPPRESSION SPRINKLERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wet-pipe sprinkler system for remodel of existing building sprinkler system, including all food preparation, serving, and dining areas.

B. System design, installation, and certification.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 21 05 00 - Common Work Results for Fire Suppression: Pipe, fittings, and valves.

C. Section 21 05 48 - Vibration and Seismic Controls for Fire Suppression Piping and Equipment.

D. Section 21 05 53 - Identification for Fire Suppression Piping and Equipment.

1.03 REFERENCE STANDARDS

A. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.

B. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2012.

C. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2012.

D. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2013.

E. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2013.

F. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

G. NFPA 13 - Standard for the Installation of Sprinkler Systems; National Fire Protection Association; 2013 (Errata 2014).

H. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.

B. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

C. Shop Drawings:

1. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.
2. Submit shop drawings to authority having jurisdiction for approval. Submit proof of approval to Architect.

D. Manufacturer's Certificate: Certify that system has been tested and meets or exceeds specified requirements and code requirements.

E. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Extra Sprinklers: Type and size matching those installed, in quantity required by referenced NFPA design and installation standard.
3. Sprinkler Wrenches: For each sprinkler type.

G. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.

1.05 QUALITY ASSURANCE

A. Maintain one copy of referenced design and installation standard on site.

B. Conform to UL requirements.

C. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

D. Installer Qualifications: Company specializing in performing the work of this section with minimum five years experience approved by manufacturer.

E. Equipment and Components: Provide products that bear UL label or marking.

F. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sprinklers, Valves, and Equipment:
1. Tyco Fire Protection Products, a Tyco Business: www.tyco-fire.com.
2. Viking Corporation: www.vikinggroupinc.com.
3. Reliable Sprinkler Corp.; www.reliablesprinkler.com.

2.02 SPRINKLER SYSTEM

A. Sprinkler System: Provide coverage for entire project area remodel..

B. Occupancy: Light and Ordinary Hazard, Comply with NFPA 13 as currently adopted by the AHJ..

C. Water Supply: Determine volume and pressure from water flow test data. Water Flow Test is the responsibility of this contractor.

D. Storage Cabinet for Spare Sprinklers and Tools: Steel, located adjacent to alarm valve.

E. Pipe Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
6. Other Types: As required.
7. Manufacturers:
   a. Powers Fasteners, Inc: www.powers.com.
   b. Hilti; www.hilti.com.

2.03 SPRINKLERS

A. Suspended Ceiling Type: Semi-recessed pendant type with matching push on escutcheon plate.
   1. Response Type: Quick.
   2. Coverage Type: Standard.
   3. Finish: Enamel, color white.
   4. Escutcheon Plate Finish: Enamel, color white.
   5. Fusible Link: Glass bulb type temperature rated for specific area hazard.

B. Exposed Area Type: Pendant type with guard.
   1. Response Type: Quick.
   2. Coverage Type: Standard.
   3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

C. Flexible Drop System: Stainless steel, multiple use, open gate type.
   1. Application: Use to properly locate sprinkler heads.
   2. Include all supports and bracing.
   3. Provide braided type tube as required for the application.
      a. Product:
         1) Victaulic Company; Vic-Flex: www.victaulic.com.
         2) FlexHead Industries; www.flexhead.com.
         3) Substitutions: Not permitted.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with referenced NFPA design and installation standard.

B. Install equipment in accordance with manufacturer's instructions.

C. Place pipe runs to minimize obstruction to other work.

D. Place piping in concealed spaces above finished ceilings.

E. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.

F. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.

G. Flush entire piping system of foreign matter.

H. Hydrostatically test entire system.

I. Require test be witnessed by Fire Marshal.

END OF SECTION

SECTION 22 05 19

METERS AND GAGES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Thermometers and thermometer wells.

1.02 REFERENCE STANDARDS

A. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014.

B. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers; 2014.

1.03 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.

B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.

C. Project Record Documents: Record actual locations of components and instrumentation.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements. for additional provisions.

PART 2 PRODUCTS

2.01 STEM TYPE THERMOMETERS

A. Manufacturers:
   1. Dwyer Instruments, Inc: www.dwyer-inst.com.
   2. Weksler Glass Thermometer Corp: www.wekslerglass.com.
   3. H.O. Trerice Co., Inc: www.trerice.com

B. Thermometers - Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
   1. Size: 9 inch scale.
   2. Window: Clear Lexan.
   3. Accuracy: 2 percent, per ASTM E77.
   4. Calibration: Degrees F.

2.02 THERMOMETER SUPPORTS

A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

2.03 TEST PLUGS

A. Manufacturers:
   1. Sisco.
   2. PEC.

B. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 200 degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Locate test plugs as shown on plans, schematics, and as specified..

3.02 SCHEDULES

A. Stem Type Thermometers, Location and Scale Range:
   1. Domestic hot water supply and recirculation, 0 to 180 degrees F.

END OF SECTION

SECTION 22 05 48

VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vibration isolators.

B. Seismic restraints.

1.02 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Product Data:
   1. Provide manufacturer's product literature documenting compliance with PART 2 PRODUCTS.
   2. Include seismic rating documentation for each isolator and restraint component accounting for horizontal, vertical, and combined loads.

C. Shop Drawings: Indicate inertia bases and locate vibration isolator and restraint component accounting for horizontal, vertical, and combined loads.

D. Manufacturer's Instructions: Indicate installation instructions with special procedures and setting dimensions.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. General:
   1. All vibration isolators, base frames and inertia bases to conform to all uniform deflection and stability requirements under all operating loads.

2.02 VIBRATION ISOLATORS

A. Neoprene Pad Isolators:
   1. Rubber of neoprene waffle pads.
   2. Configuration: Single layer.

B. Seismic Snubbers:
   1. Type: Non-directional and double acting unit consisting of interlocking steel members restrained by neoprene elements.
   2. Elements: Replaceable neoprene, minimum of 0.75 inch thick with minimum 1/8 inch are gap.
   3. Capacity: 4 times load assigned to mount groupings at 0.4 inch deflection.
   4. Attachment Points and Fasteners: Capable of withstanding 3 times rated load capacity of seismic snubber.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Install in accordance with manufacturer's instructions.

END OF SECTION

SECTION 22 05 53

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Pipe markers.

1.02 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007 (ANSI/ASME A13.1).

1.03 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.

B. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Brady Corporation

B. Champion America, Inc

C. Seton Identification Products

2.02 NAMEPLATES

A. Description: Laminated three-layer plastic with engraved letters.
   1. Letter Color: White.
   2. Letter Height: 1/4 inch.
   3. Background Color: Black.

2.03 TAGS

A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

C. Chart: Typewritten letter size list in anodized aluminum frame.

2.04 PIPE MARKERS

A. Comply with ASME A13.1.

B. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

C. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

D. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

E. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.

F. Identify control panels and major control components outside panels with plastic nameplates.

G. Identify thermostats relating to terminal boxes or valves with nameplates.

H. Identify valves in main and branch piping with tags.

I. Tag automatic controls, instruments, and relays. Key to control schematic.

J. Identify piping, concealed or exposed, with plastic tape pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

K. Install ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

SECTION 22 07 19

PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

1.02 REFERENCE STANDARDS

A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus; 2013.

B. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.

C. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2015.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.04 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER PIPING INSULATION

A. Manufacturers:
   1. Johns Manville Corporation MicroLok HP
   2. Owens Corning Corp SSL II
   3. Knauf Earthwool
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: ASTM C547 ; class 3, rigid molded, noncombustible.
   1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
   2. Maximum Service Temperature: 850 degrees F.
   3. Maximum Moisture Absorption: 0.2 percent by volume.

C. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches, with self-sealing longitudinal closure laps (SSL) and butt strips. Shall comply with Oregon Revised Statute 853.085 by containing less than 0.10% decabromodiphenyl ether by mass.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:
   1. Armacell InternationalArmaflex
   2. K-Flex Insultube
   3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 3; use molded tubular material wherever possible.
   1. Minimum Service Temperature: Minus 40 degrees F.
   2. Maximum Service Temperature: 220 degrees F.
   3. Connection: Waterproof vapor barrier adhesive.

2.04 JACKETS

A. PVC Plastic Valve and Fitting Covers
   1. Manufacturers:
      a. Johns Manville CorporationZeston 2000 Series
      b. Knauf Proto
      c. Speedline
      d. Substitutions: See Section 01 60 00 - Product Requirements.
   2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: 0 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 10 mil.
      e. Connections: Pressure sensitive color matching vinyl tape, tacks or welding adhesive.

B. Fiberglass Valve Covers
   1. Description: Woven fiberglass jacketing around 2” thick fiberglass batt.
   2. Attachment: Stainless steel wire and lacing hooks.

2.05 INSERTS AND SHIELDS

A. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.

B. Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.

C. Insert material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Exposed Piping: Locate insulation and cover seams in least visible locations.

C. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

D. Glass fiber insulated pipes conveying fluids below ambient temperature:
   1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with PVC fitting covers.

E. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

F. Glass fiber insulated pipes conveying fluids above ambient temperature:
   1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive.
   2. Insulate valves and fittings, including flanges, with PVC covers or fiberglass batt and woven fiberglass insulation jacketing.

G. Inserts and Shields:
   1. Application: Piping 1-1/2 inches diameter or larger.
   2. Insert Location: Between support shield and piping and under the finish jacket.

H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.

I. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.03 SCHEDULES

A. Plumbing Systems:
   1. Domestic Hot Water Supply in Recirculating Systems:
      a. Glass Fiber Insulation:
         1) Pipe Size Range: All sizes
         2) Thickness: one inch.
   2. Domestic Hot Water Supply in Non-recirculating Systems:
      a. Glass Fiber Insulation:
         1) Pipe Size Range: All sizes.
         2) Thickness: Half inch, for first 8 feet from water heater or storage tank.
   3. Domestic Hot Water Return (recirculation):
      a. Glass Fiber Insulation:
         1) Pipe Size Range: All sizes.
         2) Thickness: One inch.
   4. Domestic Cold Water, above grade:
      a. Glass fiber insulation: 0.5 inch thick.
   5. Solar collector supply and return:
      a. Glass fiber insulation: One inch thickness.

b. Exterior piping with aluminum jacketing.

END OF SECTION

SECTION 22 10 05

PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, valves, and connections for piping systems.
   1. Sanitary sewer.
   2. Domestic water.
   3. Storm water.
   4. Flanges, unions, and couplings.
   5. Pipe hangers and supports.
   6. Valves.
   7. Flow controls.
   8. Check.
   9. Strainers.

1.02 RELATED REQUIREMENTS

A. Section 09 90 00 - Painting and Coating.

B. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment.

C. Section 22 05 53 - Identification for Plumbing Piping and Equipment.

D. Section 22 07 19 - Plumbing Piping Insulation.

1.03 REFERENCE STANDARDS

A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2012 (ANSI B16.18).

B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; The American Society of Mechanical Engineers; 2013.

C. ASME B31.9 - Building Services Piping; The American Society of Mechanical Engineers; 2014 (ANSI/ASME B31.9).

D. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).

E. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2010.

F. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.

G. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.

H. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2010.

I. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2002 (Reapproved 2010).

J. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2012.

K. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2014.

L. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2014.

M. AWWA C651 - Disinfecting Water Mains; American Water Works Association; 2005 (ANSI/AWWA C651).

N. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; Cast Iron Soil Pipe Institute; 2009.

O. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; Cast Iron Soil Pipe Institute; 2011

P. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2009.

Q. MSS SP-67 - Butterfly Valves; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2011.

R. MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2011.

S. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2013.

T. MSS SP-85 - Cast Iron Globe & Angle Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2011.

U. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).

V. NSF 372 - Drinking Water System Components - Lead Content; 2011.

1.04 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

C. Project Record Documents: Record actual locations of valves.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Pipe: CISPI 301, hubless.
   1. Fittings: Cast iron.
   2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.

B. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.03 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

2.04 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET **OF BUILDING**

A. Copper Pipe: ASTM B42, hard drawn.
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
   2. Joints: ASTM B 32, alloy Sn95 solder.

2.05 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Joints: ASTM B32, alloy Sn95 solder.
   3. Mechanical Press Sealed Fittings: Double pressed type, NSF 61 and NSF 372 approved or certified, utilizing EPDM, non toxic synthetic rubber sealing elements.
      a. Manufacturers:
         1) Grinnell Products, a Tyco Business: www.grinnell.com.
         2) Shurjoint Piping Products, Inc., a Tyco Business: www.shurjoint.com.
         3) Viega LLC: www.viega.com.
         4) Substitutions: See Section 01 60 00 - Product Requirements.

2.06 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

2.07 STORM WATER PIPING, ABOVE GRADE

A. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

2.08 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 2 inches and Under:
   1. Ferrous pipe: Class 150 malleable iron threaded unions.
   2. Copper tube and pipe: Class 150 bronze unions with soldered joints.

B. Flanges for Pipe Size Over 2 inches:
   1. Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
   2. Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.09 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
   3. Trapeze Hangers: Welded steel channel frames attached to structure.
   4. Vertical Pipe Support: Steel riser clamp.

B. Plumbing Piping - Drain, Waste, and Vent:

C. Plumbing Piping - Water:
   1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
   2. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
   3. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.10 GLOBE VALVES

A. Manufacturers:
   1. Hammond
   2. Conbraco Industries, Inc: www.apollovalves.com.
   3. Nibco, Inc: www.nibco.com.
   4. Milwaukee Valve Company: www.milwaukeevalve.com.

B. Up To and Including 2 inches:
   1. MSS SP-80, Class 125, bronze body, bronze trim, handwheel, bronze disc, solder ends. Hammond IB440 (threaded) or IB418 (soldered).

C. Over 2 inches:
   1. MSS SP-85, Class 125, iron body, bronze trim, handwheel, outside screw and yoke, renewable bronze plug-type disc, renewable seat, flanged ends. Provide chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor. Hammond IR116.

2.11 BALL VALVES

A. Manufacturers: Hammond as noted below, Apollo, Nibco, Milwaukee or approved.

B. Construction, 3 inches and smaller: 600 WOG, 150 SWP, 2 piece body style, full port, brass tunneled ball, reinforced TFE seats, hex gland follower, brass body of ASTM B283, blow-out proof stem, lever handle. Hammond 8901 (threaded) or 8911 (soldered).

2.12 BUTTERFLY VALVES

A. Manufacturers:
   1. Hammond 6100 or 6200 series.
   2. Crane Valve
   3. Milwaukee :
   4. Apollo

B. Construction 2-1/2 inches and Larger: MSS SP-67, 200 psi CWP, cast or ductile iron body, nickel-plated ductile iron or aluminum bronze disc, resilient replaceable EPDM or Buna N seat, wafer or lug ends, extended neck, infinite position lever handle with memory stop.

2.13 FLOW CONTROLS

A. Manufacturers:
   1. ITT Bell & GossettCircuit Setter
   2. Griswold Controls
   3. Taco, Inc
   4. Flow Design Acusetter
   5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.

C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

2.14 SWING CHECK VALVES

A. Manufacturers: Hammond as noted below, or Apollo, Nibco, Milwaukee.
   1. Hammond Valve as noted below.
   2. Nibco, Inc
   3. Milwaukee Valve Company

4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Up to 2 Inches:
1. MSS SP-80, Class 125, bronze body and cap, bronze swing disc with rubber seat, solder ends. Hammond IB904 (threaded) or IB912 (soldered).

C. Over 2 Inches:
1. MSS SP-71, Class 125, iron body, bronze swing disc, renewable disc seal and seat, flanged or grooved ends. Hammond IR1124.

2.15 WATER PRESSURE REDUCING VALVES

A. Manufacturers: Watts as noted below, Apollo, Cla-Val, or approved.

B. Up to 2 Inches:
1. ASSE 1003, bronze body, stainless steel and thermoplastic internal parts, EPDM reinforced diaphragm, strainer, threaded or solder single union end.
2. Manufacturers: Watts U5, Wilkins, or approved.

C. Over 2 Inches:
1. ASSE 1003, bronze body, elastomeric diaphragm, stainless steel seat, EPDM disc, integral or separate strainer, flanged or threaded.
2. Manufacturers: Watts N223, Wilkins, or approved.

2.16 RELIEF VALVES

A. Pressure Relief:
1. Manufacturers:
a. Watts Regulator Company; Model 174A, Apollo, Cla-Val, Hoffman or approved.
2. AGA Z21.22 certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.

B. Temperature and Pressure Relief:
1. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME (BPV IV) certified and labelled.

2.17 STRAINERS

A. Manufacturers:
1. Hammond as noted below.
2. Mueller
3. Watts
4. Apollo

B. Size 2 inch and Under:
1. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen. Hammond 3010 (threaded) or 3040 (soldered).

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Install piping to maintain headroom, conserve space, and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

G. Provide access where valves and fittings are not exposed.

H. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.

I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

J. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.

K. Excavate and backfill in accordance with Section 31 00 00.

L. Install valves with stems upright or horizontal, not inverted.

M. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.

N. Sleeve pipes passing through partitions, walls and floors.

O. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

P. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.9.
   2. Support horizontal piping with hanger spacing in compliance with Code.
   3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   4. Place hangers within 12 inches of each horizontal elbow.
   5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   6. Provide copper plated hangers and supports for copper piping.
   7. Support cast iron drainage piping at every joint.

3.04 APPLICATION

A. Install unions downstream of valves and at equipment or apparatus connections.

B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

3.05 TOLERANCES

A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.

B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Prior to starting work, verify system is complete, flushed and clean.

B. Ensure Ph of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.

D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.

E. Maintain disinfectant in system for 24 hours.

F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.

G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

END OF SECTION

SECTION 22 10 06

PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Drains.

B. Roof and floor drains.

C. Cleanouts.

D. Back water valves.

E. Double check valve assemblies.

F. Water hammer arrestors.

G. Mixing valves.

H. Thermostatic mixing valves.

I. Trap primers

J. Downspout nozzles

1.02 REFERENCE STANDARDS

A. ASME A112.6.3 - Floor and Trench Drains; The American Society of Mechanical Engineers; 2001 (R2007).

B. ASME A112.6.4 - Roof, Deck, and Balcony Drains; The American Society of Mechanical Engineers; 2003.

C. ASME A112.14.3 - Grease Interceptors

D. ASSE 1012 - Backflow Preventer with Intermediate Atmospheric Vent; American Society of Sanitary Engineering; 2009 (ANSI/ASSE 1012).

E. ASSE 1013 - Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers; American Society of Sanitary Engineering; 2011.

F. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).

G. NSF 372 - Drinking Water System Components - Lead Content; 2011.

H. PDI-WH 201 - Water Hammer Arrestors; Plumbing and Drainage Institute; 2010.

1.03 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.

B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.

C. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS

A. Manufacturers:
   1. JR Smith, Sioux Chief, Zurn, Josam, Mifab, Wade or as noted.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

B. Roof Drains (RD1):
   1. Assembly: ASME A112.6.4.
   2. Body: Lacquered cast iron with sump.
   3. Strainer: Removable polyethylene dome with vandal proof screws.
   4. Accessories: Coordinate with roofing type, refer to Section 07 53 00:
      a. Membrane flange and membrane clamp with integral gravel stop.
      b. Adjustable under deck clamp.
      c. Waterproofing flange.
   5. Model: JR Smith Figure 1010, Sioux Chief Figure 868, or approved.

C. Roof Overflow Drains (OD1):
   1. Lacquered cast iron body and clamp collar and bottom clamp ring; pipe extended to two inches above primary drain elevation.
   2. Model: JR Smith Figure 1080, Sioux Chief Figure 868-STP2, or approved.

D. Downspout Nozzles (DN1):
   1. Bronze round with offset bottom section.
   2. Model: JR Smith Figure 1770t or approved.

E. Floor Drain (FD1):
   1. ASME A112.6.3; 5 inch diameter top drain, lacquered cast iron two piece body with bottom outlet, double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze heelproof strainer: 0.5 inch trap primer connection.
   2. Model: JR Smith 2005, Sioux Chief 833-DNR Series, or approved.

F. Floor Sink (FS1)
   1. 12" square top, acid resistant coated cast iron receptor with seepage holes, less grate, aluminum dome type strainer, no hub outlet, 10" depth, outlet size as scheduled.
   2. Model: Ceco 910-3, JR Smith 3440Y, Sioux Chief 861.

2.03 CLEANOUTS

A. Manufacturers: JR Smith, Josam, Zurn, Mifab or approved.

B. Cleanouts at Exterior Surfaced Areas (GCO):
   1. Round cast nickel bronze access frame and non-skid cover.
   2. Model: JR Smith 4103, Zurn Z-1400, Sioux Chief 834-DNR series, or approved.

C. Cleanouts at Interior Finished Floor Areas (FCO):
   1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.
   2. Model: JR Smith 4020, Zurn Z-1400, Sioux Chief 834-DNR series, or approved.

D. Cleanouts at Interior Finished Wall Areas (WCO):
   1. Round stainless steel wall access cover complete with securing screw and bronze raised hex head plug.
   2. Model: JR Smith 4472T, Zurn Z-1468, Sioux Chief 873 series, or approved.

2.04 BACK WATER VALVES

A. Manufacturers: Zurn BW2930, Oatey, Savko, Rectorseal Clean Check, or approved.

B. Plastic Back Water Valves: ABS body and valve, extension sleeve, and access cover.

2.05 DOUBLE CHECK VALVE ASSEMBLIES

A. Manufacturers: Febco Model , Conbraco, Watts, Zurn, Ames or approved.

B. Double Check Valve Assemblies:
   1. ASSE 1012; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent.

2.06 WATER HAMMER ARRESTORS

A. Manufacturers: Sioux Chief Hydra-rester, Josam Series 75000, JR Smith, PPP, Zurn or approved.

B. Description
   1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range minus 100 to 300 degrees F and maximum 250 psi working pressure.

2.07 MIXING VALVES

A. Thermostatic Controller (TC1)
   1. Manufacturers: Powers 1434HL, Symmons, Armstrong, or approved.
   2. Description: High capacity water temperature control system with high capacity and low capacity thermostatic valves, certified to ASSE 1017
   3. Finish: Rough brass or bronze with rough chrome finish on operating handle and service stops.
   4. Accessories: Pressure reducing valve, check stops, ball valves, pressure gauges and thermometers.
   5. Capacity: 0.5 gpm minimum flow rate, 5 gpm minimum to ASSE 1017, 5 psi differential at 72 gpm.

B. Thermostatic Controller (TC2)
   1. Manufacturers: Powers 430 Hydroguard, Symmons Tempcontrol or approved.
   2. Description: Thermostatic controller with integral check stops, removable cartridge with strainer, stainless steel piston and liquid fill thermal motor with bellows mounted out of water.
   3. Finish: Rough brass or bronze with rough chrome finish on operating handle and service stops.
   4. Accessories: Wall mounting bracket.
   5. Capacity: 0.5 gpm minimum flow rate, 5 psi differential pressure at 15 gpm.

C. Tempering Valves (TV)
   1. Manufacturers: Watts, Symmons, Powers, or approved.
   2. TV1: Watts Model 1170-M2 to control hot water temperature at source, with integral check valves and filter washers. 0.5 gpm minimum, 25 gpm maximum flowrate. Meets ASSE 1017.
   3. TV2: Watts Model MMV-M1 to control hot water temperature to multiple fixtures, with integral check valves and filter washers. 0.5 gpm minimum and 12 gpm maximum flowrate. Meets ASSE 1070.
   4. TV3: Watts Model USG-B to control hot water temperature at individual fixture, with integral check valves. 0.5 gpm minimum and 2.5 maximum flowrate. Meets ASSE 1016.

D. Emergency Tempering Valve (ETV1)
   1. Manufacturers: Powers ES-200, Lawler 911E, or approved.
   2. Description: ANSI Z358.1; Thermostatic mixing valve for providing tepid water to emergency fixtures.
   3. Construction: Parafin-filled or bimetal temperature element, with dual internal cold water bypass.
   4. Capacity: 3 gpm minimum flow rate, 30 psi drop at 20 gpm with 50/50 mixed ratio.

E. Emergency Tempering Valve (ETV2)
   1. Manufacturers: Powers ES-150, Lawler 911EF, or approved.
   2. Description: ANSI Z358.1; Thermostatic mixing valve for providing tepid water to emergency fixtures.
   3. Construction: Parafin-filled or bimetal temperature element, with dual internal cold water bypass.
   4. Capacity: 1 gpm minimum flow rate, 5 psi drop at 4 gpm with 50/50 mixed ratio.

2.08 TRAP PRIMERS (TP1)

A. Manufacturers: PPP Prime Rite, or approved.

B. Description: Automatic trap primer to deliver a metered amount of water to as many as four separate traps. Operates by sensing pressure drop in line.

C. Accessories: Distributors, splitters as needed to service multiple floor drains.

2.09 TRAP PRIMER (TP2)

A. Manufacturers: Sloan VBF-72-A1, Delany, or approved.

B. Description: Vacuum breaker trap primer to divert small amount of water to floor drain when toilet is flushed. Connect between flush valve and toilet inlet.

C. Accessories: One piece flush connection, water deflector, 3/8” elbow and flex bend tube connection, diverter wall flange and fittings, chrome wall flange and ½” fitting.

2.10 DOWNSPOUT BOOTS (DB)

A. Description: Transition piece for connecting sheet metal exposed downspout to underground storm drain piping. Provides protection of lower part of exposed downspout.

B. Construction: Cast Iron.

C. Size: Inlet size to match downspout, with 4” spigot outlet, for connection to 4” pipe.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

C. Encase exterior cleanouts in concrete flush with grade.

D. Install floor cleanouts at elevation to accommodate finished floor.

E. Pipe relief from backflow preventer as indicated.

F. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatories and sinks .

END OF SECTION

SECTION 22 25 00

PLUMBING WATER TREATMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Treatment of domestic water systems.

1.02 RELATED REQUIREMENTS

A. Section 22 10 05 - Plumbing Piping.

1.03 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.

B. Product Data: Provide chemical treatment materials and chemicals.

C. Operation and Maintenance Data.

D. Certificate of completion.

E. Treatment Report.

PART 2 PRODUCTS

2.01 MANUFACTURER/SUPPLIER

A. US Water Services, Nalco, Mogul, Chemax, Chemcoa, DuBois Chemicals..

B. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PLUMBING WATER TREATMENT

A. Domestic Water Chlorination:

1. Chlorination shall be accomplished by personnel employed by a firm licensed to perform the work.
2. As a minimum, potable water systems shall be disinfected prior to use as outlined within the current State or local plumbing code, or as prescribed by the Health Authority, whichever requirements are more stringent.
3. Chemicals: Sodium Hypochlorite 12.5% EPA registered for drinking water application.

PART 3 EXECUTION

3.01 PREPARATION

A. Plumbing Domestic Water Systems:

1. Flush new portions of plumbing system with fresh water to remove all dirt and construction debris.
2. Open all fixtures to develop slow rate of flow through system.
3. Inject sodium hypochlorite solution at a rate to achieve greater than 100 ppm chlorine at all fixtures.
4. Flush all affected portions of plumbing system until no chlorine is present.
5. Bacteriological samples shall be submitted to a certified laboratory who shall certify that the water is suitable for drinking. The certificate stating purity of water shall be delivered to the Architect.

3.02 FINAL ADJUSTMENT

A. Following acceptance of systems by Owner, chemical treatment supplier shall make final adjustments in required concentrations.

END OF SECTION

SECTION 22 30 00

PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water heaters.

B. Expansion tanks.

C. Pumps.

1. Circulators.

1.02 REFERENCE STANDARDS

A. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; The American Society of Mechanical Engineers; 2015.

B. UL 174 - Standard for Household Electric Storage Tank Water Heaters; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

C. UL 1453 - Standard for Electric Booster and Commercial Storage Tank Water Heaters; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.

B. Product Data:

1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
2. Indicate pump type, capacity, power requirements.
3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
4. Provide electrical characteristics and connection requirements.

C. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.

C. Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.06 WARRANTY

A. See Section 01 77 00 - Closeout Procedures, for additional warranty requirements.

B. Provide three year manufacturer warranty for domestic water heaters.

PART 2 PRODUCTS

2.01 WATER HEATER MANUFACTURERS

A. Rheem Manufacturing Company: www.rheem.com.

B. Lochinvar; www.lochinvar.com.

C. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MINI TANK WATER HEATERS

A. Manufacturers: Bosch/Ariston, Stiebel-Eltron, or approved.

B. Type: Small storage electric point-of-use.

C. Tank: 2.5 gallons minimum glass-lined.

D. Mount: Wall.

E. Electrical Characteristics: Plug-in 120 volt.

F. Heating Capacity: 1500 watts maximum.

G. Recovery at 90 degree rise: 6.8 gph

2.03 COMMERCIAL ELECTRIC WATER HEATERS

A. Type: Factory-assembled and wired, electric, vertical storage.

B. Performance: As scheduled.

C. Electrical Characteristics: As scheduled.

D. Tank: Glass lined welded steel; 4 inch diameter inspection port, thermally insulated with minimum 2 inches glass fiber encased in corrosion-resistant steel jacket; baked-on enamel finish.

E. Controls: Automatic immersion water thermostat; externally adjustable temperature range from 60 to 180 degrees F, high temperature limit thermostat.

F. Accessories: Provide:

1. Water connections: Brass.
2. Dip tube.
3. Drain Valve: all-brass or bronze construction.
4. Anode: Magnesium.
5. Temperature and Pressure Relief Valve: ASME labelled.

G. Heating Elements: Flange-mounted immersion elements; individual elements sheathed with Incoloy corrosion-resistant metal alloy, rated less than 75 Watts per square inch.

2.04 DIAPHRAGM-TYPE EXPANSION TANKS

A. Manufacturers: Amtrol Therm-X-Trol, Bell & Gossett PT, Taco or approved.

B. Construction: Steel diaphragm tank, tested and rated for working pressure of 150 psig, with flexible EPDM diaphragm sealed into tank, and steel legs or saddles

C. Accessories: Air-charging fitting, tank drain; precharge to 60 psig.

D. Size: As scheduled.

2.05 IN-LINE CIRCULATOR PUMPS

A. Manufacturers: Taco, Grundfos UP.

1. Substitutions: See Section 01 60 00 - Product Requirements.

B. Casing: Bronze or brass, rated for 125 psig working pressure.

C. Impeller: Non-metallic.

D. Shaft: Ceramic.

E. Bearings: Carbon or stainless steel.

F. Drive: Flexible coupling.

G. Controls: Combination timer and thermostatic control, by same manufacturer, furnished with pump.

H. Performance and electrical: As scheduled.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

B. Coordinate with plumbing piping and related electrical work to achieve operating system.

END OF SECTION

SECTION 22 40 00

PLUMBING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water closets.

B. Urinals.

C. Lavatories.

D. Sinks.

E. Mop sinks.

F. Wash fountains.

1.02 RELATED REQUIREMENTS

A. Section 06 41 00 - Architectural Wood Casework: Preparation of counters for sinks and lavatories.

B. Section 07 92 00 - Joint Sealants: Sealing joints between fixtures and walls and floors.

C. Section 22 10 05 - Plumbing Piping.

D. Section 22 10 06 - Plumbing Piping Specialties.

E. Section 22 30 00 - Plumbing Equipment.

1.03 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. ANSI Z124.1.2 - American National Standard for Plastic Bathtub and Shower Units; 2005.

D. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2008.

E. ASME A112.19.1 - Enamelled Cast Iron and Enamelled Steel Plumbing Fixtures; 2013

F. ASME A112.19.3 - Stainless Steel Plumbing Fixtures (Designed for Residential Use); The American Society of Mechanical Engineers; 2008 (R2013).

G. ASME A112.19.4M - Porcelain Enameled Formed Steel Plumbing Fixtures; The American Society of Mechanical Engineers; 1994 (R2004).

H. ASME A112.19.5 - Flush Valves and Spuds for Water-Closet Bowls, Urinals, and Tanks; The American Society of Mechanical Engineers; 2011.

I. ASME A112.19.15 - Bathtub/Whirlpool Bathtubs with Pressure Sealed Doors; 2012.

J. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices; 2004.

K. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).

L. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2014.

M. ASTM D696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between - 30 C and 30 C with a Vitreous Silica Dilatometer; 2008.

N. ASTM D785 - Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials; 2008

O. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

P. IAPMO Z124 - Plastic Plumbing Fixtures; 2012.

Q. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; International Surface Fabricators Association; 2013.

R. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

S. NSF 61 - Drinking Water System Components - Health Effects; 2014.

T. NSF 372 - Drinking Water System Components - Lead Content; 2011.

1.04 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.

B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

C. Sustainable Design Documentation: Submit appropriate evidence that materials used in potable water systems comply with the specified requirements.

D. Samples: Submit two lavatory supply fittings.

E. Manufacturer's Instructions: Indicate installation methods and procedures.

F. Maintenance Data: Include fixture trim exploded view and replacement parts lists.

G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Toilet Seats: One of each type and size.
   3. Flush Valve Service Kits: One for each type and size.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept fixtures on site in factory packaging. Inspect for damage.

B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.08 WARRANTY

A. See Section 01 77 00 - Closeout Procedures, for additional warranty requirements.

B. Provide five year manufacturer warranty for electric water cooler.

PART 2 PRODUCTS

2.01 GENERAL

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

B. Water Efficiency: EPA WaterSense label is required for all water closets, urinals, and lavatory faucets.

2.02 FIXTURES

A. Refer to Plumbing Connection Schedule on Drawings for fixture product data and details.

B. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

B. Verify that electric power is available and of the correct characteristics.

3.02 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.

C. Install components level and plumb.

D. Install and secure fixtures in place with wall supports and bolts.

E. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 90 05, color to match fixture.

F. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 92 00, color to match fixture.

G. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

H. All plumbing fixtures shall be trapped and vented according to the Oregon Plumbing Specialty Code. Air admittance valves are prohibited.

3.04 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.05 CLEANING

A. Clean plumbing fixtures and equipment.

3.06 PROTECTION

A. Protect installed products from damage due to subsequent construction operations.

B. Do not permit use of fixtures by construction personnel.

C. Repair or replace damaged products before Date of Substantial Completion.

3.07 FIXTURE HEIGHTS

A. Fixture Heights: Install fixtures to heights above finished floor as indicated on architectural elevations and as required to meet ADA Guidelines.

END OF SECTION

SECTION 23 05 13

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single and three phase electric motors.

1.02 REFERENCE STANDARDS

A. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 2014.

B. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. Oregon Energy Efficiency Specialty Code - Motor Efficiency Requirements; 2014.

1.03 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.

B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.

C. Test Reports: Indicate test results verifying nominal efficiency and power factor for three phase motors larger than 1/2 horsepower.

D. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.

E. Operation Data: Include instructions for safe operating procedures.

F. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.04 QUALITY ASSURANCE

A. Conform to NFPA 70.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

PART 2 PRODUCTS

2.01 GENERAL CONSTRUCTION AND REQUIREMENTS

A. Type: ECM, or as specified.

B. Nominal Efficiency:
   1. Comply with Oregon Energy Code.

C. Construction:
   1. Open drip-proof type except where specifically noted otherwise.
   2. Design for continuous operation in 40 degrees C environment.
   3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.

D. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.

E. Wiring Terminations:
   1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
   2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.

C. Check line voltage and phase and ensure agreement with nameplate.

END OF SECTION

SECTION 23 05 19

METERS & GAGES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pressure gages and pressure gage taps.

B. Thermometers and thermometer wells.

C. Test plugs.

1.02 RELATED REQUIREMENTS

A. Section 23 09 00 - Controls

1.03 REFERENCE STANDARDS

A. ASME B40.100 - Pressure Gauges and Gauge Attachments; The American Society of Mechanical Engineers; 2013.

B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014.

C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers; 2014.

D. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.

B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.05 FIELD CONDITIONS

A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 PRODUCTS

2.01 PRESSURE GAGES

A. Manufacturers: Ashcroft Type 3005 or 3006p, Trerice, Weiss, Weksler, or approved.

B. Pressure Gages: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
   1. Case: ABS or Steel with brass bourdon tube.
   2. Size: 2-1/2 inch diameter.
   3. Mid-Scale Accuracy: Grade B 3-2-3 percent.
   4. Scale: Psi.

2.02 PRESSURE GAGE TAPPINGS

A. Gage Cock: Tee or lever handle, brass for maximum 150 psi.

B. Pulsation Damper: Pressure snubber, brass with 1/4 inch connections.

2.03 STEM TYPE THERMOMETERS

A. Manufacturers: Ashcroft, Trerice, Weiss, Weksler, or approved.

B. Thermometers - Fixed Mounting: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish.
   1. Size: 9 inch scale.
   2. Window: Clear Lexan.
   3. Accuracy: 2 percent, per ASTM E77.
   4. Calibration: Degrees F.

2.04 THERMOMETER SUPPORTS AND THERMOWELLS

A. Socket: Brass separable sockets for thermometer stems and DDC furnished temperature sensors with or without extensions as required, and with cap and chain.

2.05 TEST PLUGS

A. Manufacturers: Pete's Plug, Sisco, Waymire, Trerice or approved.

B. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with Nordel core for temperatures up to 350 degrees F.

C. Test Kit: Carrying case, internally padded and fitted containing one 2-1/2 inch diameter pressure gages, one gage adapters with 1/8 inch probes, two 1 inch dial thermometers.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install pressure gages with pulsation dampers. Provide gage cock to isolate each gage. Provide siphon on gages in steam systems. Extend nipples and siphons to allow clearance from insulation.

C. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets or install at elbows. Ensure sockets allow clearance from insulation.

D. Provide instruments with scale ranges selected according to service with largest appropriate scale.

E. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

F. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.

G. Locate test plugs where indicated. Mount so that they are accessible for insertion of a test probe.

END OF SECTION

SECTION 23 05 49

VIBRATION & SEISMIC CONTROLS FOR HVAC

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Intent

1. All mechanical equipment, piping and ductwork as noted on the equipment schedule or in the specification shall be mounted on vibration isolators to prevent the transmission of vibration and mechanically transmitted sound to the building structure .
2. Vibration isolators shall be selected in accordance with the weight distribution so as to produce reasonably uniform deflections.
3. All mechanical equipment, piping and ductwork as noted on the equipment schedule, in the specification or as required by code shall be held in place during a seismic event.

1.02 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures for submittal procedures.

B. The manufacturer of vibration isolation and seismic restraints shall provide submittals for products as follows:

1. Descriptive Data:
   a. Catalog cuts or data sheets on vibration isolators and specific restraints detailing compliance with the specification.
   b. Detailed schedules of flexible and rigidly mounted equipment, showing vibration isolators and seismic restraints by referencing numbered descriptive drawings.
   c. Shop Drawings:
      1) Submit fabrication details for equipment bases including dimensions, structural member sizes and support point locations.
      2) Provide all details of suspension and support for ceiling hung equipment.
      3) Where walls, floors, slabs or supplementary steel work are used for seismic restraint locations, details of acceptable attachment methods for ducts, conduit and pipe shall be included and approved before the condition is accepted for installation. Restraint manufacturers' submittals shall include spacing, static loads and seismic loads at all attachment and support points.
      4) Provide specific details of seismic restraints and anchors; include number, size and locations for each piece of equipment.
   d. Seismic Certification and Analysis:
      1) Seismic restraint calculations shall be provided for all connections of equipment to structure. Calculations shall be stamped by a registered professional engineer with at least five years of seismic design experience, licensed in the state of the job location.
      2) All restraining devices shall have a preapproval number from California OSHPD or another recognized government agency showing maximum restraint ratings. Where pre-approved devices are not available, submittals based on independent testing or calculations stamped by a registered professional engineer with at least five years of seismic design experience and licensed in the state of the job location are required.

C. Contractor shall provide to the City of Eugene Building and Permit Services Department as Supplemental Information all seismic details and calculations required at each Site. This information is required before Permits can be issued. Any additional permit fees will be covered by Owner . Where details are the same at multiple Sites, copies may be submitted.

Where new roof curbs are installed, details and calculations shall include attachment of curb to structure as well as attachment of equipment to curb. Where adaptor curbs are installed details and calculations shall include attachment of adaptor curb to existing curb as well as attachment of equipment to adaptor curb.

1.03 REGULATORY REQUIREMENTS

A. Typical Applicable Codes and Standards
   1. Seismic design shall be in accordance with the 2014 Oregon Structural Specialty Code.
   2. ACSE 7-05 as referenced in OSSC 2014.

1.04 MANUFACTURER'S RESPONSIBILITY

A. Manufacturer of vibration isolation and seismic control equipment shall have the following responsibilities:
   1. Determine vibration isolation and seismic restraint sizes and locations.
   2. Provide vibration isolation and seismic restraints as scheduled or specified.
   3. Provide calculations and materials if required for restraint of non-isolated equipment.
   4. Provide installation instructions, drawings and trained field supervision to insure proper installation and performance.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Mason Industries, as basis of design

B. CalDyn

C. Amber-Booth

D. Kinetics Noise Control

E. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PRODUCT DESCRIPTIONS

A. Vibration Isolators
   1. SPECIFICATION 1: Two layers of 3/4" thick neoprene pad consisting of 2" square waffle modules separated horizontally by a 16 gauge galvanized shim. Load distribution plates shall be used as required. Pads shall be Type Super "W" pads as manufactured by Mason Industries, Inc.
   2. SPECIFICATION 10: Hangers shall consist of rigid steel frames containing a steel spring with general characteristics as in Specification B seated in a steel washer reinforced neoprene cup on the bottom. The neoprene cup shall have a neoprene bushing projecting through the steel box. Hanger shall include an upper neoprene element. Spring diameters and hanger box lower hole sizes shall be large enough to permit the hanger rod to swing through a 30 arc from side to side before contacting the rod bushing and short circuiting the spring. Hangers shall be Type 30N. At seismic brace locations hangers shall be Type RW30N as manufactured by Mason Industries, Inc.

B. Seismic Restraints
   1. SPECIFICATION 12: Seismic sway braces shall consist of galvanized steel aircraft cables or steel angles/channels. Cables braces shall be designed to resist seismic tension loads and steel braces shall be designed to resist both tension and compression loads with a minimum safety factor of 2. Brace end connections shall be steel assemblies that swivel to the final installation angle. Rod braces when required shall be clamped to the threaded hanger rods at the seismic sway brace locations utilizing a minimum of two ductile iron clamps. Do not mix cable and steel braces on the same system or equipment. Brace

assemblies and rod clamps shall have an Anchorage Preapproval "OPA" Number from OSHPD in the State of California verifying the maximum certified load ratings. Cable brace assemblies shall be Type SCB or SCBH, steel brace assemblies shall be Type SSB, SSBS or SSRF, and rod clamps shall be Type UC all as manufactured by Mason Industries, Inc.

PART 3 - EXECUTION

3.01 GENERAL

A. All vibration isolators and seismic restraint systems shall be installed in strict accordance with the manufacturer's written instructions and all certified submittal data.

B. Installation of vibration isolators and seismic restraints shall not cause any change of position of equipment, piping or ductwork resulting in stresses or misalignment.

C. No rigid connections between equipment and the building structure shall be made that degrades the noise and vibration control system herein specified.

D. Any conflicts with other trades which will result in rigid contact with equipment or piping due to inadequate space or other unforeseen conditions should be brought to the architects/engineers attention prior to installation. Corrective work necessitated by conflicts after installation shall be at the responsible contractor’s expense.

3.02 SEISMIC BRACING REQUIREMENTS

A. Mechanical and electrical components shall meet the requirements of OSSC 2014 as noted in this section.

B. Requirements vary for systems with Ip=1.0 or 1.5. All components shall be assigned a component importance factor, Ip equal to 1.0 except the component importance factor Ip shall be taken as 1.5 where any of the following conditions apply:
   1. The component is required to function for life-safety purposes after an earthquake, including fire protection sprinkler systems.
   2. The component contains hazardous materials.
   3. The component is in or attached to an Occupancy Category IV structure and it is needed for continued operation of the facility or its failure could impair the continued operation of the facility.

   Occupancy Categories are defined in OSSC 2014 Table 1604.5

C. For the purpose of this project ductile pipe is copper, steel, aluminum and cast iron no-hub pipe joined with approved elastomeric couplings.

D. Components suspended from above are not required to meet the requirements of this section provided that they cannot be damaged or cannot damage any other component when subject to seismic motion and they have ductile or articulating connections to the structure at the point of attachment. The gravity design load for these items shall be three times their operating load.

E. Seismic restraints can be excluded from the following when Ip=1.0:
   1. Mechanical and electrical components where flexible connections are provided between the components and associated ductwork, piping and conduit, and the system components are mounted at 4 ft. or less above floor or roof level and weigh 400 lbs. or less.
   2. Mechanical and electrical components weighing 75 lbs. or less where flexible connections are provided between the components and associated ductwork, piping and conduit.
   3. Piping, ductwork and electrical distribution systems weighing 5 lbs./ft or less where flexible connectors are provided between the component and the piping, ductwork or electrical distribution system.

4. Suspended HVAC ducts provided they meet either of the following conditions for the entire run of duct, the hangers are 12 in. or less in length from the top of duct to the supporting structure detailed to avoid significant bending to the hangers or their connections or the cross-sectional area is less than 6 ft2 .
5. Ductile piping with a nominal pipe size of 3 in. or less.

F. Seismic restraints can be excluded from the following when Ip=1.0 or 1.5:
1. Equipment items installed in-line with the duct system (e.g. fans, heat exchangers, and humidifiers) with an operating weight equal to or less than 75 lbs. Unbraced piping attached to in-line equipment shall be provided with adequate flexibility to accommodate differential displacements.
2. Piping supported by rod hangers provided that all hangers in the pipe run are 12 in. or less in length from the top of the pipe to the supporting structure and the pipe can accommodate the expected deflections. Rod hangers shall not be constructed in a manner that would subject the rod to bending moments.

G. Additional requirements for ductwork systems designated with an Ip=1.5:
1. In addition to attachment and supports, ductwork systems designated as having an Ip=1.5 themselves shall be designed to meet the force and displacement requirements of this section.
2. HVAC duct systems fabricated and installed according to approved standards meet the lateral bracing requirements of this section, include brace exclusions for ductwork under 6 sq. ft. area, ductwork supported 12” or less from the structure.

H. Additional requirements for piping systems designated with an Ip=1.5:
1. Seismic braces can be excluded from ductile piping with Ip=1.5 and a nominal pipe size of 1 in. or less where provisions are made to protect the piping from impact of larger piping or other equipment.
2. In addition to attachment and supports, piping systems designated as having an Ip=1.5 themselves shall be designed to meet the force and displacement requirements of this section.
3. Piping designated as having an Ip=1.5, but not designed in accordance with ASME B31 shall meet the maximum stress levels shown in ASCE 7-05 and shall have adequate flexibility between support attachment points to the structure, ground, equipment or other piping.

I. Consider additional Fp factors:
1. The resulting seismic force calculated from the above equations and tables is based on design strength loads. Initial use of these forces conflicts with the data available for the anchorage components used to resist the seismic forces that are based on allowable stress design (working stress design). Unless design strength values for anchor components are available, divide the resulting seismic force by 1.4 before designing the anchoring component.
2. Components mounted on vibration isolation systems shall have bumper restraint or snubber in each horizontal direction. If the maximum clearance (air gap) between the equipment support frame and the restraint is greater than 1/4” the design force shall be taken as 2xFp. If the maximum clearance specified on the construction documents is 1/4", the design force may be taken as Fp .
3. Where component anchorage is provided by shallow expansion anchors, shallow chemical anchors or shallow cast-in-place anchors (where embedment is less than 8xD) a value of Rp=1.5 shall be used.
4. Anchors embedded in concrete shall be designed for 1.3 times the force.

J. Consider additional requirements:
   1. The design strength of anchors in concrete shall be determined in accordance with ACI-318-02; the only post-installed anchors currently meeting ACI-318-02 requirements are Hilti HDA, HSL and Kwik Bolt TZ.
   2. Expansion anchors shall not be used for mechanical equipment rated over 10 hp unless vibration isolators are provided.
   3. Mechanical and electrical components shall meet the force and seismic relative displacement requirements. Design drift can be taken as 1% of the story height. For example, differential motion from floor to ceiling for a 20' story height is 2.4 inches. Suspended piping and ductwork attached to floor mounted equipment shall have the inherent flexibility or flexible connectors to allow differential motion without overloading the component connection.
   4. Mechanical and electrical components shall be designed to resist seismic forces. Components with an Ip=1.5 which shall remain operable shall demonstrate operability by shake table testing or experience data. The manufacturer's certificate of compliance shall be submitted to the authority having jurisdiction. Additional requirements for a quality assurance plan, special inspection and certification requirements are in OSSC 2014.

3.03 EQUIPMENT SCHEDULE

A. Base mounted equipment: Specifications 1

B. Base mounted equipment over 400 pounds: Provide seismic attachment to structure or roof curb.

C. Suspended Air Handlers: Specifications 10 and 12

END OF SECTION

SECTION 23 05 53

IDENTIFICATION FOR HVAC EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Pipe Markers.

D. Ceiling Markers.

1.02 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.

1.03 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C. Product Data: Provide manufacturers catalog literature for each product required.

D. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Brady, Seton, Champion or approved.

B. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 NAMEPLATES

A. Description: Laminated three-layer plastic with engraved letters.
   1. Letter Color: White.
   2. Letter Height: 1/4 inch.
   3. Background Color: Black.

2.03 TAGS

A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

C. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 PIPE MARKERS

A. Color: Conform to ASME A13.1.

B. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

2.05 CEILING TACKS

A. Description: Round adhesive stickers, color coded.

B. Color code as follows:
   1. HVAC Equipment: Yellow.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with Section 09 9000 for stencil painting.

3.02 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

D. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.

E. Identify valves in main and branch piping with tags. Tag is not required for equipment isolation valves when valve is located within 6 feet of equipment.

F. Identify air terminal units and radiator valves with numbered tags.

G. Identify piping, concealed or exposed, with plastic tape pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

H. Provide ceiling markers to locate fan coil units, terminal units, or dampers above T-bar type panel ceilings. Locate on grid near equipment.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preconstruction reading of existing air systems.

B. Preconstruction reading of existing hydronic systems.

C. Testing, adjustment, and balancing of air systems.

D. Testing, adjustment, and balancing of completed air systems.

E. Testing, adjustment, and balancing of completed hydronic systems

1.02 REFERENCE STANDARDS

A. AABC MN-1 - AABC National Standards for Total System Balance; Associated Air Balance Council; 2002.

B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 2008.

C. NEBB (TAB) - Procedural Standard for Testing Adjusting and Balancing of Environmental Systems; National Environmental Balancing Bureau; 2005, Seventh Edition.

D. SMACNA (TAB) - HVAC Systems Testing, Adjusting, and Balancing; Sheet Metal and Air Conditioning Contractors' National Association; 2002.

1.03 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.

B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.

C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
   1. Submit to Architect.
   2. Submit six weeks prior to starting the testing, adjusting, and balancing work.
   3. Include at least the following in the plan:
      a. Preface: An explanation of the intended use of the control system.
      b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
      c. Identification and types of measurement instruments to be used and their most recent calibration date.
      d. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
      e. Final test report forms to be used.

D. Preconstruction Conditions Report
   1. Measure existing air systems as indicated on drawings prior to demolition of structure, finishes, or equipment. The intention is to capture an accurate assessment of existing HVAC conditions.
   2. Complete readings two weeks after notice to proceed and prior to demolition and preparation of other equipment submittals.
   3. Submit electronic copy of report directly to Engineer for review and comment. Note that results of report may necessitate changes to original design.

E. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
   1. Submit to the the Commissioning Authority within two weeks after completion of testing, adjusting, and balancing.
   2. Revise TAB plan to reflect actual procedures and submit as part of final report.
   3. Submit electronic draft copy of report for review by Mechanical Engineer prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
   4. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
   5. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
   6. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
   7. Units of Measure: Report data in I-P (inch-pound) units only.
   8. Test Reports: Indicate data on AABC-MN-1 forms, forms perpared following ASHRAE Std 111, or NEBB forms.
   9. Include the following on the title page of each report:
      a. Name of Testing, Adjusting, and Balancing Agency.
      b. Address of Testing, Adjusting, and Balancing Agency.
      c. Telephone number of Testing, Adjusting, and Balancing Agency.
      d. Project name.
      e. Project location.
      f. Project Architect.
      g. Project Engineer.
      h. Project Contractor.
      i. Project altitude.
      j. Report date.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
   1. AABC MN-1, AABC National Standards for Total System Balance.
   2. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
   3. SMACNA (TAB).

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.

D. TAB Agency Qualifications:
   1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
   2. Having minimum of three years documented experience.

3. Certified by one of the following:
    a. AABC, Associated Air Balance Council: www.aabchq.com; upon completion submit AABC National Performance Guaranty.
    b. NEBB, National Environmental Balancing Bureau: www.nebb.org.
    c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org.

E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

F. Pre-Qualified TAB Agencies:
1. AIR Inc..
2. Substitutions: See Section 01 60 00 - Product Requirements.

3.02 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
1. Systems are started and operating in a safe and normal condition.
2. Temperature control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Air coil fins are cleaned and combed.
8. Access doors are closed and duct end caps are in place.
9. Air outlets are installed and connected.
10. Duct system leakage is minimized.
11. Hydronic systems are flushed, filled, and vented.
12. Pumps are rotating correctly.
13. Proper strainer baskets are clean and in place.
14. Service and balance valves are open.

B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

C. Beginning of work means acceptance of existing conditions.

3.03 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.

3.04 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.05 RECORDING AND ADJUSTING

A. Field Logs: Maintain written logs including:
1. Running log of events and issues.

2. Discrepancies, deficient or uncompleted work by others.
3. Contract interpretation requests.
4. Lists of completed tests.

B. Ensure recorded data represents actual measured or observed conditions.

C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

D. Mark on the drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.

E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.06 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

B. For preconstruction readings, make no initial adjustments to control or volume dampers, fan belts and sheaves, or fan speed control devices. Where directed, make adjustments to existing control devices for subsequent measurement.

C. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

D. Measure air quantities at air inlets and outlets.

E. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

F. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

G. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

H. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

3.07 WATER SYSTEM PROCEDURE

A. Adjust water systems to provide required or design quantities.

B. For preconstruction readings, make no initial adjustments to balancing valves. Where directed, open balance valves for subsequent measurement.

C. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

D. Effect system balance with automatic control valves fully open to heat transfer elements.

E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.08 **PRE-CONSTRUCTION SCOPE**

A. Take readings of the following, as noted on drawings:
   1.

3.09 **POST-CONSTRUCTION SCOPE**

A. Test, adjust, and balance the following:
   1. Domestic hot water recirc pump P-5 and all branches of recirculating system.
   2. Heat pump HP-1
      a. Air flow during normal operation with outside air and exhaust air dampers open.
      b. Air flow during heat pump operation with outside air and heating coil dampers open, exhaust air damper closed.
      c. Inlet and outlet air temperatures during operation with both compressors running.
   3. Pumps P-1, P-2, P-3, P-4 and P-6 operation, balanced with flow controls to attain the scheduled water flow rates. P-1 and P-2 flow rates set at full voltage output from DDC system.

3.10 MINIMUM DATA TO BE REPORTED

A. Electric Motors:
   1. Manufacturer
   2. Model/Frame
   3. HP/BHP
   4. Phase, voltage, amperage; nameplate, actual, no load
   5. RPM
   6. Service factor
   7. Starter size, rating, heater elements
   8. Sheave Make/Size/Bore

B. V-Belt Drives:
   1. Identification/location
   2. Required driven RPM
   3. Driven sheave, diameter and RPM
   4. Belt, size and quantity
   5. Motor sheave diameter and RPM
   6. Center to center distance, maximum, minimum, and actual

C. Pumps:
   1. Identification/number
   2. Manufacturer
   3. Size/model
   4. Impeller
   5. Service
   6. Design flow rate, pressure drop, BHP
   7. Actual flow rate, pressure drop, BHP
   8. Discharge pressure
   9. Suction pressure
   10. Total operating head pressure
   11. Shut off, discharge and suction pressures
   12. Shut off, total head pressure

D. Heating Coils:

1. Identification/number
2. Location
3. Service
4. Manufacturer
5. Air flow, design and actual
6. Air pressure drop, design and actual

E. Air Moving Equipment:
1. Location
2. Manufacturer
3. Model number
4. Serial number
5. Arrangement/Class/Discharge
6. Air flow, specified and actual
7. Return air flow, specified and actual
8. Outside air flow, specified and actual
9. Total static pressure (total external), specified and actual
10. Inlet pressure
11. Discharge pressure
12. Sheave Make/Size/Bore
13. Number of Belts/Make/Size
14. Fan RPM

END OF SECTION

SECTION 23 07 13

DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.

B. Duct Liner.

1.02 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.

B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.

C. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2014.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

F. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.

G. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.

H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum five years of experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.06 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, FLEXIBLE

A. Manufacturer:
   1. Knauf Fiber GlassDuct Wrap
   2. Johns Manville CorporationMicrolite
   3. Owens Corning CorpSoftR
   4. CertainTeed CorporationSoftTouch
   5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. 'K' value:.27 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Maximum Water Vapor Absorption: 5.0 percent by weight.
   3. Maximum Service Temperature: 250 degrees F.

C. Vapor Barrier Jacket:
   1. Moisture Vapor Permeability: 0.029 ng/Pa s m (0.02 perm inch), when tested in accordance with ASTM E96/E96M.
   2. Secure with pressure sensitive tape.

D. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

2.03 RECTANGULAR DUCT LINER

A. Manufacturers:
   1. Knauf Fiber Glass: Duct LIner EM
   2. Johns Manville Corporation: Linacoustic RC
   3. Owens Corning Corp: QuietR Acoustic Duct Liner.
   4. CertainTeed Corporation: ToughgardR Duct Liner

B. Insulation: Incombustible glass fiber complying with ASTM C 1071; flexible blanket; impregnated surface and edges coated with poly vinyl acetate polymer or acrylic polymer shown to be fungus and bacteria resistant by testing to ASTM G 21.
   1. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
   2. Service Temperature: Up to 250 degrees F.
   3. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.

C. Adhesive: Waterproof, fire-retardant type, ASTM C916.

D. Liner Fasteners: Galvanized steel, self-adhesive pad with integral head.

2.04 ROUND DUCT LINER

A. Manufacturers:
   1. Manville Spiracoustic Plus VSD
   2. Owens Corning Quiet Zone
   3. United McGill Double-Wall Acousti K-27
   4. United McGill Single-Wall with Acousti-line liner

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that ducts have been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Insulated ducts conveying air below ambient temperature:
   1. Provide insulation with vapor barrier jackets.
   2. Finish with tape and vapor barrier jacket.
   3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.

C. External Duct Insulation Application:
   1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
   2. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
   3. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
   4. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

D. Duct and Plenum Liner Application:
   1. Adhere insulation with adhesive for 90 percent coverage.
   2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
   3. Seal and smooth joints. Seal and coat transverse joints.
   4. Seal liner surface penetrations with adhesive.
   5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

3.03 SCHEDULES

A. Supply Ducts where not exposed to risk of damage associated with routine maintenance: Exterior wrap, minimum installed R value per OSSC Chapter 13.

B. Return Ducts within ten feet of air handling equipment: Liner, 1 inch.

END OF SECTION

SECTION 23 07 19

HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 23 21 13 - Hydronic Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.

D. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus; 2013.

E. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.

F. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2013.

G. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.

H. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2015.

I. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).

J. ASTM D1056 - Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber; 2014.

K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

L. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

M. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER

A. Manufacturers:
   1. Johns Manville Corporation MicroLok HP
   2. Owens Corning Corp SSL II
   3. Knauf Earthwool
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
   1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
   2. Maximum Service Temperature: 850 degrees F.
   3. Maximum Moisture Absorption: 0.2 percent by volume.

C. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E 96/E 96M of 0.02 perm-inches, with self-sealing longitudinal closure laps (SSL) and butt strips. Shall comply with Oregon Revised Statute 853.085 by containing less than 0.10% decabromodiphenyl ether by mass.

2.03 HYDROUS CALCIUM SILICATE

A. Manufacturers:
   1. IIG Thermo-12 Gold
   2. Pabco
   3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: ASTM C533 and ASTM C795; rigid molded, asbestos free, gold color.
   1. 'K' Value: ASTM C177 and C518; 0.40 at 300 degrees F, when tested in accordance with ASTM C177 or ASTM C518.
   2. Maximum Service Temperature: 1200 degrees F.
   3. Density: 15 lb/cu ft.

2.04 POLYETHYLENE

A. Manufacturers:
   1. Armacell Tubolit
   2. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: Flexible closed-cell polyethylene tubing, slit lengthwise for installation, complying with applicable requirements of ASTM D1056.
   1. 'K' Value: ASTM C177; 0.25 at 75 degrees F.
   2. Maximum Service Temperature: 300 degrees F.
   3. Density: 2 lb/cu ft.
   4. Maximum Moisture Absorption: 1.0 percent by volume.
   5. Moisture Vapor Permeability: 0.05 perm inch, when tested in accordance with ASTM E96/E96M.

6. Connection: Contact adhesive.

2.05 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:
   1. Armacell International AP Armaflex
   2. K-Flex Insultube
   3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 3; use molded tubular material wherever possible.
   1. Minimum Service Temperature: Minus 40 degrees F.
   2. Maximum Service Temperature: 220 degrees F.
   3. Connection: Waterproof vapor barrier adhesive.

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.06 JACKETS

A. PVC Plastic Valve and Fitting Covers
   1. Manufacturers:
      a. Johns Manville Corporation Zeston 2000 Series
      b. Knauf Proto
      c. Speedline
      d. Substitutions: See Section 01 60 00 - Product Requirements.
   2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: 0 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 10 mil.
      e. Connections: Pressure sensitive color matching vinyl tape, tacks or welding adhesive.

B. Fiberglass Valve Covers
   1. Description: Woven fiberglass jacketing around 2” thick fiberglass batt.
   2. Attachment: Stainless steel wire and lacing hooks.

2.07 JACKETS FOR EXTERIOR USE

A. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
   1. Thickness: 0.016 inch sheet.
   2. Finish: Smooth.
   3. Joining: Longitudinal slip joints and 2 inch laps.
   4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
   5. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

B. Stainless Steel Jacket: ASTM A666, Type 304 stainless steel.
   1. Thickness: 0.010 inch.
   2. Finish: Smooth.
   3. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

2.08 INSERTS AND SHIELDS

A. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.

B. Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.

C. Insert material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Exposed Piping: Locate insulation and cover seams in least visible locations.

C. Insulated pipes conveying fluids below ambient temperature; insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

D. Glass fiber insulated pipes conveying fluids below ambient temperature:
   1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Ensure that jacket vapor barrier is not broken at hangers, clamps, and inserts.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

E. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation. Insulate all other fittings,

F. For hot piping conveying fluids over 140 degrees F: Insulate all piping including fittings, valves, unions, flanges, and strainers.
   1. Glass fiber insulated pipes conveying fluids above ambient temperature.
      a. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive.
      b. Insulate fittings, joints, strainers, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers. Valves larger than 2 inches may be insulated with woven fiberglass jacketing and fiberglass batts.

G. Inserts and Shields:
   1. Application: Piping 1-1/2 inches diameter or larger.
   2. Insert location: Between support shield and piping and under the finish jacket.

H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 84 00.

I. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping. Provide two coats of UV resistant finish for flexible elastomeric cellular insulation without jacketing.

3.03 SCHEDULE

A. Heating Systems:

1. Heating Water Supply and Return: Glass fiber
   a. 1.5 inch thickness for piping up to 1.5 inch diameter and 2 inch thickness for larger pipe.

END OF SECTION

SECTION 23 09 00

CONTROLS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The general contractor and his subs shall coordinate with the Owner's DDC contractor, who will be direct-hired by the District to alter/extend the existing DDC system to control new HVAC and plumbing pumping equipment added by this project. DDC contractor will be required to coordinate with General and General's subcontractors in manner similar to a DDC contractor being a sub to General. Both parties shall coordinate schedules with one another. Owner's DDC contractor will be Clima-Tech of Oregon, contact is Henri Ostiguy 503-905-0092.

B. Control valves and temperature sensor wells in piping shall be furnished by the Owner's DDC contractor but installed by this project's mechanical contractor. Locate per mechanical drawings.

C. For use by DDC contractor, General Contractor shall provide single switch box and ¾" conduit to above accessible ceiling level in all new walls requiring space temperature sensor. Locate per mechanical drawings.

D. General Contractor shall provide one 120V, 20A circuit connection to a DDC power supply in each new mechanical room. Power supply shall be provided by DDC contractor.

E. Note that DDC contractor does not furnish or install dampers, smoke detectors, magnetic motor starters, VFDs, fire/smoke dampers or actuators, or exhaust fan off-cycle 2-position isolation dampers or actuators.

F. All programing for sequence of operation, graphics, and database setup shall be the responsibility of Owner or Owner's DDC contractor.

G. General Contractor will provide construction site power, other temporary construction site services, and waste disposal facilities such as a dumpster, for use by Owner's DDC Contractor.

1.02 WORK BY OTHERS/RESPONSIBILITIES OF OWNER

A. Owner will set up database as required.

B. Owner will generate programs, graphics, and database modification for all modules to facilitate contractor's point testing/commissioning.

C. Sequence of operation testing/commissioning will be solely the responsibility of Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 23 21 13

HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hydronic system requirements.

B. Pipe and pipe fittings for:
   1. Heating water piping system.
   2. Equipment drains and overflows.

C. Pipe hangers and supports.

D. Unions, flanges, mechanical couplings, and dielectric connections.

E. Valves:
   1. Ball valves.
   2. Butterfly valves.
   3. Check valves.

1.02 RELATED REQUIREMENTS

A. Section 08 31 00 - Access Doors and Panels.

B. Section 22 07 19 - Plumbing Piping Insulation.

C.

1.03 REFERENCE STANDARDS

A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2012 (ANSI B16.18).

B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.

C. ASME B31.9 - Building Services Piping; 2014 (ANSI/ASME B31.9).

D. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2001 (R2005).

E. ASME B31.9 - Building Services Piping; The American Society of Mechanical Engineers; 2008 (ANSI/ASME B31.9).

F. ASTM B32 - Standard Specification for Solder Metal; 2008.

G. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.

H. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.

I. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015.

J. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2009.

K. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2013.

L. ASTM D2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80; 2006.

M. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings; 1996 (Reapproved 2010).

N. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).

O. AWS A5.8/A5.8M - Specification for Filler Metals for Brazing and Braze Welding; American Welding Society; 2011 and errata.

P. AWS A5.8/A5.8M - Specification for Filler Metals for Brazing and Braze Welding; American Welding Society; 2004 and errata.

Q. AWWA C606 - Standard Specification for Grooved and Shouldered Joints; American Water Works Association; 2006.

R. MSS SP-58 - Pipe Hangers and Supports - Materials, Design and Manufacture, Selection, Application, and Installation; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2009.

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Product Data: Include data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.

C. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

D. Substitutions: See Section 01 60 00 - Product Requirements.

1.05 REGULATORY REQUIREMENTS

A. Conform to ASME B31.9 code for installation of piping system.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

A. Comply with ASME B31.9 and applicable federal, state, and local regulations.

B. Piping: Provide piping, fittings, hangers and supports as required, as indicated, and as follows:
   1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
   2. Use non-conducting dielectric connections whenever jointing dissimilar metals.
   3. Grooved mechanical joints may be used in accessible locations only.
      a. Accessible locations include those exposed on interior of building, in pipe chases, and in mechanical rooms, aboveground outdoors, and as approved by Architect.
      b. Use rigid joints unless otherwise indicated.
   4. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.
   5. Provide pipe hangers and supports in accordance with ASME B31.9 unless indicated otherwise.

C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.

D. Valves: Provide valves where indicated:

2.02 HEATING WATER PIPING, ABOVE GROUND

A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn, using one of the following joint types:
   1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.
      a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
      b. Braze: AWS A5.8/A5.8M BCuP copper/silver alloy.
   2. Grooved Joints: AWWA C606 grooved tube, fittings of same material, and copper-tube-dimension mechanical couplings.
   3. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.

B. Polypropylene Pressure Piping: PP-R, ASTM F2389, SDR 11 with faser-composite
   1. Joints: Heat fusion
   2. Manufacturers: Aquatherm Climatherm, or approved.

2.03 EQUIPMENT DRAINS AND OVERFLOWS

A. PVC Pipe: ASTM D1785, Schedule 40, or ASTM D2241, SDR 21 or 26.
   1. Fittings: ASTM D2466 or D2467, PVC.
   2. Joints: Solvent welded in accordance with ASTM D2855.

2.04 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.

B. Conform to ASME B31.9.

C. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Carbon steel, adjustable swivel, split ring.

D. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.

E. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.

F. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.

G. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

H. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods, cast iron roll.

I. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.

J. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.

K. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.

L. Vertical Support: Steel riser clamp.

M. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

N. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

O. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

P. In grooved installations, use rigid couplings with offsetting angle-pattern bolt pads or with wedge shaped grooves in header piping to permit support and hanging in accordance with ASME B31.9.

2.05 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

A. Unions for Pipe 2 Inches and Under:
   1. Ferrous Piping: 150 psig malleable iron, threaded.
   2. Copper Pipe: Bronze, soldered joints.

B. Flanges for Pipe Over 2 Inches:
   1. Ferrous Piping: 150 psig forged steel, slip-on.
   2. Copper Piping: Bronze.
   3. Gaskets: 1/16 inch thick preformed neoprene.

C. Dielectric Connections: Union or waterway fitting with water impervious isolation barrier and one galvanized or plated steel end and one copper tube end, end types to match pipe joint types used.

2.06 BALL VALVES

A. Manufacturers:
   1. Hammond 8301 (threaded) or 8311 (soldered)
   2. Apollo
   3. Nibco
   4. Milwaukee
   5. Legend
   6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Up To and Including 2 inches:
   1. Bronze two piece body, full port, chrome plated brass ball, teflon seats and stuffing box ring, lever handle with balancing stops, solder or threaded ends with union.

2.07 BUTTERFLY VALVES

A. Manufacturers:
   1. Hammond 5211
   2. Apollo
   3. Nibco
   4. Crane
   5. Milwaukee
   6. Legend
   7. Substitutions: See Section 01 60 00 - Product Requirements.

B. Body: Cast or ductile iron with resilient replaceable EPDM seat, wafer, lug, or grooved ends, extended neck.

C. Disc: Construct of aluminum bronze, chrome plated ductile iron, stainless steel, ductile iron with EPDM encapsulation, or Buna-N encapsulation.

D. Body: 200# WOG cast or ductile iron with resilient replaceable EPDM seat, wafer or lug ends, extended neck.

E. Disc: Aluminum bronze.

F. Stem: Blow-out proof, stainless steel, two piece.

G. Operator: lever or wheel depending on valve size.

2.08 SWING CHECK VALVES

A. Manufacturers: Hammond as noted, Nibco, Milwaukee, Legend, or approved.
   1. Hammond as noted
   2. Apollo
   3. Nibco
   4. Milwaukee
   5. Legend
   6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Up To and Including 2 Inches:
   1. Bronze body, bronze trim, bronze rotating swing disc, with composition disc, solder or threaded ends. Hammond IB945 (soldered) or IB940 (threaded)

C. Over 2 Inches:
   1. Iron body, bronze trim, stainless steel, bronze, or bronze faced rotating swing disc, renewable disc and seat, flanged or threaded ends.
   2. Iron body, bronze trim, bronze or bronze faced rotating swing disc, renewable disc and seat, flanged ends. Hammond IR1124.

2.09 SPRING LOADED CHECK VALVES

A. Manufacturers: Hammond as noted, Nibco, Milwaukee, Legend, or approved.
   1. Hammond as noted
   2. Apollo
   3. Nibco
   4. Milwaukee
   5. Legend
   6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Up To and Including 2 inches:
   1. Bronze body; bronze trim, split plate, hinged with stainless steel spring; resilient seal bonded to body; Hammond 947 (screwed) or 943 (soldered)

C. Over 2 inches: Iron body, bronze trim, split plate, hinged with stainless steel spring, resilient seal bonded to body, wafer or threaded lug ends. Hammond IR9253.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment using jointing system specified.

D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

E. After completion, fill, clean, and treat systems. Refer to Section 23 25 00 for additional requirements.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

C. Route piping in orderly manner, parallel to building structure, and maintain gradient.

D. Install piping to conserve building space and to avoid interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Slope piping and arrange to drain at low points.

G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 22 05 16.

H. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

I. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
   2. Support horizontal piping at spacing as required by Code.
   3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   4. Place hangers within 12 inches of each horizontal elbow.
   5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
   7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
   8. Provide copper plated hangers and supports for copper piping.

J. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 07 19.

K. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 08 31 00.

L. Provide stem extensions for ball valves installed on insulated lines.

M. Provide memory stops for all valves to be used for balancing.

N. Install all gate, globe, and ball valves with stems within 45 degrees of the upright vertical position.

O. Install butterfly valves with stem at the horizontal, and so that the handle points down when closed and in the direction of flow when in the open position.

P. Adjust all packing nuts after installation.
   1. Provide lever handles for 6” and smaller butterfly valves.
   2. Provide gear operator for 8” and larger butterfly valves.

Q. Provide swing check valves where installed in horizontal position or vertically, facing up. Provide spring check valves where installed vertically, facing down.

END OF SECTION

SECTION 23 21 14

HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air vents.

B. Strainers.

C. Balancing valves

D. Automatic control valves

E. Consolidated fittings

1.02 RELATED REQUIREMENTS

A. Section 23 21 13 - Hydronic Piping.

B. Section 23 25 00 - HVAC Water Treatment: Pipe Cleaning.

1.03 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description, model and dimensions.

C. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

D. Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

E. Substitutions: See Section 01 60 00 - Product Requirements.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 AIR VENTS

A. Automatic Type: Solid brass construction, to provide continuous air venting, with integral vacuum breaker; Spirotherm Spirotop or approved.

B. Manual Type: Brass needle valve or "coin" vent.

2.02 STRAINERS

A. Manufacturers: Mueller as noted, Armstrong, Metraflex, or approved.

B. Size 2 inch and Under:

1. Screwed bronze body for 175 psi working pressure, Y pattern with 1/32 inch stainless steel 20 mesh screen (for terminals with greater than 1.5 gpm) and 40 mesh screen for terminals with less than 1.5 gpm. Mueller 352M (screwed) or 358S (soldered).

C. Size 2-1/2 inch to 4 inch:
1. Flanged iron body for 175 psi working pressure, Y pattern with .062 inch stainless steel perforated screen. Mueller 758.

2.03 AUTOMATIC FLOW LIMITING VALVES

A. Manufacturers: Griswold Automatic Flow Control Valve, Flow Design Autoflow, B&G Circuit Sentry, Nexus, or approved.

B. Construction: Brass or bronze body.

C. Calibration: Control flow within 5 percent of selected rating, over operating range of 10 times minimum pressure required for control; minimum pressure differential of 1 psid.

D. Control Mechanism: Stainless steel or nickel plated brass piston or regulator cup, operating against stainless steel helical or wave formed spring.

E. Test kit: Diaphragm gauge with hoses and P/T adaptors housed in vinyl case.

2.04 MANUAL BALANCING VALVES - 2 INCH OR SMALLER

A. Manufacturers: Griswold Quickset, Flow Design Flowset, Nexus, or approved.

B. Type: Ball valve equipped with venturi and graduated memory stop,

C. Construction: Brass body and end connections, nickel-plated brass ball, Teflon ball seals, EPDM O-ring seal.

D. Features: Two 0.25 inch NPT body tappings with P/T test ports, memory stop handle with graduated markings.

2.05 MANUAL BALANCING VALVES - 2 INCH AND LARGER

A. Manufacturers: Flow Design Flowset Accusetter Models AF, AG, or AW, or approved.

B. Type: Butterfly valve equipped with venturi and graduated memory stop,

C. Venturi Construction: Steel body, low-loss piezo-ring throat.

D. Valve Construction: Cast iron, lug-type body, class 150, EPDM seat and gasket, 410 stainless steel stem, nylon bearings, bronze disc.

E. Instrument ports: Extended P/T test ports.

F. Accuracy: Plus or minus 3 percent of full scale.

G. Rating: 240 psig at 250F

2.06 AUTOMATIC CONTROL VALVES

A. Manufacturers: Griswold Unimizer 2-Way, Flow Design, or approved.

B. Type: Two-position full-port ball valve

C. Construction: Forged brass body, ASTM B283, brass end connections and stem, nickel-plated brass ball, Teflon seals with EPDM o-rings.

D. Actuator: Belimo. By Controls Contractor.

E. Size: As scheduled (or otherwise indicated).

2.07 CONSOLIDATED FITTINGS

A. Manufacturers: Griswold as noted below, Flow Design, Nexus, or approved.

B. Description: Pre-assembled assemblies of hydronic components as described below:

C. Assembly “A”: Ball valve and integrated strainer with 20 mesh stainless steel screen. Valve with one fixed connection and one union connection. Union end includes union nut and EPDM o-ring. Body has one 0.5 inch tapped port with one pressure/temperature test valve. Assembly to include drain valve with 0.75 inch hose connection with cap. Griswold Space Saver S

D. Assembly “B”: Automatic balancing valve as above with integrated ball valve. Valve includes one fixed end connection and one union connection. Union end includes union nut and EPDM o-ring. Valve body has two 0.25 inch tapped ports with two pressure/temperature test valves. Griswold Space Saver R.

E. Assembly “C”: Forged brass union with one fixed end connection and one union connection. Union includes union nut and EPDM o-ring. Union body has two 0.25 inch tapped ports with one manual air vent and one with pressure/temperature test valve. Griswold Union with +PT option.

F. Assembly "D": Same as assembly "A" but including branch with manual balancing valve and union for 3-way valve service.

PART 3 EXECUTION

3.01 INSTALLATION REQUIREMENTS

A. Balancing valves of all kinds shall have no more than 3 psi permanent pressure drop.

B. Install specialties in accordance with manufacturer's instructions.

C. Provide automatic air vents at system high points and as indicated.

D. Provide valved drain and hose connection on strainer blow down connections.

E. Provide pump suction fitting on suction side of base mounted centrifugal pumps where indicated. Remove temporary strainers after cleaning systems.

F. Provide combination pump discharge valve on discharge side of base mounted centrifugal pumps where indicated.

G. Provide relief valves on pressure tanks, low pressure side of reducing valves, heat exchangers, and expansion tanks, and as indicated.

H. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.

I. Pipe relief valve outlet to nearest floor drain.

J. Where one line vents several relief valves, make cross sectional area equal to sum of individual vent areas.

K. Install balancing valves so that test ports are accessible for reading.

END OF SECTION

SECTION 23 25 00

HVAC WATER TREATMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cleaning of piping systems.

B. Chemical treatment.

1.02 RELATED REQUIREMENTS

A. Section 23 21 13 - Hydronic Piping.

1.03 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Product Data: Provide chemical treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.

C. Shop Drawings: Indicate system schematic, equipment locations, and controls schematics, electrical characteristics and connection requirements.

D. Manufacturer's Field Reports: Indicate start-up of treatment systems when completed and operating properly. Indicate analysis of system water after cleaning and after treatment.

E. Operation and Maintenance Data: Include data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures including target concentrations.

1.04 REGULATORY REQUIREMENTS

A. Conform to applicable code for addition of non-potable chemicals to building mechanical systems and to public sewage systems.

PART 2 PRODUCTS

2.01 MANUFACTURER/SUPPLIER

A. ChemAqua (Tom Hubbard, 541.505.1768).

2.02 MATERIALS

A. System Cleaner:
   1. Manufacturers:
      a. AmSolv/Division of Amrep, Inc: www.amsolv.com.
      b. GE Water Technologies: www.gewater.com.
      c. Nalco Company: www.nalco.com.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

B. HVAC Water Treatment Closed Loop Chemicals
   1. Chemicals will be provided by Eugene School District 4j chemical treatment provider (see above).

PART 3 EXECUTION

3.01 PREPARATION

A. Systems shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.

B. Place terminal control valves in open position during cleaning.

C. Verify that existing system has properly installed and functional chemical shot feeders at system pumps.

3.02 CLEANING SEQUENCE

A. Concentration:
   1. As recommended by manufacturer.

B. Hot Water Heating Systems:
   1. Apply heat while circulating, slowly raising temperature to 160 degrees F and maintain for 12 hours minimum.
   2. Remove heat and circulate to 100 degrees F or less; drain systems as quickly as possible and refill with clean water.
   3. Circulate for 6 hours at design temperatures, then drain.
   4. Refill with clean water and repeat until system cleaner is removed.

3.03 CLOSED SYSTEM TREATMENT

A. Introduce closed system treatment through existing central boiler room bypass feeder.

B. Final system treatment shall achieve 800 to 1200 ppm sodium nitrite in heating water system.

C. Minimum tolyltriazole concentration applied to closed system shall be 3 ppm.

D. Test to confirm proper inhibitor levels.

3.04 FINAL ADJUSTMENT

A. Following acceptance of systems by Owner, chemical treatment supplier shall make final adjustments in required concentrations.

END OF SECTION

SECTION 23 31 00

HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ductwork.

B. Nonmetal ductwork.

1.02 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

B. OEESC - Oregon Energy Efficiency Specialty Code; 2014.

C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.

D. OMSC - Oregon Mechanical Specialty Code; 2014.

1.03 PERFORMANCE REQUIREMENTS

A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Product Data: Provide data for duct materials and duct connections.

C. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.

B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum 5 years of documented experience.

1.06 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 MATERIALS

A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant, zero VOC.

1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.

2. VOC Content: Not more than 250 g/L, excluding water.
3. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.

C. Insulated Flexible Ducts:
1. Manufacturers: JP Lamborn Model PR-25, flexmaster Type 5, or approved.
2. Black polymer film supported by helically wound spring steel wire; fiberglass insulation; polyethylene vapor barrier film.
a. Pressure Rating: 4 inches WG positive and 0.5 inches WG negative.
b. Maximum Velocity: 4000 fpm.
c. Temperature Range: -20 degrees F to 175 degrees F.

D. Hanger Rod: ASTM A 36/A 36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.02 DUCTWORK FABRICATION

A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards and to meet Section 503.2.7.1 of the OEESC

B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide turning vanes.

D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

E. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

F. All ducts and plenums shall be sealed. Joints and seams shall comply with Section 603.9 of the OMSC and 503.2.7.1 of the OEESC.

2.03 MANUFACTURED DUCTWORK AND FITTINGS

A. Manufacture in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages,reinforcing, and sealing for operating pressures indicated.

B. Transverse Duct Connection System: SMACNA "E" rated rigidly class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips in accordance with SMACNA (DCS).

PART 3 EXECUTION

3.01 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

B. Install in accordance with manufacturer's instructions.

C. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

D. Install and seal metal and flexible ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.

E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

F. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.

G. Use double nuts and lock washers on threaded rod supports.

H. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

3.02 SCHEDULES

A. Ductwork Material:
   1. Low Pressure Supply (Heating Systems): Steel.
   2. Low Pressure Supply (System with Cooling Coils): Steel.
   3. Return and Relief: Steel.
   4. General Exhaust: Steel.
   5. Outside Air Intake: Steel.

B. Ductwork Pressure Class:
   1. Supply (Heating Systems): 1/2 inch
   2. Supply (System with Cooling Coils): 1/2 inch.
   3. Return and Relief: 1/2 inch.
   4. General Exhaust: 1 inch.
   5. Outside Air Intake: 1/2 inch.

END OF SECTION

SECTION 23 33 00

AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air turning devices

B. Backdraft dampers - metal.

C. Backdraft dampers - fabric.

D. Backdraft dampers.

E. Combination fire and smoke dampers.

F. Duct access doors.

G. Volume control dampers.

H. Control dampers.

1.02 RELATED REQUIREMENTS

A. Section 23 31 00 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2015.

B. NFPA 92 - Standard for Smoke-Control Systems; 2015.

C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.

D. UL 555 - Standard for Fire Dampers; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

E. UL 555S - Standard for Smoke Dampers; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

C. Substitutions: See Section 01 60 00 - Product Requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES

A. Manufacturers: Durodyne, Sheet Metal Connectors Inc, or approved.

2.02 BACKDRAFT DAMPERS - METAL

A. Multi blade turning vane assembly with blades aligned in short dimension; constructed of same material as ductwork in which installed, with individual vanes of the hollow airfoil type, with rails screwed into duct fitting. Vane length not to exceed 36 inches. Construct per SMACNA.

2.03 BACKDRAFT DAMPERS - LOW PRESSURE GRAVITY RELIEF

A. Manufacturers: Ruskin Model CBD2, Greenheck, Cesco, Nailor, or approved.

2.04 BACKDRAFT DAMPERS - FABRIC

A. Fabric Backdraft Dampers: Factory-fabricated.
   1. Blades: Neoprene coated fabric material.
   2. Birdscreen: 1/2 inch nominal mesh of galvanized steel or aluminum.
   3. Maximum Velocity: 1000 fpm (5 m/sec) face velocity.

B. General: Extruded aluminum, light duty, counterbalanced backdraft damper suitable for application in HVAC systems with velocities to 1,000 feet per minute

C. Construction:
   1. Frame: 2 inches x minimum 0.090 inch extruded aluminum channel.
   2. Blades:
      a. Style: Single-piece, overlap frame.
      b. Action: Parallel.
      c. Orientation: Horizontal.
      d. Material: Minimum 0.025 inch formed aluminum.
      e. Width: Maximum 6 inches.
   3. Bearings: Corrosion-resistant, synthetic, formed as single piece with axles.
   4. Blade Seals: Extruded vinyl, mechanically attached to blade edge.
   5. Linkage: Concealed in frame.
   6. Axles: Corrosion-resistant, synthetic, locked to blade and formed as single piece with bearings.
   7. Counterbalances: Adjustable zinc plated steel weights mechanically attached to blade enabling damper to operate over wide range of pressures.
   8. Mounting: Any position.
   9. Finish: Mill aluminum.

D. Performance Data:
   1. Temperature Rating: Withstand -40 to 200 degrees F.
   2. Capacity: Demonstrate capacity of damper to withstand HVAC system operating conditions.
      a. Closed Position: Maximum back pressure of 4.5 inches w.g.
      b. Open Position: Maximum air velocity of 1,000 feet per minute.
   3. Operation of Blades:
      a. Start to Open: 0.01 inch w.g.
      b. Fully Open: 0.06 inch w.g.
   4. Pressure Drop: Maximum 0.04 inch w.g. at 1,000 feet per minute through 24 inch x 24 inch damper.

2.05 COMBINATION FIRE AND SMOKE DAMPERS

A. Manufacturers: Ruskin Model FSD36, Nailor, Greenheck, Cesco, Belimo, or approved.

B. Fabricate in accordance with NFPA 90A, UL 555, UL 555S, and as indicated.

C. Provide factory sleeve and collar for each damper.

D. Multiple Blade Dampers: Fabricate with 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and 1/2 inch actuator shaft.

E. Operators: UL listed and labelled fall close, spring return electric type suitable for 120 volts, single phase, 60 Hz. Provide end switches to indicate damper position. Locate damper operator on exterior of duct where practical, or interior if service clearance is not available, and link to damper operating shaft.

F. Mounting Position: Rated for verical or horizontal mounting, included with mounting sleeves.

G. Velocity rating: Rated for use in systems with airflow in either direction with velocities up to 2,000 feet per minute and pressures up to 4 inches w.g.

H. Electric resettable fuse link: Heat actuated release device to permit controlled closure through damper actuator, allowing damper to automatically reopen after test, smoke detection, or power failure condition.

I. Duct smoke detector: Photoelectric type, 120 volt, factory mounted on sleeve opposite to actuator and wired to actuator, suitable for minimum 300 feet per minute air velocity; similar to Ruskin DSDF.

J. For grille and diffuser applications, provide as above but with ability to gain front access to damper and actuator through grille. Delete smoke detector.

2.06 DUCT ACCESS DOORS

A. Manufacturers: ABI, Keys, or approved.

B. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
   1. Less Than 12 inches Square: Secure with sash locks.
   2. Up to 18 inches Square: Provide two hinges and two sash locks.
   3. Up to 24 x 48 inches: Three hinges and two compression latches with outside and inside handles.
   4. Larger Sizes: Provide an additional hinge.

2.07 FIRE DAMPERS - ROUND

A. Manufacturers:
   1. Ruskin Model FDR25, Greenheck, Cesco, Pottorff.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

B. Fire Rating: UL 555 classified and labeled as a 1-1/2 hour fire damper.

C. Air Flow Rating: UL approved for dual directional air flow.

D. Frame/Sleeve: minimum 20 gage galvanized steel with roll formed beads and groove.

E. Blade:
   1. Style: Single piece, spring closure upon fusible link release.
   2. Material: Minimum 14 gage galvanized steel with angle stiffeners.

F. Bearings: Self-lubricating stainless steel sleeve, turning in hole in frame.

G. Axle: Minimum 1/2 inch diameter plated steel, mechanically attached to blade.

H. Cinch Plates:
   1. One-piece, minimum 20 gage galvanized steel.

2. Adjustable bolt-type.
3. Factory matched and shipped with individual damper.

I. Mounting: Vertical

J. Temperature Release Device: Fusible link, 165 degrees F.

K. Finish: Mill galvanized.

L. Assembly: Factory assemble damper and accessories and furnish as a single unit conforming to UL 555.

M. Performance Data:
1. Temperature Qualified: Damper qualified in accordance with UL 555 as a 1-1/2 hour fire damper.
2. Capacity: Demonstrate capacity of damper to close in HVAC system operating conditions.
a. Maximum Pressure: 4 inches w.g..
b. Maximum Air Velocity: 4,000 feet per minute.

2.08 FIRE DAMPERS - RECTANGULAR, GRILLE ACCESS

A. Manufacturers"
1. Ruskin Model DIBD2GA, Greenheck, Cesco, Pottorff
2. Substitutions: See Section 01 60 00 - Product Requirements.

B. Ratings:
1. Fire Resistance: 1½ hours in accordance with UL 555
2. Dynamic Closure Rating: Classified for dynamic closure to 2000 fpm and 4 inches w.g. static pressure

C. Construction:
1. Frame: Maximum 5 inch roll formed, galvanized steel channel.
2. Sleeves: Single assembly with integral factory sleeve, 12 inches long.
3. Retaining Angles: Sized to provide installation overlap in accordance with manufacturer's UL listing.
4. Blades: Galvanized curtain type.
5. Closure Springs: Type 301 stainless steel, constant force or spring clip type.
6. Temperature Release Device: Fusible link, 165 degrees F
7. Duct Transition Connection, Damper Style:
a. A style - rectangular connection, frame and blades in air stream.
b. G style - A style connection, grille mounting tabs at end of sleeve for grille.
8. Mounting: Vertical
9. Finish: Mill galvanized.

2.09 VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.

C. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

D. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.

E. Quadrants:
   1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
   2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
   3. Where rod lengths exceed 30 inches provide regulator at both ends.
   4. Manufacturers:

F. Regulator extensions: Where damper is located above inaccessible ceiling, provide extension arm, gear driver and ceiling mounted access plate.

2.10 LOW-LEAK CONTROL DAMPERS (OSA, EA, RELIEF AIR)

A. Manufacturers: Ruskin CD50, Greenheck, Johnson, or approved.

B. Frames: 5 inches x 1 inch x minimum 0.125 inch 6063-T5 extruded aluminum hat-shaped channel, mounting flanges on both sides of frame, reinforced at corners.

C. Blades: Airfoil-shaped, single-piece 6063-T5 extruded aluminum

D. Jamb seals: Flexible stainless steel, compression type to prevent leakage between the end of the blade and the damper frame.

E. Bearings: Molded synthetic sleeve, turning in hole in frame.

F. Axles: ½" plated steel, hexagon shaped and positively locked into damper blades.

G. Linkage: Concealed in frame.

H. Leakage: Based on AMCA Publication 500, less than 3 cfm/sq. ft. at 1" of static pressure.

I. Pressure drop: Maximum 0.03 inch w.g. at 1,500 feet per minute across 24 inch x 24 inch damper.

J. Actuation: By Controls Contractor.

2.11 CONTROL DAMPERS (RA)

A. Manufacturers: Ruskin CD36, Greenheck, Johnson, or approved.

B. Frames: 5 inches x minimum 16 gage roll formed, galvanized steel hat-shaped channel, reinforced at corners.

C. Blades: Minimum 16 gage galvanized steel, single skin with 3 longitudinal grooves.

D. Bearings: Molded synthetic sleeve, turning in extruded hole in frame.

E. Seals:
   1. Blade: Inflatable PVC coated fiberglass material and galvanized steel. Mechanically attached to blade edge.
   2. Jamb: Flexible metal compression type

F. Linkage: Concealed in frame.

G. Axles: Minimum 1/2 inch diameter plated steel, hex-shaped, mechanically attached to blade.

H. Actuation: By Controls Contractor.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 31 00 for duct construction and pressure class.

B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide for cleaning kitchen exhaust ducts in accordance with NFPA 96. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated. Provide 4 x 4 inch for balancing dampers only. Review locations prior to fabrication.

D. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

E. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.

END OF SECTION

SECTION 23 34 23

POWER VENTILATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roof exhausters.

B. Wall exhausters.

C. Cabinet exhaust fans.

D. Ceiling exhaust fans.

1.02 REFERENCE STANDARDS

A. AMCA (DIR) - [Directory of] Products Licensed Under AMCA International Certified Ratings Program; Air Movement and Control Association International, Inc.; http://www.amca.org/certified/search/company.aspx.

B. AMCA 99 - Standards Handbook; Air Movement and Control Association International, Inc.; 2010.

C. AMCA 204 - Balance Quality and Vibration Levels for Fans; Air Movement and Control Association International, Inc.; 2005.

D. AMCA 204 - Balance Quality and Vibration Levels For Fans; Air Movement and Control Association International, Inc.; 2005

E. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; Air Movement and Control Association International, Inc.; 2007 (ANSI/AMCA 210, same as ANSI/ASHRAE 51).

F. AMCA (DIR) - [Directory of] Products Licensed Under AMCA International Certified Ratings Program; Air Movement and Control Association International, Inc.; http://www.amca.org/certified/search/company.aspx.

G. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; Air Movement and Control Association International, Inc.; 2014.

H. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; Air Movement and Control Association International, Inc.; 2014.

I. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; National Fire Protection Association; 2014.

J. UL 705 - Power Ventilators; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.

PART 2 PRODUCTS

2.01 POWER VENTILATORS - GENERAL

A. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.

B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.

C. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.

D. Fabrication: Conform to AMCA 99.

E. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.02 ROOF EXHAUSTERS

A. Performance: As scheduled.

B. Fan Unit: V-belt or direct driven as indicated, with spun aluminum housing; resilient mounted motor; 1/2 inch mesh, 0.62 inch thick aluminum wire birdscreen; square base to suit roof curb with continuous curb gaskets.

C. Fan Unit: V-belt or direct driven as indicated, with spun aluminum housing; resilient mounted motor; 1/2 inch mesh, 0.62 inch thick aluminum wire birdscreen; square base to suit roof curb with continuous curb gaskets.

D. Roof Curb: 8 inch high self-flashing of aluminum with continuously welded seams, built-in cant strips.

E. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor .

F. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked, and line voltage motor drive, power open, spring return.

G. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

2.03 WALL EXHAUSTERS

A. Manufacturers: Cook Model SWD, Greenheck

B. Performance: As scheduled.

C. Fan Unit: V-belt or direct driven with spun aluminum housing; resiliently mounted motor; 1/2 inch mesh, 0.062 inch thick aluminum wire bird screen.

D. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor, and wall mounted multiple speed switch.

E. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked, and line voltage motor drive, power open, spring return.

2.04 CEILING EXHAUST FANS - DIRECT-DRIVEN

A. Manufacturers:
   1. Cook Model GC, Greenheck.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

B. Performance Ratings: As scheduled.

C. Electrical Characteristics: As scheduled.

D. Centrifugal Fan Unit: Direct driven, lined with acoustic insulation.

1. Fan housing: 20 gage galvanized steel.
2. Blower and motor assembly: Resiliently mounted to 14 gage reinforcing channel. Totally enclosed motor with permanently lubricated bearings and built-in thermal overload protection.
3. Wiring box: Integral
4. Discharge position: Right angle ceiling configuration.
5. Outlet: Duct collar with reinforced aluminum backdraft damper(s).
6. Wheel: DWDI centrifugal forward curved type, galvanized steel.

E. Grille: Powder painted white steel.

F. Ratings: UL 705 listed, AMCA certified, balanced per AMCA Standard 204

G. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

2.05 CEILING EXHAUST FANS

A. Manufacturers: Panasonic WhisperGreen, or approved.

B. Description: Ceiling mounted exhaust fan with integral backdraft damper.

C. Motor: Totally enclosed, brushless DC type, designed for low power consumption, variable speed and time controls built in.

D. Approvals: Energy Star rated, certified by HVI, conforming to UL standards.

E. Blower wheel type: Sirocco.

F. Body: Rust proof paint treatment on galvanized steel body.

G. Protection: Thermal fuse.

H. Performance and electrical characteristics: As scheduled.

2.06 IN-LINE EXHAUST FANS

A. Manufacturers: Panasonic WhisperLine, or approved.

B. Description: Duct mounted exhaust fan.

C. Motor: Condenser type, designed for low power consumption.

D. Approvals: Washington State VIAQ code.

E. Blower wheel type: Sirocco.

F. Body: Rust proof paint treatment on galvanized steel body.

G. Protection: Thermal fuse.

H. Performance and electrical characteristics: As scheduled.

2.07 WALL EXHAUST FANS

A. Manufacturers: Panasonic WhisperWall, or approved.

B. Description: Wall mounted exhaust fan, with integral backdraft damper.

C. Motor: Condenser type, designed for low power consumption.

D. Approvals: Washington State VIAQ code.

E. Blower wheel type: Propeller.

F. Body: Rust proof paint treatment on galvanized steel body.

G. Protection: Thermal fuse.

H. Performance and electrical characteristics: As scheduled.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Secure roof exhausters with cadmium plated steel lag screws to roof curb.

C. Extend ducts to roof exhausters into roof curb. Counterflash duct to roof opening.

END OF SECTION

SECTION 23 36 00

AIR TERMINAL UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Constant volume terminal units.

B. Variable volume terminal units.

C. Integral heating coils.

1.02 RELATED REQUIREMENTS

A. Section 23 05 49 - Vibration and Seismic Controls for HVAC.

B. Section 23 31 00 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

A. ASTM A492 - Standard Specification for Stainless Steel Rope Wire; 1995 (Reapproved 2013).

B. ASTM A603 - Standard Specification for Zinc-Coated Steel Structural Wire Rope; 1998 (Reapproved 2014).

C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2015.

D. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; Sheet Metal and Air Conditioning Contractors' National Association; 2008.

E. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Trane (Basis of Design).

B. Other acceptable manufacturers offering equivalent products.
   1. Krueger .
   2. Carnes .
   3. Price .
   4. Titus.

2.02 MANUFACTURED UNITS

A. Ceiling mounted variable air volume supply air control terminals for connection to single duct, central air systems, with electronic variable volume controls, (furnished by DDC contractor and installed in field), hot water heating coils.

B. Identify each terminal unit with clearly marked identification label and air flow indicator. Include unit nominal air flow, maximum factory set airflow, minimum factory set air flow, and coil type.

2.03 SINGLE DUCT VARIABLE VOLUME UNITS

A. Basic Assembly:
   1. Casings: Minimum 22 gage, 0.0299 inch galvanized steel.

2. Lining: Minimum 1/2 inch thick neoprene or vinyl coated fibrous glass insulation, 1.5 lb/cu ft density, meeting NFPA 90A requirements and UL 181 erosion requirements. Face lining with mylar film.
3. Plenum Air Inlets: Round stub connections for duct attachment.
4. Plenum Air Outlets: S slip and drive connections.

B. Basic Unit:
1. Configuration: Air volume damper assembly inside unit casing. Locate control components inside protective metal shroud.
2. Volume Damper: Construct of galvanized steel with peripheral gasket and self lubricating bearings; maximum damper leakage: 2 percent of design air flow at 1 inches rated inlet static pressure.
3. Mount damper operator to position damper normally open.

C. Hot Water Heating Coil:
1. Construction: 1/2 inch copper tube mechanically expanded into aluminum plate fins, leak tested under water to 200 psig pressure, factory installed.
2. Capacity: Based on 120 degree F entering water, 100 degree F leaving water and 50 percent total air volume.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install the inlets of air terminal units and air flow sensors a minimum of four duct diameters from elbows, transitions, and duct takeoffs.

C. Provide ceiling access doors or locate units above easily removable ceiling components.

D. Support units individually from structure with wire rope complying with ASTM A492 and ASTM A603 in accordance with SMACNA (SRM). See Section 22 05 48.

E. Do not support from ductwork.

F. Connect to ductwork in accordance with Section 23 31 00.

END OF SECTION

SECTION 23 37 00

AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Diffusers.

B. Registers/grilles.

C. Gravity Ventilators.

D. Wall and roof caps

1.02 RELATED REQUIREMENTS

A. Section 09 90 00 - Painting and Coating: Painting of ducts visible behind outlets and inlets.

1.03 REFERENCE STANDARDS

A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; Air Movement and Control Association International, Inc.; 2012.

B. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.; 2006 (R2011).

C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.05 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

B. Test and rate louver performance in accordance with AMCA 500-L.

PART 2 PRODUCTS

2.01 DIFFUSERS AND GRILLES

A. Acceptable Manufacturer:
   1. Price, as scheduled, Titus, Krueger, Metal-Aire, Tuttle and Bailey
   2. Substitutions: See Section 01 60 00 - Product Requirements.

B. Ceiling Diffusers and Grilles: Type as scheduled.
   1. Frame: Mounting type as required to suit ceiling type, or duct mounted.
   2. Fabrication: Steel or aluminum, as scheduled.
   3. Finish: Provide with white finished coat except where indicated.

C. Return and Exhaust Grilles: Type as scheduled.
   1. Frame: One inch margin with countersunk screw mounting and gasket.
   2. Fabrication: Steel or aluminum, as scheduled.
   3. Finish: Provide with white finished coat except where indicated on Drawings.

2.02 LOUVERS

A. Type: 4 inch deep with blades on 45 degree slope with center baffle and return bend, heavy channel frame, 1/2 inch square mesh screen over exhaust and 1/2 inch square mesh screen over intake.

B. Fabrication: 16 gage thick galvanized steel welded assembly, with factory prime coat finish, color to be selected by Architect.

C. Mounting: Furnish with interior flat flange for installation.

2.03 GRAVITY VENTILATORS (GVI, GVR)

A. Fabricate air inlet or exhaust hoods in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.

B. Fabricate of aluminum, minimum 8 gage base and 18 gage hood; suitably reinforced; with removable hood; birdscreen with 1/2 inch square mesh for exhaust and 3/4 inch for intake, and factory prime coat finish.

C. Mount unit on minimum 8 inch high curb base with insulation between duct and curb.

D. Make hood outlet area minimum of twice throat area.

E. Manufacturers
   1. Cook PR as scheduled, Greenheck.
   2. Substitutions: See Section 01 60 00 - Product Requirements

2.04 GRAVITY VENTILATORS (GVI, GVR)

A. Fabricate air inlet or exhaust hoods in accordance with SMACNA (DCS).

B. Fabricate of aluminum, minimum 8 gage base and 18 gage hood; suitably reinforced; with removable hood; birdscreen with 1/2 inch square mesh for exhaust and 3/4 inch for intake, and factory mill finish.

C. Fabricate of aluminum, minimum 8 gage base and 18 gage hood; suitably reinforced; with removable hood; birdscreen with 1/2 inch square mesh for exhaust and 3/4 inch for intake; lifting lugs, rain gutter.

D. Mount unit on minimum 12 inch high curb base with insulation between duct and curb.

E. Make hood outlet area minimum of twice throat area.

F. Manufacturers
   1. Cook GI/GR as scheduled, Greenheck.
   2. Substitutions: See Section 01 60 00 - Product Requirements

2.05 WALL CAPS

A. Manufacturers: Greenheck Model WC, PennBarry, Cook, or approved

B. Construction: Aluminum, with built-in birdscreen and gravity damper. Same size as connecting duct.

2.06 ROOF CAPS

A. Manufacturers: Greenheck, PennBarry, Cook, or approved.

B. Sloped roof application: Greenheck model RJ, steel construction with black enamel finish, integral flashing flange and built in birdscreen and backdraft damper. Size same as connecting duct.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

C. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

D. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09 9100.

3.02 SCHEDULES

A. Refer to drawings.

END OF SECTION

SECTION 23 40 00

HVAC AIR CLEANING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Extended surface high efficiency media filters.

1.02 REFERENCE STANDARDS

A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 2012.

1.03 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Product Data: Provide data on filter media, filter performance data, filter assembly and filter frames, dimensions, motor locations and electrical characteristics and connection requirements.

C. Operation and Maintenance Data: Include instructions for operation, changing, and periodic cleaning.

PART 2 PRODUCTS

2.01 EXTENDED SURFACE HIGH EFFICIENCY MEDIA FILTERS

A. Type: Deep-pleated high efficiency ASHRAE highlofted, supported media, disposable type.

B. Size: As noted on drawings.

C. Construction: Microfine glass laminated to a reinforcing backing to form a uniform lofted media blanket.

D. Blanket: Formed into uniform tapered radial pleats and supported by a non-metallic stiffened media backing.

E. Media: Mechanically and chemically bonded to the inside periphery of the enclosing frame to prevent air bypass.

F. Frame: Mulitple laminate layers resistant to high-humidity and

G. Stabilizers: Minimum four contour stabilizers each on air entering and exiting sides.

H. Face grilles: Medium-impact plastic, permanently secured.

I. Initial Resistance: Not to exceed 0.5 inches W.G. at 500 fpm face velocity.

J. Minimum Efficiency Reporting Value (MERV): 13, when tested in accordance with ASHRAE 52.2.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install air cleaning devices in accordance with manufacturer's instructions.

B. Prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.

C. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with clean set.

END OF SECTION

SECTION 23 81 27

SMALL SPLIT-SYSTEM HEATING AND COOLING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air-source heat pumps.

B. Controls.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. AHRI 210/240 - Standard for Performance Rating of Unitary Air Conditioning and Air-Source Heat Pump Equipment; Air-Conditioning, Heating, and Refrigeration Institute; 2008.

B. ASHRAE Std 23.1 - Methods of Testing for Rating Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Temperatures of the Refrigerant; 2010.

C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2015.

D. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; National Fire Protection Association; 2015.

E. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.

D. Project Record Documents: Record actual locations of components and connections.

E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

F. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner s name and registered with manufacturer.

1.05 WARRANTY

A. See Section 01 77 00 - Closeout Procedures, for additional warranty requirements.

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

A. Split-System Heating and Cooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor and outdoor units; UL listed.

1. Provide refrigerant lines internal to units and between indoor and outdoor units, factory cleaned, dried, pressurized and sealed, with insulated suction line.

B. Performance Requirements: See Drawings for additional requirements.

C. Electrical Characteristics: As scheduled.

1. Disconnect Switch: Factory mount disconnect switch on equipment under provisions of Section 26 29 13.

2.02 OUTDOOR UNITS

A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
   1. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23.1 and UL 207.

B. Accessories: Filter drier, high pressure switch (manual reset), low pressure switch (automatic reset), service valves and gage ports, thermometer well (in liquid line).
   1. Provide thermostatic expansion valves.

C. Operating Controls:
   1. Control by room thermostat to maintain room temperature setting.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.

B. Install in accordance with NFPA 90A and NFPA 90B.

END OF SECTION

SECTION 23 82 00

CONVECTION HEATING AND COOLING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Convectors.

B. Fan-coil units.

C. Air coils.

1.02 REFERENCE STANDARDS

A. AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI); current edition at www.ahrinet.org.

B. AHRI 410 - Standard for Forced-Circulation Air-Cooling and Air-Heating Coils; 2001 (R2011).

C. AHRI 440 - Performance Rating of Room Fan-Coil Units; 2008.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

1.03 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Product Data: Provide typical catalog of information including arrangements.

C. Shop Drawings:
   1. Indicate mechanical and electrical service locations and requirements.

D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.

E. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

PART 2 PRODUCTS

2.01 HYDRONIC CONVECTORS

A. Perform factory run test under normal operating conditions, water, and steam flow rates.

B. Heating Elements: Seamless copper tubing mechanically expanded into evenly spaced aluminum fins and cast iron headers, steel side plates and supports, factory air pressure tested at 100 psi under water, with means of adjusting pitch of element.

C. Cabinet: 16 gage, 0.0598 inch sheet steel front and top, 18 gage, 0.0478 inch sheet steel back and ends; exposed corners rounded; easily secured removable front panels, adequately braced and reinforced for stiffness.

D. Finish: Factory applied baked primer coat.

E. Damper: Where not thermostatically controlled, provide knob-operated internal damper at enclosure air outlet.

F. Access Doors: For otherwise inaccessible valves, provide factory-made permanently hinged access doors, 6 x 7 inch minimum size, integral with cabinet.

2.02 FAN-COIL UNITS

A. Performance Data and Safety Requirements:

1. Unit capacities certified in accordance with AHRI 440.
2. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL), Intertek (ETL), or testing firm acceptable to Authority Having Jurisdiction as suitable for the purpose indicated.
3. Insulation to comply with NFPA 90A requirements for flame spread and smoke generation.
4. Equipment wiring to comply with requirements of NFPA 70.

B. Required Directory Listings: AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI).

C. Coils:
1. Evenly spaced aluminum fins mechanically bonded to copper tubes.
2. Water Coil: Suitable for working temperatures not less than 200 degrees F.
3. Provide drain pan under cooling coil easily removable for cleaning.

D. Finish: Factory applied baked primer coat on visible surfaces of enclosure or cabinet.

E. Fans: Centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven.

F. Motor: ECM.

G. Controls:
1. Provide units with control valves furnished by the fan coil unit manufacturer.
2. Actuators to be provided by Owner.

H. Filter: Easily removed 1 inch thick glass fiber throw-away type, located to filter air before coil.

I. Electrical Characteristics: As scheduled.

2.03 AIR COILS

A. Water Coils:
1. Sized for future cooling loads.
2. Provide condensate pan and drain.
3. Coils rated and tested in accordance with AHRI 410.
4. Tubes: Material to consist of seamless copper or brass, mechanically expanded or tension wound to fins; appropriate tube joining methods based on tube material.
5. Fins: Material to consist of aluminum or copper, continuous plate type with full fin collars or individual helical finned tube type wound under tension.
6. Casing: Heavy gage galvanized steel with mounting holes, including intermediate tube supports if required by coil design and length.
7. Headers (Manifolds): Construct of seamless copper pipe, cast iron, or nonferrous material with tube connection appropriate to header material provided.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are suitable for installation.

3.02 INSTALLATION

A. Install in accordance with manufacturer's recommendations.

B. Do not damage equipment or finishes.

3.03 CLEANING

A. After construction and painting is completed, clean exposed surfaces of units.

B. Vacuum clean coils and inside of units.

C. Touch-up marred or scratched surfaces of factory-finished cabinets using finish materials furnished by the manufacturer.

END OF SECTION

SECTION 26 01 26

SUBMITTALS AND SHOP DRAWINGS

PART 1 GENERAL

1.01 REQUIREMENTS

A. Refer to General Divisions for submittal requirements and procedures.

1.02 DEFINITIONS

A. Manufacturer's Product Data: Manufacturer's product data consist of one or more levels of manufacturer's information as described below and as requested in the submittal schedule. The three levels of information include: manufacturer's list, manufacturer's catalog data, and manufacturer's technical and engineering data.

1. Manufacturer's List: Manufacturer's list shall include a typewritten list of manufacturer's name, sizes and model or catalog numbers, referenced to the specification section.
2. Manufacturer's Catalog Data: Manufacturer's catalog data shall include standard catalog information marked to indicate specific equipment proposed and point of operation, if appropriate. Include installation instructions.
3. Manufacturer's Technical and Engineering Data: Manufacturer's technical and engineering data shall include materials, dimensions, details, installation instructions, weights, capacities, illustrations, wiring diagrams, control diagrams, piping diagrams, connection diagrams, performance data (including performance curves), mix design, and any other information required for a complete and thorough evaluation of the equipment or items specified, and to verify compliance with specifications. Control diagrams or control schematics, where specified and required by the submittal schedule, shall include a detailed schematic of the proposed control modifications and their interface with existing control equipment, where appropriate, and a manufacturer and model number listing of all proposed control components shown on the control schematic.

B. Shop Drawings: Shop drawings are construction drawings of items manufactured specifically for this project. Shop drawings include dimensions, construction details, weights, and additional information to identify the physical features of the system or piece of equipment.

C. Samples: Samples illustrate functional characteristics of the product with integral parts and attachment devices. Samples shall allow evaluation of full range of manufacturer's standard colors, textures, and patterns.

D. Certificates, Test Data or Other Information: Requirements for certificates, test data, or other information will be listed under referenced specification sections.

1.03 SUBMITTALS REQUIRED

A. Product Evaluation Data. The submittal schedule for product evaluation data is as indicated below. Each item requiring a submittal is given the following code:

1. Manufacturer's list
2. Manufacturer's catalog data
3. Manufacturer's technical and engineering data
4. Shop drawings
5. Samples

6. Certificates
7. Test data
8. Worker's qualifications
9. See individual sections for special requirements

1.04 SUBMITTAL SCHEDULE

Division 26 – Electrical	Codes
Section 26 09 23 - Lighting Control Equipment	1,2
Section 26 24 16 – Panelboards	1,2,3,4
Section 26 27 26 - Wiring Devices	1,2
Section 26 28 16 - Overcurrent Protective Devices	2,3
Section 26 29 13 - Motor and Circuit Disconnects	2,3
Section 26 51 13 - Indoor Lighting Fixtures, Lamps, and Ballasts	2,3,4

Division 27 – Communications	Codes
Section 27 51 13 – Intercom System	1,2,4
Section 27 53 13 – Clock System	1,2

Division 28 – Electronic Safety and Security	Codes
Section 28 10 00 – Access Control & Intrusion Detection Systems	1,2,4
Section 28 31 00 – Fire Alarm Systems	1,2,3,9

PART 2 PRODUCTS

2.01 THIS PART NOT USED

PART 3 EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.01 CONTRACT DOCUMENTS

A. The Contract Documents are complementary. What is required by any one, as affects this Division, shall be as binding as if repeated herein.

B. Separation of this Division from other Contract Documents shall not be construed as complete segregation of the Work.

C. Particular attention is called to Advertisement For Bids, Instructions to Bidders, Supplemental Instructions to Bidders, General Conditions, Supplemental General Conditions, Drawings and Specifications, and modifications incorporated in the documents before execution of the Agreement.

1.02 SCOPE OF WORK

A. General: Provide and install complete and satisfactorily operating electrical systems as specified in this Division, as shown on Drawings, as required, and as reasonably intended. Work generally includes, but is not limited to electrical distribution, lighting, devices, wiring systems and control systems.

B. Omissions: Omission of expressed reference to any item of labor or material necessary for the proper execution of the work shall not relieve responsibility from providing such additional labor or material.

1.03 EXAMINATION OF SITE

A. Examine Site of Work before making Bid and ascertain all related physical conditions.

B. Field verify scale dimensions shown since exact locations, distances and levels will be governed by actual field conditions.

C. Owner will not be responsible for any loss or unanticipated costs which may be suffered by the successful Bidder as a result of such Bidder's failure to fully inform himself in advance in regard to all conditions pertaining to the Work and character of the Work.

1.04 COORDINATION OF TRADES

A. Check Drawings of other trades to avert possible installation conflicts. Should major changes from original Drawings be necessary to resolve such conflicts, notify Architect and secure written approval and agreement on necessary adjustments before installation is started.

B. Check equipment connections and equipment locations on the job for coordination with other Divisions equipment and connections, structure, and the like.

1.05 MINOR DEVIATIONS

A. Make minor changes in equipment connections and equipment locations as directed or required before rough-in without extra cost.

1.06 SUBSTITUTIONS

A. Equal material of other manufacturer may be used following Architect's approval of a written request submitted at least 7 working days prior to bid date.

1.07 RECORD DRAWINGS

A. Maintain a marked set of prints at job site at all times. Show all changes from contract drawings, whether visible or concealed. Dimension accurately from building lines, floor or

curb elevations. Show exact location, elevation, and size of conduit, access panel and doors, and all other information pertinent to the work.

B. At project completion, submit marked set to Architect for approval.

1.08 WARRANTY

A. Warrant all work, materials, and equipment for one year.

PART 2 PRODUCTS

2.01 THIS PART NOT USED

PART 3 EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

SECTION 26 05 01

ELECTRICAL DEMOLITION

PART 1 GENERAL

1.01 SCOPE

A. It is the intent of these documents to provide the necessary information and adjustments to the electrical system required to meet Code and accommodate installation of the new work.

B. Contractor shall coordinate with the Owner so that work can be scheduled not to interrupt operations, normal activities, building access, and access to different areas. The Owner will cooperate to the best of their ability to assist in a coordinated schedule, but will remain the final authority as to time of work permitted.

1.02 EXISTING CONDITIONS:

A. The locations of existing utilities and equipment are shown in an approximate way only and have not been independently verified by the Owner or its representative. The Contractor shall determine the exact location of all existing utilities before commencing work, and agrees to be fully responsible for any and all damages which might be occasioned by the Contractor's failure to exactly locate and preserve any and all utilities and equipment. Replace damaged items with new material to match existing. Promptly notify Owner if utilities are found which are not shown on the drawings.

PART 2 PRODUCTS

2.01 MATERIALS

A. All materials accumulated during the demolition process are the Owner's property and shall be removed from the job site as directed by the Owner.

PART 3 EXECUTION

3.01 DEMOLITION

A. Remove all existing fixtures, clocks, switches, receptacles, and other electrical equipment and devices and associated wiring from walls, ceilings, floors, and other surfaces scheduled for remodeling, relocation, or demolition unless specifically shown as retained or relocated on the Drawings.

B. Disconnect all existing mechanical equipment scheduled for removal, relocation or abandonment. See mechanical Drawings for scope of work. Remove abandoned cables and unusable raceways. Relabel panels and motor control centers to reflect changes.

C. Maintain electrical continuity of all existing systems. Remove or relocate electrical boxes, conduit, wiring, equipment, fixtures, etc. as may be encountered in removed or remodeled areas in the existing construction affected by this work. Wiring which serves usable existing outlets shall be removed and restored clear of the construction or demolition. If existing junction boxes will be made inaccessible, or if abandoned outlets serve as feed through boxes for other existing electrical equipment which is being retained, new conduit and wire shall be provided to bypass the abandoned outlets. If existing conduits pass through partitions or ceiling which are being removed or remodeled, new conduit and wire shall be provided to reroute clear of the construction or demolition and maintain service to the existing load.

D. Extend circuiting and devices in all existing walls to be furred out.

E. Existing electrical outlets and light fixtures are denoted by dotted or dashed lines. Verify exact location of existing electrical outlets and light fixtures in the field. Only partial existing electrical shown. Locations of items shown on the Drawings as existing are

partially based on as-built and other drawings which may contain errors. The contractor shall verify the accuracy of the information shown prior to bidding and provide such labor and material as is necessary to accomplish the intent of the contract documents.

F. Remove all abandoned wiring to leave site clean.

G. Keep outages to occupied areas to a minimum and prearrange all outages with the Owner's representative. Requests for outages shall state the specific dates and hours and the maximum durations, with the outages kept to these specific dates and hours and the maximum durations. This Contractor will be liable for any damages resulting from un-scheduled outages or for those not confined to the preapproved times. Outages shall take place at times when the facility is not in operation or occupied by non-essential personnel. Include all costs for overtime labor as necessary to maintain electrical services in the initial bid proposal. Temporary wiring and facilities, if used, shall be removed and the site left clean before final acceptance. Requests for outages must be submitted at least (5) days prior to intended shutdown time.

H. No circuit breaker or disconnects shall be turned off without prior approval from Owner. Coordinate with the Owner's representative responsible for the area or equipment affected for any electrical interruptions which affect the operation of the remaining portions of the facility.

I. Verify with the General Contractor a location for storage of materials, supplies, tools, rubbish, etc. prior to start of work.

END OF SECTION

SECTION 26 05 19

LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Wires and Cables

B. Wire Connections

1.02 REFERENCE STANDARDS

A. National Fire Protection Association (NFPA)

NFPA 70 National Electrical Code

1.03 DELIVERY, STORAGE AND HANDLING

A. Deliver new wire to site in new standard coils or reels with approved tag denoting length, wire size, insulation type and manufacturer's name.

B. Protect from weather and damage during storage and handling.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE MATERIALS

A. Building Wiring: 98 percent conductivity copper, 600 volt insulation, stranded. Type THHN for interior dry and damp locations. Type THWN or XHHW for wet and exterior locations.

B. Branch Circuit Wiring: Conductors smaller than No. 12 AWG for power system branch circuits not permitted.

C. Motor control wires shall be No. 14 minimum.

D. Wire for special areas shall be as specified on the Drawings.

2.02 TWIST-ON CONNECTOR

A. UL pressure-type, solderless, insulated, wound spring grip twist on connector.

B. Solderless pressure connectors for terminals, taps, and splices.

2.03 COMPRESSION ADAPTER

A. For terminating a single aluminum wire into mechanical connectors, such as a circuit breaker or set screw lugs. Burndy "Hyplug" Type AYP, or equal by Anderson, Illsco, Kearney, Mac-Adapt, T&B.

2.04 TERMINAL, CRIMP-ON

A. Flat, fork tongue, self-insulating

B. For connection of stranded wire to screw terminals

C. T & B "Sta-Kon," or equal

PART 3 EXECUTION

3.01 CONDUCTOR AND CABLE INSTALLATION

A. Make conductor length for parallel feeders identical.

B. Lace or clip groups of feeder conductors at distribution centers, pull boxes, and wireways.

C. Provide copper grounding conductors and straps. A ground wire shall be pulled through conduits and used as the equipment grounding conductor.

D. Install wire and cable in code conforming raceway.

E. No shared neutrals. Provide one neutral for each phase conductor in branch circuits.

F. Use wire pulling lubricant for pulling No. 4 AWG and larger wire. UL approved type only.

G. Install wire in conduit runs after concrete and masonry work is complete and after moisture is swabbed from conduits.

H. Splice only in accessible junction or outlet boxes. Splice in feeders and services not permitted. Splices or taps in branch circuits permitted only in junction boxes where circuits divide.

I. Color code conductors to designate neutral, phase, and ground as follows:

CONDUCTOR	120/208 OR 120/240	277/480
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Gray
Ground	Green	Green

J. Wires shall be factory color coded by integral pigmentation. Colored plastic tape permitted on No. 6 and larger where integral pigmentation impractical. Apply tape in spiral half-lap over exposed portions in manholes, boxes, panels, switchboards and other enclosures.

K. All circuit conductors shall be identified with circuit number at all terminals, intermediate outlets, disconnect switches, circuit breakers, motor control centers, etc. Both ends of a given conductor shall be identified alike.

L. DO NOT install wires of different voltage systems in same raceway, box, gutter or other enclosure.

M. Radius of cable bends shall not be less than 10 times the outer diameter of the cable.

3.02 CONNECTIONS AND SPLICES

A. Follow manufacturer's instructions using manufacturers recommended tools.

B. Stripping Insulation: Carefully strip, avoid nicking conductor. No "ringing."

C. Design: Connectors shall be designed and approved for the purpose used. Connectors between aluminum and copper shall be listed "AL/CU" for the purpose of preventing electrolytic action.

D. Bare Connectors and Conductor Free Ends: Wrap with insulating rubber or friction tape to equivalent insulation of wire.

E. Ground Continuity to Metallic Surfaces: Remove any paint coating and polish surface beneath connection.

F. Copper conductors may be terminated in any approved compression or mechanical connector, including set screws.

G. No splices or taps permitted in feeder or branch circuit terminating in a single outlet.

H. Branch circuit splices and taps in junction and outlet boxes: Twist-on connectors.

I. Conductor and cable copper shall not be reduced at the terminal for making connections.

J. Slack shall be left at equipment, pullboxes, or outlet boxes to allow for a neat termination.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Electric and power system grounding

B. Communication system grounding

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. Provide grounds in accordance with National Electrical Code and additional requirements as required herein.

PART 2 PRODUCTS

2.01 GROUNDING CONDUCTORS

A. Size: Equipment grounding conductor: Table 250-122.

B. Material: Copper

C. Protection: Conductors not in raceway or concealed shall be insulated. Provide conduit where shown or required for physical protection.

D. Bonding Jumpers: Same requirements

PART 3 EXECUTION

3.01 POWER SYSTEM GROUNDING

A. Circuit Grounding: Install grounding bushings, studs, and jumpers at distribution centers, pullboxes, motor control centers, panelboards, and junction boxes.

B. Ground Connections: Clean surfaces thoroughly before applying ground lugs or clamps. If surface is coated, the coating must be removed down to the bare metal. After the coating has been removed, apply a noncorrosive approved compound to cleaned surface and install lugs or clamps. Where galvanizing is removed from metal, it shall be painted or touched up.

C. Conduit Systems:

1. Ground all metallic conduit systems.
2. Non-metallic conduit systems shall contain a grounding conductor.
3. Conduit provided for mechanical protection containing only a grounding conductor, bond to that conductor at the entrance and exit from the conduit.

D. Feeders and Branch Circuits: Install green grounding conductors with feeders and branch circuits as follows:

1. Feeders
2. Circuits serving preparation and kitchen equipment
3. Receptacle outlets
4. Directly connected laboratory equipment
5. Motors and motor controllers
6. Fixed equipment and appliances
7. Items of equipment where the final connection is made with flexible metal conduit shall have a grounding wire.
8. Additional locations and systems as shown

E. Boxes, Cabinets, Enclosures, and Panelboards:

1. Bond the grounding wires to each pullbox, junction box, outlet box, cabinets, and other enclosures through which the ground wires pass (except for special grounding systems for intensive care units and other critical units shown.
2. Provide lugs in each box and enclosure for ground wire termination.
3. Provide ground bars in panelboards, bolted to the housing, with sufficient lugs for terminating the ground wires.

F. Receptacles - Refer to Section 26 27 26 – WIRING DEVICES.

G. Ground lighting fixtures to the green grounding conductor of the wiring system when the green ground is provided; otherwise, ground the fixtures through the conduit systems. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Raceway Supports

PART 2 PRODUCTS

2.01 RACEWAY SUPPORTS

A. Single Runs: Steel rod hangers, galvanized single hole conduit straps, or ring bolt type hangers with specialty spring clips. Plumbers perforated tape or "J-nails" not acceptable.

B. Multiple Runs: Conduit rack with 25 percent spare capacity. Maximum width per manufacturer's recommendations.

C. Vertical Runs: Channel support with conduit fittings.

D. All hardware such as inserts, straps, bolts, nuts, screws and washers shall be galvanized or cadmium-plated steel.

2.02 ANCHOR METHODS

A. Hollow Masonry and Framed Walls: Toggle bolts or spider type expansion anchors

B. Solid Masonry: Lead expansion anchors or preset inserts

C. Metal Surfaces: Machine screws, bolts, or welded studs

D. Wood Surfaces: Wood screws

E. Concrete Surfaces: Self-drilling anchors or powder-driven studs

PART 3 EXECUTION

3.01 INSTALLATION

A. Layout to maintain headroom, neat mechanical appearance, and to support equipment loads required.

B. Exact location and spacing between supports per manufacturer's recommendations and NEC requirements as minimum.

C. Conduit shall be installed in such a manner as to prevent the collection of trapped condensation. All runs of conduit shall be arranged so as to be devoid of traps wherever possible.

END OF SECTION

SECTION 26 05 33

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Conduit, Tubing, and Fittings

B. Flexible Conduit

C. Electrical boxes and fittings as required for a complete installation

1.02 REFERENCE STANDARDS

A. National Fire Protection Association (NFPA)

1. NFPA 70 National Electrical Code--Chapter 3

PART 2 PRODUCTS

2.01 MATERIALS AND COMPONENTS

A. Conduit and Tubing: Galvanized steel rigid threaded conduit, electrical metallic tubing, intermediate metallic conduit.

B. Flexible Conduit: Steel armor, flexible plastic jacketed type with liquidtight connectors (liquidtight flexible metallic conduit).

C. Fittings:

1. General: Approved for purpose. Water, concrete tight where required.

2. Galvanized Rigid Steel Conduit (GRC): Threaded - no pressure type. Bushings with factory insulated throat.

3. Electrical Metallic Tubing (EMT): Connectors and couplings to be case steel. Preinsulated connectors and couplings shall be compression, setscrew type. All connectors shall have insulated throats.

4. Flexible Metallic Conduit: Clamp type, galvanized malleable iron with insulated throat.

5. Liquidtight Flexible Metallic Conduit: Continuous copper ground in core; approved watertight.

D. Expansion Joints: Offset or sliding type with bending straps and clamps. Approved for purpose.

2.02 TYPE

A. Utilize GRC or IMC in concrete with concrete-tight connectors or exterior with watertight connectors.

B. Utilize electrical metallic tubing concealed in interior spaces or exposed in unfinished interior where not subject to physical damage.

C. Utilize surface metal raceways for exposed runs in finished areas. Paint to match wall finish.

D. Make connections to motors and equipment with flexible metallic conduit or liquidtight flexible metallic conduit. Use liquidtight type in damp locations. Minimum size 1/2-inch for motor connections. Use 3/8-inch only for fixture and control wiring. Provide sufficient length of flexible conduit to avoid transmission of vibration. Sizes not noted on the Drawings shall be as required by the NEC.

2.03 OUTLET BOXES

A. Minimum Box: 4-inch box, 1-1/2-inches deep. Provide raised covers on bracket surface mounted outlet and plaster rings on flush outlets.

B. Flush Switch and Receptacle Outlets for One or Two Devices: 4-inch square box, 1-1/2-inches or more deep, with single or two-gang plaster ring.

C. Three or More Devices at One Location: Use one piece gang boxes with device cover. Install one device per gang.

D. Provide galvanized steel interior outlet wiring boxes of the type, shape and size, including depth of box, to suit each respective location and installation; constructed with stamped knockouts in back and sides, and with threaded holes with screws for securing box covers or wiring devices.

E. Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, fixture studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual wiring situations. Choice of accessories is Installer's option.

F. Outlet Box Plate Covers:

1. Flush Mounting: Bevelled, pressure formed, type 302 stainless steel, match device installed.
2. Surface Mounting: Bevelled, steel, pressure formed.

2.04 WEATHERPROOF OUTLET BOXES

A. Provide corrosion-resistant cast metal weatherproof outlet wiring boxes, of the type, shape and size, including depth of box, with threaded conduit ends, cast metal face plate with spring-hinged waterproof cap suitably configured for each application, including face plate gasket and corrosion proof fasteners.

B. Weatherproof boxes to be constructed to have smooth sides, gray finish.

C. Boxes used in contact with soil shall be cast iron alloy with gasketed screw cover and water-tight hubs.

D. Weatherproof Plates: Cast metal, gasketed, for switches and receptacles provide spring loaded doors.

2.05 WEATHERPROOF JUNCTION AND PULL BOXES

A. Provide galvanized sheet steel junction and pull boxes with screw-on covers; of the type, shape and size, to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws and washers.

2.06 PULLBOXES

A. Pullboxes and Junction Boxes: Sheet metal (indoors) or cast metal (exterior or damp locations) construction, conforming to National Electrical Code, with screw-on cover.

B. Flush Mounted Pullboxes: Provide overlapping covers with flush-head retaining screws, finished in light gray enamel.

C. Box volumes shall meet NEC for size and number of entering conduits.

PART 3 EXECUTION

3.01 RACEWAY INSTALLATION

A. Install conduit concealed in all areas excluding mechanical and electrical rooms, connections to motors, connections to surface cabinets, underfloor spaces, and above suspended ceilings.

B. For exposed runs, attach surface mounted conduit with clamps.

C. Coordinate installation of conduit in masonry work.

D. Install conduit free from dents and bruises. Plug ends to prevent entry of dirt or moisture.

E. Clean out conduit before installation of conductor.

F. Alter conduit routing to avoid structural obstructions, minimizing crossovers. Bends and offsets shall be avoided where possible, but when necessary shall be made with an approved hickey or conduit bending machine. The use of a pipe tee or a vise for bending conduit will not be permitted.

G. Provide UL approved expansion fittings complete with grounding jumpers where conduits cross building expansion joints and for long runs where conduit expansion may be excessive. Provide bends or offsets in conduit adjacent to building expansion joints where conduit is installed above suspended ceilings.

H. Route all exposed conduits parallel or perpendicular to building lines.

I. Allow minimum of 6 inches clearance at flues, steam pipes, and heat sources.

J. Vertical Runs: Straight and plumb.

K. Raceways Running in Groups: Run at same relative elevation, properly spaced and supported.

L. Dissimilar Metals: Avoid contact with pipe runs of other systems.

M. Lengths and Bends: Maximum number of bends in any run shall be the equivalent of four quarter bends (360 degrees total). Maximum length of any run shall be 300 feet, less 50 feet for each equivalent quarter bend. Junction and pull boxes shall be provided to maintain these limits.

N. Provide waterproof seal for all exterior wall and underground raceway penetrations.

O. All empty raceways shall be provided with pull string or #12 conductor.

3.02 BOX INSTALLATION

A. Locate outlet boxes flush in areas other than mechanical rooms, electrical rooms, and above suspended ceilings.

B. For boxes mounted in exterior walls, make sure that there is insulation behind outlet boxes to prevent condensation in boxes.

C. Coordinate location and mounting heights with built-in units. Adjust outlet mounting height to agree with required location for equipment served.

D. Locate pullboxes and junction boxes above suspended ceilings or in electrical rooms, utility rooms, or storage areas.

E. Support: Secure boxes independent of entering conduits by attaching directly to structure with bar hanger, blocking, or flat side bracket.

F. Identify each junction and pullbox with system description including branch circuit numbers of enclosed circuits.

G. Conduit shall be securely fastened to all sheet metal outlet, junction, and pullboxes with galvanized locknuts, and bushing.

H. Do not mount boxes back-to-back. Boxes on opposite sides of wall shall be separated by at least 3 inches.

END OF SECTION

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Permanent Identification of all electrical system components.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. Identification shall conform to the latest edition of the National Electrical Code (NEC), Articles 110-21 as a minimum requirement.

PART 2 PRODUCTS

2.01 MATERIALS

A. Laminated Plastic:

1. Three layer, black front and back with white core.
2. Engraved through outer layer to show white characters on black background.
3. Beveled edges.
4. Other colors as specified.

B. Panelboard Directory Card: Fiberboard neatly typed for newly installed panels. Circuit changes to existing panels shall be noted on the directory card by hand printing in ink. When more than five changes have been made on the directory card, a new card shall be typed.

PART 3 EXECUTION

3.01 ITEMS TO BE IDENTIFIED

A. Motor starters, power panels, lighting panels and the disconnecting devices contained therein.

B. Disconnecting devices that are located in the area and not part of the items listed in 3.01 (A).

C. Control panels, starters, pushbutton stations, pilot lights and other control devices.

D. Transformers.

E. Remote control devices.

F. Conductors at both device and terminal strip terminations for control and instrumentation cables and conductors.

G. Other items as specified or noted.

3.02 USE OF NAMEPLATES AND TAGS

A. Panel designations, as described in paragraph 3.04 (A), and disconnecting devices in motor control centers shall be identified by nameplates that are engraved or etched. Nameplates that are engraved or etched shall have a black background with white letters. Letters for panel designations shall be a minimum of 1/2 inch high and letters for disconnect devices, mentioned in this paragraph, shall be smaller than the panel designation but have a minimum height of 3/8 inch.

B. Disconnect devices in lighting panels and power panels shall be identified on the panelboard directory card.

C. All wiring shall be identified with self-laminating, machine made thermal transfer labels.

3.03 APPLYING NAMEPLATES AND TAGS

A. Nameplates that are engraved or etched, shall be attached with screws.

B. Panelboard directory cards shall be placed in holders, provided for this purpose, located inside the panel doors.

3.04 IDENTIFICATION ON NAMEPLATES AND TAGS

A. The voltage designation shall also be shown on the nameplate.

B. Nameplates for disconnecting devices contained in panels and motor control centers shall show the equipment name and location by floor and column number. Voltage designation shall not be included when the voltage is the same as for the panel or motor control center.

C. Nameplates on disconnect devices located in the area but not part of a panel or motor control center shall have the equipment name, power source identification, and voltage designation. Nameplates for disconnect devices located remotely from the equipment shall also show the equipment location by floor and column number.

D. Nameplates on items listed in paragraph 3.01 (C) shall have the equipment name while the individual switches and lights shall have the function (such as start, stop, on, off, etc.).

E. Panelboard directory cards shall list the circuit numbers and show the equipment name and location supplied by the circuits. Equipment locations shall be shown by floor and column numbers or by room numbers.

END OF SECTION

SECTION 26 09 23

LIGHTING CONTROL EQUIPMENT

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide lighting control equipment:

1. Automatic wall switches.
2. Motion sensors.

1.02 QUALITY ASSURANCE

A. Minimum Standards:

1. UL 916 Energy Management Equipment.
2. NEMA enclosure standards.

PART 2 PRODUCTS

2.01 AUTOMATIC WALL SWITCH

A. Automatic wall switch shall be completely self-contained and shall replace standard toggle switch. Motion sensor shall sense motion by using both passive infrared, and sound technology.

B. Switch shall sense motion in room and switch 120 or 277 V electronic or magnetic ballasts using zero crossing circuitry.

C. Time delay and sensitivity shall be adjustable.

D. Switch shall be immune to RFI, EMI, and voltage fluctuations.

E. Switch shall have manual on / automatic off mode.

F. Switch shall not require a neutral connection.

G. Acceptable products: Sensorswitch WSD-PST with switch or approved.

2.02 ULTRASONIC CEILING MOTION SENSOR

A. Motion sensor shall sense motion by using ultrasound sensor.

B. Time delay and sensitivity shall be adjustable.

C. Acceptable products: Novitas 01-100 or approved.

2.03 DUAL ULTRASONIC / INFRARED CEILING MOTION SENSOR

A. Motion sensor shall sense motion by using passive infrared and ultrasound sensors.

B. Time delay shall be adjustable.

C. Sensor shall be immune to false activation due to air movement.

D. Switch shall be immune to RFI, EMI, and voltage fluctuations.

E. Acceptable products: Sensorswitch CM-PDT, Unenco CU15000 2000 or approved.

2.04 WALL SWITCH DIMMER

A. Switch to be fully compatible with ballast / fixtures to be controlled

B. Switch shall be slide style with integral on/off control.

C. Switch shall have locator LED that illuminates when load is off.

D. Switch shall have decora style faceplate.

1. Finish to match other wall switched on project.

E. Acceptable product: Leviton, Hunt Dimming, Lutron, or approved.

PART 3 EXECUTION

3.01 INSTALLATION

A. System shall be installed as shown on Drawings.

B. Motion sensor manufacturer shall verify Drawings to ensure coverage is adequate.

C. At Owner's request, return once within 60 days to adjust sensitivity of all motion sensors and to adjust programming of lighting control system.

3.02 WARRANTY

A. Light level sensors, automatic wall switches, and ceiling motion sensors shall have a 5 year warranty.

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide panelboards incorporating switching and protective devices of the number, rating and type specified herein and shown in Panel Schedules.

1.02 REFERENCE STANDARDS

A. American National Standards Institute (ANSI).
1. 67 Panelboards (ANSI/UL 67).
2. C37.20 Switchgear Assemblies Including Metal-Enclosed Bus (ANSI/IEE C37.20).

B. Institute of Electrical and Electronics Engineers (IEEE).
1. Std. 141-76 Electric Power Distribution for Industrial Plants.
2. Std. 241-74 Electric Systems for Commercial Buildings.

C. National Fire Protection Agency (NFPA).
1. NFPA 70 National Electrical Code.

D. Underwriters' Laboratory (UL).
1. U.L. 67 Panelboards.
2. U.L. 869 Service Disconnects.

1.03 QUALITY ASSURANCE

A. Coordination: Panelboard breakers shall be coordinated with feeder breakers in switchboard.

B. Acceptable Manufacturers: Cutler-Hammer, Square D, Siemens.

PART 2 PRODUCTS

2.01 CONSTRUCTION

A. Box:
1. Material: Galvanized code gauge steel.
2. Size: 20-inch minimum width; 4-inch minimum gutter space on all sides.
3. Mounting Studs: Minimum 4 interior.
4. Knockouts: Individual knockouts by manufacturer or field-cut by Contractor. No concentric knockouts.
5. Finish: Except for box, all exterior and interior steel surfaces properly cleaned and finished with industry standard gray baked enamel paint over a rust-inhibiting phosphatized primer coating approved by the paint manufacturer, except panelboards exposed in finished spaces shall have factory finish to match adjacent surfaces.

B. Bussing:
1. Material: Copper
2. Tap Arrangement: Phase sequence type, permitting a two or three pole breaker to be installed at any location.

3. Short Circuit Bracing: Fully rated, 10,000 amperes RMS symmetrical minimum for 240V AC Panels, and minimum 14,000 amperes RMS Symmetrical for 480V AC Panels, or as otherwise noted.
4. Phase Bussing: Full height without reduction.
5. Neutral Bussing:
   a. Full size, unless otherwise noted.
   b. Suitable lug for each outgoing feeder requiring a neutral connection.
6. All bolts used to connect current-carrying parts together shall be accessible for tightening from the front of the panel.
7. Wiring terminals: Compression or set screw type for copper conductors; bolted to bus.

C. Trim:
1. Material: Code gauge steel.
2. Flush Panels: 3/4-inch minimum overlap all around.
3. Surface Panels: Same width and height as box.
4. Mountable by screwdriver, without need for special tools.
5. Tamper-proof: Trim shall not be removable with door closed. Adjustable indicating trim clamps shall be concealed inside door.
6. Trim shall have piano hinge down one side and shall be openable by removing crews. Dead front cover shall not open with trim.
7. Doors:
   a. Shall cover all device handles, except panels having individual metal clad externally operable dead front units.
   b. Hinges: Concealed, 5-knuckle, steel.
   c. Over 48-inches in Height: Shall have auxiliary fasteners at top and bottom of door in addition to flush latch (3-point).
   d. Latches:
      i. Flush, not protruding beyond front of door.
      ii. Spring-loaded door pull.
   e. Locks: Equip latches with flush locks keyed alike.

D. NEMA 1 unless otherwise noted or otherwise required per NEC for location installed.

2.02 CIRCUIT BREAKERS

A. Main Breaker:
1. Where required, main breakers shall be individually mounted separate from branch breakers.
2. Covered by a metal plate, except for the operating handle.
3. Connection from the load side to the panel bus shall be bus bar. Insulated wire not permitted.
4. Where used as service disconnect, breaker and panelboard shall be listed for use as service entrance equipment.

B. Branch Breakers:
1. Connection to Bus: Bolt-on.

C. Other requirements as noted elsewhere in these Specifications and as per NEC.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide mounting brackets, busbar drillings, and filler pieces for unused spaces.

B. Prepare and affix typed directory to inside cover of panelboard indicating loads controlled by each circuit as required elsewhere in these Specifications.

C. Provide panelboards flush in areas other than mechanical rooms, electrical rooms, and above removable ceilings.

D. Conduit shall be securely fastened to all panelboards and sheet metal outlet, junction, and pull boxes with galvanized locknuts, and one bushing installed in accordance with standard practice. The full number of threads shall project through to permit the bushing to be drawn tight against the end of the conduit, after which the locknut shall be made up sufficiently tight to draw each into firm electrical contact with the box.

E. Keys: Collect all panel keys. Combine all keys on one key ring and submit at time of Substantial Completion.

F. Provide handle ties per NEC for breakers serving circuits with shared neutral conductors.

END OF SECTION

SECTION 26 27 26
WIRING DEVICES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Wall Switches.

B. Receptacles.

C. Ground Fault Receptacles.

1.02 REFERENCE STANDARDS

A. American National Standards Institute (ANSI).

1. 467 Grounding and Bonding Equipment (ANSI/UL467).
2. 498 Attachment Plugs and Receptacles (ANSI/UL498).
3. C73 Series Dimensions of Attachment Plugs and Receptacles.

B. Federal Specification (FS).

1. W-C-596D and E Specification for Electrical Power Connector, Plug, Receptacle and Cable Outlet.

C. National Electrical Manufacturer's Association (NEMA).

1. WD 1-79 General Purpose Wiring Devices.

D. National Fire Protection Association (NFPA).

1. NFPA 70 National Electrical Code.

E. Underwriters' Laboratory (UL).

1. UL-20 Standard for Snap Switches.

1.03 QUALITY ASSURANCE

A. Receptacles shall be Industry Class 5362.

B. Acceptable Manufacturers: Hubbell, P&S, Sierra, Bryant, Arrow-Hart, Leviton, GE, or approved.

PART 2 PRODUCTS

2.01 MATERIALS

A. Switches: 120/277 Volt. AC Quiet, slow make, slow break design, toggle handle, with totally enclosed case, rated 20 ampere, specification grade. Provide matching two-pole, three-way and four-way switches.

B. Duplex Receptacles: Full gang size, polarized, duplex, parallel blade, U-grounding slot, specification grade, rated at 20 amperes, 125 volts (unless otherwise noted), designed for split feed service.

C. Ground Fault Receptacles: Specification grade duplex receptacle with integral ground fault circuit interrupter. Test and reset buttons. Matching wall plate.

D. Wall Plates: Satin stainless steel, Type 302. Nominal .040-inch thick. Match device configuration.

E. Nameplates: Provide engraved or embossed plastic nameplates for receptacles other than standard duplex receptacles indicating voltage, phase, amperes, circuit and panel.

F. Color: Provide gray switches and receptacles in all areas.

PART 3 EXECUTION

3.01 INSTALLATION

A. Furnish and install wiring devices of number, rating and type shown.

B. Devices to include appropriate outlet box, cover, wall plate and other necessary installation materials for a complete operating outlet.

C. Mount switches 42 inches (to center line of faceplate) above floor except as otherwise noted on the Drawings.

D. Coordinate switch mounting location with architectural detail.

E. Mount receptacles vertically at 15 inches (to bottom of faceplate) above finished floor, with grounding pole at top.

F. Coordinate receptacle height with benches and counters.

G. When mounting receptacle above bench or counter. Mount horizontally with grounding pole at left.

H. Back wiring wells may be used for receptacles.

I. Grounding: Install a separate green or bare wire between the receptacle strap grounding (green) screw and a screw into the outlet box. Self-grounding strap not approved as grounding means.

END OF SECTION

SECTION 26 28 16
OVERCURRENT PROTECTIVE DEVICES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Fuses.

B. Circuit Breakers.

1.02 REFERENCE STANDARDS

A. American National Standards Institute (ANSI).

1. C37.16 Preferred Ratings, Related Requirements, and Application Recommendations for Low Voltage Power Circuit Breakers and AC Power Circuit Protectors.
2. C37.17 Trip Devices for AC and General-Purpose DC Low-Voltage Power Circuit Breakers.
3. C97.1 Low Voltage Cartridge Fuses 600 Volts or Less.

B. Federal Specifications (FS).

1. W-C-375B/GEN Circuit Breakers, Molded Case; Branch Circuit and Service, Federal Supply Classification (FSC) 5925.
2. W-C-375/(1 through 20) Circuit Breakers, Molded Case, Branch Circuit and Service (FSC) 5925.
3. W-F-1814 Fuse Cartridge, High Interrupting Capacity. (FSC) 5920.

C. Institute of Electrical and Electronic Engineers, Inc. (IEEE).

1. 20-73 Low Voltage AC Power Circuit Breakers Used in Enclosures (ANSI C37.13-73).

D. National Electrical Manufacturer's Association (NEMA).

1. FU-1 Low Voltage Cartridge Fuses.

1.03 APPLICABLE REGULATIONS

A. Underwriters' Laboratories (UL).

1. UL 489-72 Molded Case Circuit Breakers and Circuit Breaker Enclosures.
2. UL 198 E Class R Fuses.
3. UL 198.2 High Interrupting - Capacity Fuses, Current Limiting Type.
4. UL 869 Service Disconnects.

B. National Fire Protection Association (NFPA).

1. NFPA 70 National Electrical Code.

PART 2 - PRODUCTS

2.01 FUSES

A. Feeder, Branch Circuit and Service Entrance Fuses: 600 amperes and below, UL Class J or RK1 current limiting type, 600 volt 200,000 ampere interrupting capacity.

B. Motor and Inductive Circuit Fuses: UL class RK5 time delay current limiting type, 600 volt, 200,000 ampere interrupting capacity.

C. Control Circuit Fuses: UL Class J or R current, limiting type, 600V.

2.02 MOLDED CASE CIRCUIT BREAKERS

A. Circuit Breakers:

1. Connection to Bus: Bolt-on.
2. Thermal-magnetic, molded case, with inverse time current overload and instantaneous magnetic tripping unless otherwise shown.
3. Quick-make, quick-break, with tripped indication clearly shown by breaker handle taking a position between ON and OFF.
4. Multi-pole breakers shall have a common internal trip. No handle ties between single pole breakers.
5. Contacts: T-rated, for heavy duty switching applications.
6. Breakers feeding convenience outlets shall have sensitive instantaneous trip settings of not more than 10 times the breaker trip rating to prevent repeated arcing shorts resulting from frayed appliance cords.
7. Additions to existing panelboards and switchboards shall match or be compatible with existing.
8. Where used as service disconnects, breakers shall be listed for use as service entrance equipment.

PART 3 EXECUTION

3.01 FUSE INSTALLATION

A. Label each switch to indicate type and rating of fuse installed.

B. All fuses shall be selected to provide selective system coordination.

C. Provide 10% (3 minimum) spare fuses of each size and rating used.

3.02 CIRCUIT BREAKER INSTALLATION

A. Label each breaker located in switchboard or separate enclosure to indicate load served.

B. Adjust settings on breakers to operate properly under actual field conditions and to provide selective system coordination.

C. Update directory in panelboards which have new breakers installed.

END OF SECTION

SECTION 26 29 13

MOTOR AND CIRCUIT DISCONNECTS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide and install motor disconnects as shown and as required by Codes.

B. Provide and install circuit disconnects as shown and as required by Codes.

C. Disconnects to include mounting stands, brackets, plates, supports, and required hardware and accessories for complete installation.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. Conform to National Electrical Code and to applicable inspection authority.

B. Provide circuit and motor disconnects in the proper enclosure as required by NEC for the location installed unless more stringent requirements otherwise noted on the Drawings or herein.

1.03 REFERENCE STANDARDS

A. Underwriters' Laboratory (UL).

1. Annual Product Directories.
2. UL-98 Enclosed Switches.

B. National Electrical Manufacturer's Association (NEMA).

1. NEMA KS-1 Enclosed Switches.

PART 2 PRODUCTS

2.01 COMPONENTS

A. Motor and circuit disconnects shall have an Underwriters' Laboratory label.

B. Three-Phase Disconnect Switches: Three-pole heavy duty quick make, quick break 600 volt. Number of poles and ampacity as noted or required by Code. Fusible where noted with fuse clips suitable for dual element fuses unless current limiting fuses are noted. Short circuit rating sufficient to withstand the available fault current or let-through current before the fuse melts without damage or changes in rating.

C. Compression or set-screw lugs approved for use with copper wire.

D. ON/OFF Positions: Clearly marked, lockable in "OFF" position.

E. Cover Interlock:

1. Prevents switch from being opened when "on."
2. Prevents closing switch when cover is open.
3. Defeater to permit authorized personnel to open door and inspect switch when "on," or operate with cover open.

F. Enclosure for Dry, Indoor Locations: NEMA 1 minimum. Enclosures for outdoor locations: NEMA 3R minimum. Others as required for location installed.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install motor and circuit disconnects as recommended by manufacturer and as required by Code and UL.

B. Maintain Code clearances.

C. Provide a nameplate on each motor and circuit disconnect identifying the equipment item served. Where disconnect is to be installed in existing motor control center replace existing nameplate with new nameplate identifying new equipment item served.

END OF SECTION

SECTION 26 51 13
INDOOR LIGHTING FIXTURES, LAMPS AND BALLASTS

PART 1 GENERAL

1.01 WORK INCLUDED

A. This Section includes supply and installation of luminaires, supports and accessories; and supply of plaster frames, trim rings and backboxes for plaster, tile, drywall or concrete ceilings.

B. Provide and install lamps in all light fixtures. Refer to lighting fixture schedule.

1.02 REFERENCE STANDARDS

A. National Electrical Manufacturer's Association (NEMA).

1. NEMA LE1: Fluorescent Luminaires.

1.03 COORDINATION

A. Confirm compatibility and interface of other materials with luminaire and ceiling system. Report discrepancies to the Engineer/Architect, and defer ordering until clarified.

B. Supply plaster frames, trim rings and backboxes to other trades.

C. Coordinate with Division 23 to avoid conflicts between luminaires, supports, fittings, and mechanical equipment.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Refer to Fixture Schedule.

2.02 BALLASTS

A. Linear Fluorescent Electronic Ballast

1. Program start, universal voltage, extreme system
2. THD < 10%
3. Ballast Power Factor > 99%
4. 0 degree F minimum lamp starting temperature
5. Operating input voltage +/- 20%
6. Operating input frequency 50/60 Hz
7. Audible noise rating “A” or better
8. Output frequency > 40 KHz with no visible flicker
9. Lamp current crest factor < 1.5
10. Constant light output for line voltage variation of +/- 10%
11. Ballast factor 0.71
12. No PCBs
13. 5 year warranty + $15.00 labor allowance.
14. Meets FCC Class A specifications for EMI/RFI
15. Meets ANSI C62.41 Cat A for transient protection
16. UL listed

17. Acceptable product: Osram Sylvania Xtreme System Low Ballast Factor, Advance, or approved.

B. Compact Fluorescent Electronic Ballast

1. Program rapid start
2. THD < 10%
3. Ballast Power Factor > 99%
4. 0 degree F minimum lamp starting temperature
5. Operating input voltage +/- 10%
6. Operating input frequency 50/60 Hz
7. Audible noise rating "A" or better
8. Output frequency > 25 KHz with no visible flicker
9. Lamp current crest factor < 1.5
10. Constant light output for line voltage variation of +/- 10%
11. Ballast factor > 0.95
12. No PCBs
13. 5 year warranty + $10.00 labor allowance
14. Meets ANSI C62.41 Cat A for transient protection
15. UL listed (Osram/Sylvania)
16. Acceptable product: Sylvania Quicktronic Professional or approved

2.03 FLUORESCENT LUMINAIRES

A. Prime coat and finish in high reflectance baked white enamel, two coats minimum on exposed and reflective surfaces, giving reflectance of 85 percent. Paint after fabrication.

B. Reflective plates: 22-gauge (0.80 mm) metal.

C. Provide 20-gauge (0.90 mm) steel housing.

D. Provide Hinged Frames with Catches; removable for cleaning without tools. Support lay-in lenses on four sides with flip ends on short dimension.

E. Provide gasketing, stops, and barriers to form light traps and prevent light leaks.

F. Design luminaire to dissipate ballast and lamp heat.

G. Use formed or ribbed backplates, endplates, reinforcing channels.

H. Suitable for mounting on low density ceilings, where applicable.

2.04 RECESSED LUMINAIRES

A. Recessed Incandescent Luminaires: Prewired type with junction box forming an integral part of the assembly.

B. Supply recessed luminaire complete with trim type required for ceiling system installed. Before ordering, confirm ceiling construction details and architectural finish for each area.

2.05 LED LUMINAIRES

A. General

1. LED light fixtures shall be in accordance with IES, NFPA, UL, as shown on the drawings, and as specified.
2. LED light fixtures shall be Reduction of Hazardous Substances (RoHS)-compliant.

3. LED drivers shall include the following features unless otherwise indicated:
   a. Minimum efficiency: 85 percent at full load.
   b. Minimum Operating Ambient Temperature: -20°C (-4°F).
   c. Input Voltage: 120 - 277V (±10%) at 60 Hz.
   d. Integral short circuit, open circuit, and overload protection.
   e. Power Factor: ≥ 0.95.
   f. Total Harmonic Distortion: ≤ 20%.
4. LED modules shall include the following features unless otherwise indicated:
   a. Comply with IES LM-79 and LM-80 requirements.
   b. Minimum CRI 80 and color temperature 4000˚K unless otherwise specified in LUMINAIRE SCHEDULE.
   c. Minimum Rated Life: 50,000 hours per IES L70.
   d. Light output lumens as indicated in the LUMINAIRE SCHEDULE.

B. LED Downlights:
1. Housing, LED driver, and LED module shall be products of the same manufacturer.

C. LED Troffers:
1. LED drivers, modules, and reflector shall be accessible, serviceable and replaceable from below the ceiling.
2. Housing, LED driver, and LED module shall be products of the same manufacturer.

D. Supply recessed luminaire complete with trim type required for ceiling system installed. Before ordering, confirm ceiling construction details and architectural finish for each area.

2.06 PENDANTS/CABLE HANGERS

A. Swivel sockets permitting normal fixture motion and self-adjustment. Adjustable to provide fixture height alignment.

B. One piece, white finish, with matching canopies.

C. Fixtures shall be factory counter-weighted and balanced to provide level hanging. Weights shall not be visible.

D. Cable hangers shall be adjustable for a minimum of 18”.

2.07 LAMP TYPE AND COLOR

A. Refer to Lighting Fixture Schedule.

B. All lamps of each type and color shall be by the same manufacturer.

2.08 LINEAR FLUORESCENT LAMPS

A. Low mercury, TCLP compliant, 85 CRI, 4100K color temperature.

B. Minimum of 3000 Initial Lumens.

C. Acceptable manufacturers: Osram Sylvania F032/850/XP/ECO, GE, Philips.

2.09 COMPACT FLUORESCENT LAMPS

A. Low mercury, TCLP compliant 81 CRI, 4100K color temperature.

B. Acceptable manufacturers: GE, Philips, Osram Sylvania.

PART 3 EXECUTION

3.01 COORDINATION

A. Refer to Reflected Ceiling Plans for exact locations with respect to ceiling construction.

B. Consult Finish Schedule for ceiling and wall construction and finish.

C. Prior to ordering lighting fixtures, coordinate style of mounting with ceiling construction and trim details for ceiling system finally selected.

3.02 SURFACE MOUNTING

A. Attach with means that will draw fixtures snugly to finished surface without bending or tipping. Twist-on clips with studs not allowed on exposed "T" grid ceilings, except where specified. Support from channel above ceiling framing members with bolt at each corner of fixture.

3.03 PENDANTS

A. Support from structure per paragraph titled “SUPPORT”.

B. Provide steel, stranded safety cable between fixture and structure to support fixture in the event of a pendant breakage.

3.04 SUPPORT

A. Suspended ceiling:

1. Positively attach all light fixtures to the suspended ceiling system. The attachment device shall have a capacity of 150% of the lighting fixture weight acting in any direction.
2. Support grid with No. 12 minimum gage hangers attached to the grid members within 3 inches of the corner of each fixture, attached to structure above.
3. Attach two No. 12 minimum hangers from the fixture housing to the structure above. These wires may be slack.
4. Where suspended fixtures do not align with grid, provide “bridging” above grid and support from structure.
5. Support pendent-hung lighting fixtures directly from the structure above with No. 9 minimum wire or approved alternate support.

B. Support all other fixtures from structure by method rated at least five times support weight.

3.05 ACCESS

A. Recessed fixtures shall have code accessible supply. Use reach-through type fixtures in non-accessible ceilings or other suitable means. Coordinate with ceiling installer.

3.06 FIRE RATED CEILINGS

A. Where a ceiling carries a fire rating, recessed fixtures shall carry UL rating for use in protective enclosures. Coordinate installation of protective enclosures to provide sufficient air space for heat dissipation. 3 inch minimum all around.

3.07 CLEAN-UP

A. At time of acceptance, fixtures and lamps shall be clean, with visible labels removed. Touch-up any blemishes.

B. Remove ballast leakage and dispose of cleaning materials in accordance with EPA regulations.

3.08 FIXTURES AS RACEWAYS

A. Code Reference: NEC 410-31.

B. Through-Wiring: In continuous rows of fluorescent lighting, a connection to a single point in the row indicates that the branch circuit conductors are to be routed through the fixture wiring compartments and a connection made to each ballast.

3.09 LAMP INSTALLATION

A. Install lamps in accordance with manufacturer's instructions.

3.10 EXTRA STOCK

A. Provide extra lamps of all types, based on initial lamping quantity: Incandescent 25%, all others 10%. Where a fraction occurs, round up to next larger integer.

3.11 BURNOUT REPLACEMENT

A. Make replacements from extra stock as required until 90 days after Substantial Completion date. Deliver remaining lamps to Owner.

END OF SECTION

SECTION 27 05 00

COMMON WORK RESULTS FOR COMMUNICATION

PART 1 GENERAL

1.01 CONTRACT DOCUMENTS

A. The Contract Documents are complementary. What is required by any one, as affects this Division, shall be as binding as if repeated herein.

B. Separation of this Division from other Contract Documents shall not be construed as complete segregation of the Work.

C. Particular attention is called to Advertisement For Bids, Instructions to Bidders, Supplemental Instructions to Bidders, General Conditions, Supplemental General Conditions, Drawings and Specifications, and modifications incorporated in the documents before execution of the Agreement.

1.02 BASIC COMMUNICATION REQUIREMENTS

A. All materials and equipment installed under this contract shall be new, unused, free of defects, and of current manufacture.

B. The Contractor shall field-investigate this facility to ascertain the exact physical and electrical conditions in the main Equipment Room (MDF), and the Telecommunications Room (IDF) locations to become familiar with the physical environment of the building.

C. The Contractor shall provide, install, and test the entire cable infrastructure as described under this contract.

D. The Contractor shall call attention to the Owner any error, conflict, or discrepancy in Plans and/or Specifications. Do not proceed with any questionable items of work until a resolution or clarification has been made. Supplemental Plans and Specifications may be supplied as required and shall become part of the Contract Documents.

1.03 SCOPE OF WORK

A. General: Provide and install complete and satisfactorily operating communications systems as specified in this Division, as shown on Drawings, as required, and as reasonably intended. Work generally includes, but is not limited to communication and alarm systems.

B. Omissions: Omission of expressed reference to any item of labor or material necessary for the proper execution of the work shall not relieve responsibility from providing such additional labor or material.

1.04 QUALITY ASSURANCE

A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner.

B. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where

"approved equal" is stated or a substitution is requested, equipment shall be equivalent in every way to that of the equipment specified. All substitutions are subject to the control and approval of the owner or the owner representative.

C. Strictly adhere to all Telecommunications Industry Association (TIA) and BICSI recommended installation practices and manufacturer's guidelines when installing communications components.

1.05 MANUFACTURER'S WARRANTY CERTIFICATION

A. The manufacturer's certification must be supported by Contractor's successful completion of an installation class recognized by an independent organization (such as BICSI or an accredited school). A written test is strongly preferred.

1.06 TECHNICAL QUALIFICATIONS

A. Contractor must be certified by manufacturer as able to provide a 20 year (minimum) manufacturer's warranty certificate.

B. A minimum of three references demonstrating Contractor's past installation experience in Certified Category 6A systems in similar facilities with a minimum of 500 nodes shall be submitted. The Contractor must supply a one year warranty upon completion of the job.

C. At least 50% of the technicians, to include all on-site Journeymen Electricians, must have successfully completed the manufacturer's warranty certification class. D. All Journeymen are to possess a current Oregon License.

E. All Apprentices are to be actively enrolled in an Oregon State approved electrical apprenticeship program.

F. All Equipment/Telecommunication Room and Telecommunications Outlet equipment shall be installed and tested on-site by a technician(s) who, by virtue of an acceptable training course or documented experience, is qualified to perform these procedures. Acceptable training may include successful completion of the manufacturer's training course, documented on-the-job experience or successful completion of applicable technical courses in a recognized trade school.

G. Verification of the above requirements must be submitted in writing with bid.

1.07 CERTIFICATES

A. Contractor must provide evidence of ability to provide a Manufacturer's Certificate of Warranty for the system bid.

B. Contractor must provide Technician Certificate(s) for the 50% mentioned above.

1.08 EXAMINATION OF SITE

A. Examine Site of Work before making Bid and ascertain all related physical conditions.

B. Field verify scale dimensions shown since exact locations, distances and levels will be governed by actual field conditions.

C. Owner will not be responsible for any loss or unanticipated costs which may be suffered by the successful Bidder as a result of such Bidder's failure to fully inform himself in advance in regard to all conditions pertaining to the Work and character of the Work.

1.09 COORDINATION OF TRADES

A. Check Drawings of other trades to avert possible installation conflicts. Should major changes from original Drawings be necessary to resolve such conflicts, notify Architect and secure written approval and agreement on necessary adjustments before installation is started.

B. Check equipment connections and equipment locations on the job for coordination with other Divisions equipment and connections, structure, and the like.

1.10 MINOR DEVIATIONS

A. Make minor changes in equipment connections and equipment locations as directed or required before rough-in without extra cost.

1.11 SUBSTITUTIONS

A. Equal material of other manufacturer may be used following Architect's approval of a written request submitted at least 7 working days prior to bid date.

1.12 RECORD DRAWINGS

A. Maintain a marked set of prints at job site at all times. Show all changes from contract drawings, whether visible or concealed. Dimension accurately from building lines, floor or

curb elevations. Show exact location, elevation, and size of conduit, access panel and doors, and all other information pertinent to the work.

B. At project completion, submit marked set to Architect for approval.

1.13 WARRANTY

A. Warrant all work, materials, and equipment for one year.

B.

PART 2 PRODUCTS

2.01 GENERAL

A. The use of a manufacturer's name and model or catalog number herein is for the purpose of establishing the product set, which the Contractor is to supply and install. B. Quantities are to be determined by Contractor unless specified.

C. Products shall be UL® listed for the purpose they are to be used.

2.02 PRE-APPROVED PRODUCTS

A. The following products are pre-approved for this project. Except as noted, all others will require a substitution request to be completed and approved as per these documents. The District will not consider product sets that have not been pre-approved or accepted as per the substitution request process.

1. Structured Cable Systems:

a. CommScope - all category 5e, 6 and category 6A components, i.e., jacks, patch panels, patch cords and fiber optic components.

b. Panduit - all category 5e, 6 and category 6A components, i.e., jacks, patch panels, patch cords and fiber optic components. Partner cable, i.e., General is acceptable for the Panduit solution.

2. Racks, cabinets, frames and associated fastening devices

a. Chatsworth Products Incorporated (CPI)

b. Hoffman

2.03 FIRESTOPPING

A. Comply with the requirements of Section 07 8400

B. Products may be in the form of caulk, putty, strip, sheet, or devices that shall be specifically designed to fill holes, spaces, and voids at communications penetrations.

B. Firestopping materials shall also provide adhesion to substrates and maintain fire and smoke seal under normal expected movements of substrates, conduits and cables.

2.04 ACOUSTIC SEPARATION

A. Acceptable products for 2” through 4” penetrations are as follows

1. STI EasyPath™

2. Resilient latex caulk and re-enterable putty manufactured by 3M™, Specified Technologies or Hilti.

3. Or approved substitution

B. Acceptable products for less than 2” penetrations are as follows

1. Resilient latex caulk and re-enterable putty manufactured by 3M™, Specified Technologies or Hilti.
2. Or approved substitution

PART 3 EXECUTION

3.01 THIS PART NOT USED

END OF SECTION

SECTION 27 05 29

HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Raceway Supports

PART 2 PRODUCTS

2.01 RACEWAY SUPPORTS

A. Single Runs: Steel rod hangers, galvanized single hole conduit straps, or ring bolt type hangers with specialty spring clips. Plumbers perforated tape or "J-nails" not acceptable.

B. Multiple Runs: Conduit rack with 25 percent spare capacity. Maximum width per manufacturer's recommendations.

C. Vertical Runs: Channel support with conduit fittings.

D. All hardware such as inserts, straps, bolts, nuts, screws and washers shall be galvanized or cadmium-plated steel.

2.02 ANCHOR METHODS

A. Hollow Masonry and Framed Walls: Toggle bolts or spider type expansion anchors

B. Solid Masonry: Lead expansion anchors or preset inserts

C. Metal Surfaces: Machine screws, bolts, or welded studs

D. Wood Surfaces: Wood screws

E. Concrete Surfaces: Self-drilling anchors or powder-driven studs

PART 3 EXECUTION

3.01 INSTALLATION

A. Layout to maintain headroom, neat mechanical appearance, and to support equipment loads required.

B. Exact location and spacing between supports per manufacturer's recommendations and NEC requirements as minimum.

C. Conduit shall be installed in such a manner as to prevent the collection of trapped condensation. All runs of conduit shall be arranged so as to be devoid of traps wherever possible.

END OF SECTION

SECTION 27 05 33

RACEWAYS AND BOXES FOR COMMUNIATIONS SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Conduit, Tubing, and Fittings

B. Flexible Conduit

C. Electrical boxes and fittings as required for a complete installation

1.02 REFERENCE STANDARDS

A. National Fire Protection Association (NFPA)

1. NFPA 70 National Electrical Code--Chapter 3

PART 2 PRODUCTS

2.01 MATERIALS AND COMPONENTS

A. Conduit and Tubing: Galvanized steel rigid threaded conduit, electrical metallic tubing, intermediate metallic conduit.

B. Fittings:

1. General: Approved for purpose. Water, concrete tight where required.

2. Galvanized Rigid Steel Conduit (GRC): Threaded - no pressure type. Bushings with factory insulated throat.

3. Electrical Metallic Tubing (EMT): Connectors and couplings to be case steel. Preinsulated connectors and couplings shall be compression, setscrew type. All connectors shall have insulated throats.

C. Expansion Joints: Offset or sliding type with bending straps and clamps. Approved for purpose.

2.02 TYPE

A. Utilize GRC or IMC in concrete with concrete-tight connectors or exterior with watertight connectors.

B. Utilize electrical metallic tubing concealed in interior spaces or exposed in unfinished interior where not subject to physical damage.

C. Utilize surface metal raceways for exposed runs in finished areas. Paint to match wall finish.

2.03 PULLBOXES

A. Pullboxes and Junction Boxes: Sheet metal (indoors) or cast metal (exterior or damp locations) construction, conforming to National Electrical Code, with screw-on cover.

B. Flush Mounted Pullboxes: Provide overlapping covers with flush-head retaining screws, finished in light gray enamel.

C. Box volumes shall meet NEC for size and number of entering conduits.

2.02 SURFACE MOUNTED RACEWAY

A. Surface Mounted Raceway (SMR) shall be provided as per Section 27 0528.39 with all fittings including but not limited to mounting clips and straps, couplings, flat, bend limiting internal and external elbows, cover clips, bushings, device boxes and other incidental and miscellaneous hardware required for a complete SMR system.

2.03 WIRE BASKET CABLE TRAY

A. Provide wire basket cable tray of types and sizes indicated with connector assemblies, clamp assemblies, connector plates, splice plates and splice bars. Construct units with rounded edges and smooth surfaces; in compliance with applicable standards; and with the additional construction highlighted in Section 2.02.

B. All straight section longitudinal wires shall be constructed with a continuous top wire safety edge. Safety edge must be kinked and T-welded on all tray sizes.

C. Wire basket cable tray shall be made of high strength steel wires and formed into a standard 2 inch by 4 inch wire mesh pattern with intersecting wires welded together. All mesh sections must have at least one bottom longitudinal wire along entire length of straight section. D. Wire basket cable tray sizes shall conform to the following nominal criteria:

1. Straight sections shall be furnished in standard 118.3 inch lengths.
2. Wire diameter shall be 0.196" (5mm) minimum on all mesh sections (minimum size of 4.5mm on stainless steel).
3. Wire basket cable tray shall have a 4 inch usable loading depth by 12 or 18 inches wide as called out on Drawings.

E. In order for a system to be approved as an equipment ground conductor (EGC), all splicing assemblies shall be UL® Classified or CSA approved as an EGC. When using powder coated wire mesh cable tray as an EGC, the paint must be completely removed at all contact points of splice/ground bolt attachments.

F. Material and Finishes: Material and finish specifications for are as follows.

1. Non-exposed cable tray shall be bright zinc plated, as manufactured.
2. In exposed areas, not exposed to view, the cable tray shall be white powder coat. In exposed areas, subject to view, the cable tray shall be custom powder coated to match dark grey ceiling color. Straight sections shall be powder coated with an average paint thickness of 1.2mils (30microns) to 3.0mils (75microns). Field paint supports, hangers, and accessories to match tray color.

G. All fittings shall be field formed from straight sections in accordance with manufacturer's instructions. Where exposed, white touch-up matching powder coat shall be applied to conceal bright edges.

H. Wire basket cable tray supports shall be "L" shaped wall brackets from the manufacturer of the tray.

I. Non-wall support hangers shall be supported by ¼" inch or $^3/_8$" inch diameter rods.

J. Special accessories shall be furnished as required to protect, support and install a wire basket cable tray system.

2.04 FIRE WALL PENETRATIONS

A. Nelson "MCT Multi-Cable-Transit", O.Z./Gedney "Fire-Seal", or approved.

2.03 J-HOOKS

A. J-hooks shall be constructed of galvanized steel or hot dipped zinc.

B. Fastener is to be installed using dedicated wire/rod with one non-continuous cable support, factory or jobsite assembled; rated for indoor use in non-corrosive environments. Product is to be UL® Listed for the application.

C. Acceptable products: CADDY® CABLECAT – Wide Base Cable Support.

2.05 ADJUSTABLE CABLE SUPPORT SYSTEM

A. Cable support system shall be a factory produced assembly and sized to accommodate 100 percent expansion, i.e., rated to hold double the number of initially installed cables.

B. Acceptable product is: CADDY® CABLECAT Adjustable Cable Support

2.06 ROD MOUNTED CABLE SUPPORT SYSTEMS

A. Acceptable product is: CADDY® CAT-CM Cable Support System

2.07 WALL OUTLETS

A. Box: 2-gang square by 2-inch deep with double-gang plaster ring.

B. Wall Plates: Blank, Stainless steel.

2.08 HOMERUNS

A. 1-1/4-inch conduit from each outlet to accessible ceiling space or IDF

B. 1-1/4-inch conduit through any accessible areas between outlet and trunk or terminal.

PART 3 EXECUTION

3.01 GENERAL

A. Install per manufacturer's instruction per weight loading.

B. Install in accordance with directions given in Section 27 0528.39

C. SMR shall be securely supported using mechanical fasteners at intervals not exceeding 10 feet or in accordance with manufacturer's installation instructions.

D. Telecommunication Outlets shall be surface mount outlet boxes compatible with the raceway specified.

E. The path of the SMR shall minimize impact on molding, tack boards and other architectural elements. Vertical runs of raceway from the ceiling to outlets shall be installed on walls near corners wherever possible. Raceway may be installed horizontally at the same height as the outlets or near to the ceiling. Entrance end fittings will be supplied at the ends of raceway runs to transition to conduit sleeves through walls, ceilings or floors. SMR shall be installed parallel and perpendicular to surfaces or exposed structural members, and follow surface contours where possible.

F. Metal components shall be bonded and grounded in accordance with applicable code and ANSI/TIA-607-B.

G. J-hooks are to be supported by dedicated wires or rods installed by this contract. In no case will ceiling grid wires be used to support J-hooks. J-hooks will be attached to ceiling grid wires (where applicable) to satisfy seismic bracing requirements and to prevent swinging.

H. Adjustable cable support systems are to be securely attached to building structure and loaded as per manufacturer's instruction.

I. Fire Rated wall and floor penetrations shall be fire-stopped in accordance with the manufacturer's instructions using the product set referenced in 2.06 above.

3.02 RACEWAY INSTALLATION

A. Install conduit concealed in all areas excluding mechanical and electrical rooms, connections to motors, connections to surface cabinets, underfloor spaces, and above suspended ceilings.

B. For exposed runs, attach surface mounted conduit with clamps.

C. Coordinate installation of conduit in masonry work.

D. Install conduit free from dents and bruises. Plug ends to prevent entry of dirt or moisture.

E. Clean out conduit before installation of conductor.

F. Alter conduit routing to avoid structural obstructions, minimizing crossovers. Bends and offsets shall be avoided where possible, but when necessary shall be made with an approved hickey or conduit bending machine. The use of a pipe tee or a vise for bending conduit will not be permitted.

G. Provide UL approved expansion fittings complete with grounding jumpers where conduits cross building expansion joints and for long runs where conduit expansion may be excessive. Provide bends or offsets in conduit adjacent to building expansion joints where conduit is installed above suspended ceilings.

H. Route all exposed conduits parallel or perpendicular to building lines.

I. Allow minimum of 6 inches clearance at flues, steam pipes, and heat sources.

J. Vertical Runs: Straight and plumb.

K. Raceways Running in Groups: Run at same relative elevation, properly spaced and supported.

L. Dissimilar Metals: Avoid contact with pipe runs of other systems.

M. Lengths and Bends: Maximum number of bends in any run shall be the equivalent of four quarter bends (360 degrees total). Maximum length of any run shall be 300 feet, less 50 feet for each equivalent quarter bend. Junction and pull boxes shall be provided to maintain these limits.

N. Provide waterproof seal for all exterior wall and underground raceway penetrations.

O. All empty raceways shall be provided with pull string or #12 conductor.

3.03 BOX INSTALLATION

A. Locate outlet boxes flush in areas other than mechanical rooms, electrical rooms, and above suspended ceilings.

B. For boxes mounted in exterior walls, make sure that there is insulation behind outlet boxes to prevent condensation in boxes.

C. Coordinate location and mounting heights with built-in units. Adjust outlet mounting height to agree with required location for equipment served.

D. Locate pullboxes and junction boxes above suspended ceilings or in electrical rooms, utility rooms, or storage areas.

E. Support: Secure boxes independent of entering conduits by attaching directly to structure with bar hanger, blocking, or flat side bracket.

F. Identify each junction and pullbox with system description including branch circuit numbers of enclosed circuits.

G. Conduit shall be securely fastened to all sheet metal outlet, junction, and pullboxes with galvanized locknuts, and bushing.

H. Do not mount boxes back-to-back. Boxes on opposite sides of wall shall be separated by at least 3 inches.

3.04 CABLE TRAY INSTALLATION

A. Install wire basket cable tray in accordance with NEMA VE 2 to ensure that the cable tray equipment complies with the requirements of the *NEC*®, applicable portions of NFPA 70B, and the National Electrical Contractors Association's (NECA) 'Guide to Quality Electrical Installations' pertaining to general electrical installations practices.

B. All trays should be supported using a minimum of ¼" All Threaded Rod (ATR).

C. Special accessories shall be furnished as required to protect, support and install a wire basket cable tray system.

D. Coordinate wire basket cable tray with other electrical work as necessary to properly interface installation of wire basket cable tray with other work.

E. Support trays and fasten to structure. Install supports at each connection point, at end of each run, and at other points to maintain spacing between supports of 5 feet maximum.

F. Install firestopping in accordance with local and NFPA regulations to sustain ratings when passing wire basket cable tray through fire-rated elements.

G. Ground and bond metal cable tray in accordance with NFPA 70, National Electrical Code Article 392: Cable Trays. Additionally;

1. Bond cable tray system to a known source of building ground.
2. Provide continuity between wire basket cable tray components. Powder coating must be thoroughly removed at grounding device connection point.
3. Make connections to tray using mechanical, compression or exothermic connectors.
4. If required, ground cable trays by mounting up to two #6 AWG bare copper wires to each wire basket cable tray section, bonded with a grounding clamp

H. Provide sufficient space encompassing wire basket cable tray to permit access for installing and maintaining cables.

END OF SECTION

SECTION 27 51 13

INTERCOMMUNICATION (INTERCOM) SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnish and install complete and operating addition to the existing system.

B. Furnish and install all required equipment necessary to interconnect the equipment to the existing intercom system.

1.02 DESCRIPTION OF SYSTEM

A. System provides ALL CALL and zone paging throughout the building, operated by picking up a telephone with this class of service and dialing an access code.

B. When not being used for paging, system serves as a distribution system for background music.

C. Selected offices are equipped with volume controls for individual preference. However, when in the OFF position, paging announcements will come through with normal, preset volume.

PART 2 PRODUCTS

2.01 FLUSH SPEAKER, STANDARD

A. Backbox: Soundolier #95-8.

B. Speaker:

1. 8-inch, 5 watts normal power rating.
2. Full frequency response for music.
3. Integral Transformer: Dual voltage 25/70 volt line input, 1/4, 1/2, 1, and 2 watt output taps.
4. Compatible with existing system intercom master.

C. Baffle:

1. Round, flat, heavy gauge steel.
2. Finish: White enamel.
3. Soundolier #51-8.

2.02 VOLUME CONTROL

A. Priority attenuator type, stainless steel wall plate for single-gang outlet.

B. Outlet:

1. Box: 4-inch square, 1-1/2 inch deep, single-gang plater ring, flush in wall.
2. Conduit: 1/2-inch EMT to accessible ceiling.
3. Volume controls located at speaker, in ceiling space, require only a box.

2.03 SOUND REINFORCEMENT SYSTEMS

A. Every teaching space will receive a sound reinforcement system. Units will be LightSPEED CAT 855IR, or AMX ResQ equivalent. All systems will include paging override option.

1. Provide ceiling mounted IR sensors at the rate of one per 1000 sq/ft or smaller classrooms and at the rate of two per 1001 sq/ft or larger room.
2. Ceiling mounted speakers per plans, Lightspeed DRQ or approved.
3. Include power supply, and cables for sensors and speakers.

4. Provide two REDMIKE volume control lanyard microphones with batteries, charger, and Page First Option.
5. Provide stereo RCA connections between the projector and the sound reinforcement system.

2.04 WIRING

A. No. 22 AWG, solid, color coded pairs, overall PVC jacket.

B. Mohawk #1403 (3-pair) or Equal:

1. One Pair: To volume and speaker.
2. One Pair: To volume and speaker.
3. One Pair: Spare.

PART 3 EXECUTION

3.01 INSTALLATION

A. Rough-In and Wiring Pulling: Requirements shall be coordinated with installer.

B. Equipment Installation: Shall be made by trained manufacturer's representative.

C. Fastening and Support:

1. All equipment, except portable equipment shall be held firmly in place including loudspeakers, amplifiers and cable.
2. Adequate to support their loads with a safety factor of at least three (3).

3.02 WIRING

A. Provide wiring as required by manufacturer for number of stations and arrangement shown.

B. Circuits, home runs, and feeders shown on Drawings are to establish routing and general system connection only. Provide number and type of wires as recommended by manufacturer.

3.03 TESTING AND ADJUSTMENT

A. Test each circuit after installation for quality of operation.

B. Set speaker transformer taps for proper sound volume, assuming a normal room ambient noise level.

END OF SECTION

SECTION 27 53 13
CLOCK SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included - Addition to Existing System:
   1. Replace existing or provide new clocks as required by Owner.

B. System Type:
   1. Wired synchronous.
   2. Hourly and 12-hour individual correction.
   3. 24 volt.

PART 2 - PRODUCTS

2.01 INDICATING CLOCKS

A. Mounting: Semi-flush or surface to replace existing, or as shown on drawing.

B. Existing back boxes may be used. Where no back box exists, surface mounted clock shall be used.

C. Acceptable Model: Lathem SS, Telcor, Synchronous wired.

2.02 WIRE GUARDS

A. 9 gauge wire frame, white vinyl absite coated. Safety Technology International, Inc. or approved equal.

PART 3 - EXECUTION

3.01 WIRING

A. Wire:
   1. General: Furnish and install per manufacturer's specific instructions.
   2. Clock Branch Circuits:
      a. 18 awg, stranded copper, 4 conductor. Wire colors shall be red, white, black and green.

B. Installation: Tag all wire ends.

END OF SECTION

SECTION 28 10 00

ACCESS CONTROL AND INTRUSION DETECTION SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide a complete security access control system with alarm monitoring, relay control and owner provided badging. System shall include installation, equipment, wiring, materials, accessories, software, programming, documentation, testing, training and miscellaneous items required for a complete and operational system.

1.02 SUBMITTALS:

A. Submit complete and descriptive shop drawings indicating compliances with the specifications herein. Submit in accordance with Section 01330.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. DMP/Lenel to match District Standard.

B. DMP 714 model zone expanders.

2.02 EQUIPMENT

A. Refer to Additional Equipment Lists on Drawings.

B. Color Coding: All wiring shall be color coded with an orange outer jacket.

C. Lenel-Security Reader Interface –Lenel-1320 for dual door application. Provide 1 per card access door indicated.

D. Card Reader – HID Thinline II, HID 5355AGN00 with glass mount kit.

E. Pin Pad – HID 5355AGK09 for Arm/Disarm. HID 5355ABK09 for door control.

F. Access Panels – Lenel Enterprise Series.

G. HID proximity Series – Proxpro II. 1326 standard proximity cards. 1386 ISO series cards. Provide 500 cards with system.

PART 3 EXECUTION

3.01 INSTALLATION

A. The installation shall be accomplished with quality materials in a neat and professional manner. Materials under this section or other sections of the specifications damaged during this installation shall be replaced with new materials at no additional cost to the Owner.

B. Prior to beginning work, hold a coordination meeting to coordinate all interfaces between equipment, rough-in requirements, phasing issues, etc.

C. Verify location of access controller board and CPU with Owner.

D. Sensors and other devices shall be mounted where indicated.

E. Remote reader electronics and junction boxes shall not be installed in inaccessible ceilings. They shall be located in the nearest accessible ceiling and all wiring piped to the security devices.

F. All wiring shall be concealed in raceway, regardless of location.

3.02 PROGRAMMING

A. Provide complete programming of all system components per Owners Instructions.

3.03 TRAINING

A. Provide 8 hours of on-site training utilizing the actual access control system. Training shall include at minimum the following: System programming, operating doors, photo badging and monitoring. At end of training, provide a certification letter indicating the training was given and understood by the attendees.

END OF SECTION

SECTION 28 31 00

FIRE ALARM SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnish and install a complete and satisfactory operating addition to the existing automatic fire alarm and detection system.

B. System to include control panel modifications, detection devices, notification appliances, manual stations, accessories, raceways, wiring, batteries, and any other necessary accessories and installation materials.

C. Provide plans, specifications, equipment list and calculations for permit review by the Fire Marshall.

1.02 DESCRIPTION OF SYSTEM

A. Supervised non-coded annunciated multiplex style, addressable, solid state system with intelligent analog alarm initiation.

B. System Operation:
1. Alarm Caused By: Activation of any automatic detection or manual device, or water flow within sprinkler system.
2. Alarm Initiation to Cause:
   a. Audible and visual zone identification at Control Panel and annunciators.
   b. Lamp to light in base of initiating detector; or if detector is concealed from view, light a remote lamp at nearest visible location.
   c. Closing of selected supply air dampers and HVAC units.
   d. Transmission of alarm to remote monitoring station via 2 line automatic telephone dialer.
   e. All smoke and fire doors to close.
   f. All horns to sound selected tone.
   g. All strobes to flash.
3. Audible alarm may be manually silenced at Control Panel. Alarm signal circuit and zone alarm light shall remain initiated until actuated devices have been restored to normal and Control Panel reset.
4. Trouble Signal Caused By:
   a. An open or short in detector or signaling loop wiring.
   b. Removing any initiating or signaling device from system.
   c. Moving any sprinkler system valve from the full open position.
   d. Failure of battery charger.
5. Trouble initiation to cause: audible and visual indication at the Control Panel.
6. Audible trouble indication may be silenced at Control Panel. Trouble circuit and zone light to remain initiated until trouble corrected.
7. Trouble circuit to be self-restoring after correction of problem, or have automatic "ring-back" if left in silenced condition.
8. Alarm shall override trouble.

1.03 PLAN SUBMITTAL AND INSPECTION REQUIREMENTS

A. Plans and Specifications submittal: Three complete plans and specifications for fire alarm systems shall be submitted for review and approval prior to system installation. Plan review fees must be paid before picking up the approved set of plans. Plans and specifications shall be submitted to the Permit and Information Center. Provide Owner with a copy of the approved plans.

B. Plans and specifications shall include, at minimum, the following information. Provide additional information as required by Fire Marshall.

C. Floor plan with rooms labeled and occupancy use noted.
1. Location of all initiating, notifications devices, control panel, and remote annunciator.
2. Mounting heights and ceiling description where detectors are installed.

D. Point to point system wiring diagram
1. Devices, controls, and end-of-line location for each circuit.
2. Number of conductors and wire gauge for each circuit run
3. Zone identification

E. Voltage drop calculation
1. Devices, length, resistance of wire, and end-of-line voltage for each circuit

F. Battery calculation.

G. Other information required by the local authority having jurisdiction.

H. Location and Security: The alarm control unit, remote annunciator panel, and access keys to locked fire alarm equipment shall be installed and maintained in a lock box location approved by the Fire Marshall. Lockbox to be provided by the Contractor. Written operating instructions shall be provided within the alarm control unit. Lock box to meet requirements of fire marshal.

1.04 REFERENCE STANDARDS

A. NFPA 72: National Fire Alarm Code

B. NFPA 101: Life-Safety Code

C. Uniform Fire Code

D. Oregon Structural Specialty Code

E. UL-STD 864, UL-UOJZ

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Match existing

2.02 EXISTING FIRE ALARM MASTER PANEL

A. Features:
1. Solid-state. "Mother/Daughter" board configuration.
2. Plug-in modules.
3. Separately fused inputs.
4. Multiple two wire addressable communication loops for zones and devices required.
5. Supervision and sensitivity testing of all circuits and devices.
6. All necessary 24 VDC power supplies.
7. Alarm reset switch.
8. Ground fault indicator.
9. Lamp test switch or lamp supervision.
10. Trouble silencing switch: self-restoring, or with ring-back.
11. Separate system trouble indicator: Supervises circuits and control panel wiring.
12. Audible and visual trouble indication including location and address of device. Visual indication shall be English language readout.
13. Power-on indicator.
14. Separate supervised alarm and trouble indicators for each circuit.
15. Detector circuit to accommodate intermixing of all types of detection and contact devices without resistors or circuits compensating devices at each initiating device.
16. Terminals for remote annunciators and controls.
17. Addressable auxiliary contacts: Two each NO/NC for alarm and trouble.
18. Fire drill switch and an audible alarm silence switch.
19. Detector sensitivity, calibration and identification to be supervised by control panel. Detector sensitivity capable of being changed from the control panel.

2.03 MANUAL STATIONS

A. Addressable non-coded semi-flush mount, single-action, fully compatible with ionization and thermal detectors. Key reset, so that once station has been pulled, it cannot be reset by unauthorized personnel. Bright red finish. Engraved "FIRE ALARM."

B. Provide protective shields for all manual pull stations unless otherwise noted. Tamper-proof, clear lexan shield and red frame that easily fits over manual pull stations. When shield is lifted, it sounds a loud, piercing warning horn. Battery-operated horn. Acceptable Example Model: Safety Technology International Stopper II.

2.04 THERMAL DETECTORS

A. Addressable Combination Rate of Rise/Fixed Temperature:
1. Plug-in base, interchangeable with other detectors, 2-wire loop operation.
2. Alarm indicator lamp.
3. Rate of Rise Initiation: 15^{o}F rise over a one-minute period.
4. Fixed temperature initiation: 135^{o}F or 200^{o}F, as shown.
5. Integral communications and built-in device type identification.

2.05 SMOKE DETECTORS

A. Features:
1. Optical sensing, photoelectric type addressable smoke detector.
2. No moving parts.
3. Alarm indicator LED to pulse only for trouble and alarm signals.
4. Capable of having sensitivity tested and adjusted.

5. Nominal 24V DC 2-wire loop operation.
6. Provision for connecting a remote alarm lamp.
7. Terminal base connection.
8. Concealed socket head screw to prevent tampering.
9. Integral communications and built-in device type identification.
10. The detector shall be capable of bi-directional communication with the control panel.
11. The detector shall be dynamically supervised and uniquely identifiable by the control panel. The control panel shall be capable of analyzing the signal of the detector's analog value for calibration, identification and sensitivity. These values can be displayed by the control panel and monitored for processing according to control panel instructions. The detector's sensitivity shall be individually adjustable from the control panel. Should the detector sensitivity voltage shift beyond an acceptable level and stay there for a predetermined length of time, a discrete detector trouble signal shall be annunciated at the control panel.

B. Duct detectors shall be similar with duct mounting enclosure, sampling tubes, remote test and reset station. Provide relay base with each duct detector. Connect to shut down associated HVAC unit upon alarm.

2.06 COMBINATION HORN/STROBE

A. Electronic Horn:
1. Selectable horn or temporal (Code 3) tones.
2. 3 selectable dBA levels: 90, 95, 99 dBA Anechoic at 10’ for both tones.

B. Electronic Strobe:
1. Capable of being synchronized by adding synchronization module.
2. 0.2 sec maximum pulse duration with 40% duty cycle.
3. Flash rate of 1 Hz to 2 Hz.
4. Clear or nominal white light source not to exceed 1000 cd.
5. Minimum intensity: 75 candela. 15/75 candela unit is not acceptable.

C. Audio and strobe inputs shall be supervised.

D. Wheelock HSR.

2.07 ELECTRONIC HORN

A. Selectable horn or temporal (Code 3) tones.

B. 3 selectable dBA levels: 90, 95, 99 dBA Anechoic at 10’ for both tones.

C. Exterior horns shall be weatherproof and listed for outdoor use.

D. Wheelock STR.

2.08 ELECTRONIC STROBE

A. Capable of being synchronized by adding synchronization module.

B. 0.2 sec maximum pulse duration with 40% duty cycle.

C. Flash rate of 1 Hz to 2 Hz.

D. Clear or nominal white light source not to exceed 1000 cd.

E. Input shall be supervised.

F. Minimum intensity: 75 candela. 15/75 candela unit is not acceptable.

2.09 WIRING

A. Type:
1. UL listed limited energy cable for fire protective signaling.
2. Conductors: Minimum size No. 18 AWG, solid, color coded, shielded where required by manufacturer.
3. Overall PVC jacket, red color.
4. Belden Fire Alarm Cable or equivalent.

B. Size: The sizes and quantity of the different wires shall be those specified by the manufacturer. Color code shall be used where specified.

2.10 TRANSPARENT NOTIFICATION DEVICE GUARD

A. Install as shown on Drawings.

B. Strobe light loss shall not exceed 35%.

C. Horn sound loss shall not exceed 6 dB(a).

D. Non-transparent cowl shall not block side of strobes.

E. Flush-mounted notification devices shall have flush mount compatible covers where indicated on Drawings.

PART 3 - EXECUTION

3.01 WIRING

A. Raceway:
1. Raceway not required where wiring is accessible and concealed above ceiling or in chase. Raceway is required in all other areas.
2. Install surface non-metallic raceway for surface wiring in finished areas. Install conduit in all other areas where raceway is required.

B. Wire:
1. All wires shall be tagged at all junction points and shall be free from ground or crosses between conductors.
2. One-inch conduit between the FACP and the central station transmitter connection as indicated. Install number of conductors and electrical supervision for connecting wiring as required to suit central-station monitoring function. Provide telephone conductors, jacks, and boxes for connection between transmitter and MPOP.

3.02 INSTALLATION

A. Manufacturer to provide supervision of installation and make final connection of tagged wiring.

B. Maintain existing system fully operational until new has been tested and accepted. As new equipment is installed label existing equipment "NOT IN SERVICE UNTIL ACCEPTED".

C. Ground equipment and conductor and cable shields. For audio circuits, minimize to the greatest extent possible ground loops, common mode returns, noise pickup, cross talk, and other impairments. Provide 5-ohm ground at main equipment location. Measure, record, and report ground resistance.

D. The Contractor shall provide for a communication line from the fire alarm master to the building security panel for monitoring alarm conditions. The Contractor shall pay all costs associated with connecting to the building security panel.

3.03 FIELD QUALITY CONTROL

A. Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.

B. Provide a 10-day minimum notice in writing when the system is ready for final acceptance testing.

C. Final Acceptance Test: Test the system according to the procedures outlined in NFPA 72. Minimum required tests are as follows:

1. Verify the absence of unwanted voltages between circuit conductors and ground.
2. Megger test all conductors other than those intentionally and permanently grounded with electronic components disconnected. Test for resistance to ground. Report readings less than 1-megaohm for evaluation.
3. Test all conductors for short circuits utilizing an insulation-testing device.
4. With each circuit pair, short circuit at the far end of the circuit and measure the circuit resistance with an ohmmeter. Record the circuit resistance of each circuit on the record drawings.
5. Verify the control unit is in the normal condition as detailed in the manufacturer's operating and maintenance manual.
6. Test initiating and indicating circuits for proper signal transmission under open circuit conditions. One connection each should be opened at not less than 10 percent of the initiating and indicating devices. Observe proper signal transmission according to class of wiring used.
7. Test each initiating and indicating device for alarm operation and proper response at the control unit. Test smoke detectors with actual products of combustion.
8. Test the system for all specified functions according to the manufacturer's operating and maintenance manual. Systematically initiate specified functional performance items at each station including making all possible alarm and monitoring initiations and using all communications options. For each item, observe related performance at all devices required to be affected by the item under all system sequences. Observe indicating lights, displays, signal tones, and annunciator indications. Observe all voice audio for routing, clarity, quality, freedom from noise and distortion, and proper volume level.
9. Test both primary power and secondary power. Verify, by test, the secondary power system is capable of operating the system for the period and in the manner specified.

D. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

E. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log. Submit log upon the satisfactory completion of tests.

F. Tag all equipment, stations, and other components at which tests have been satisfactorily completed.

3.04 VOLTAGE DROP TESTING

A. Verify voltage drop for each indicating circuit using a calibrated digital Volt-Ohm-Meter calibrated within the past 6-months. Proof of calibration to be provided with test results.
1. Energize each indicating circuit by placing the system into alarm condition.
2. Measure the voltage at the source of each indicating circuit.
3. Measure the voltage at the end-of-line resistor of each indicating circuit.
4. Subtract the end-of-line voltage from the source voltage for each indicating circuit.
5. Divide the difference by the source voltage for each indicating circuit.
6. The value remaining is the percent voltage drop for each indicating circuit.
7. This value shall not exceed the maximum 10% voltage drop as specified above.
8. Provide all documentation to the School District.
9. The School District reserves the right to verify the voltage measurements with additional measuring instruments of the School District's choice. If the values are different when taken a second time, a third measurement will be taken by the School District in the presence of the Contractor with a digital Volt-Ohm-Meter (calibrated within the past 6 months) provided by the School District.

3.05 CLEANING AND ADJUSTING

A. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish. Clean unit internally using methods and materials recommended by manufacturer.

3.06 CERTIFICATION

A. The installer shall provide written certification to the fire marshal and to the Owner that the system has been installed in accordance with the approved plans and specifications.

END OF SECTION

SECTION 31 00 00

EARTHWORK

PART 1 – GENERAL

1.1 DESCRIPTION

Work includes, but is not limited to the following:

A. Preparing subgrades (excavation and fill) for building foundations, pavements, walks and landscape areas.

B. Subbase course for concrete walks and pavements.

C. Excavation and backfill for site utility trenches and storm water facilities (rain gardens and grassy filter strip).

1.2 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division Specification Sections, apply to this section.

A. REFERENCED SPECIFICATIONS:
   1. ODOT Standard Specifications (current edition).

B. REFERENCED DOCUMENTS
   1. Geotechnical Report: Provided by Branch Engineering, October 20, 2015.
   2. All earthwork shall comply with the recommendations and requirements of the Geotechnical Report.

1.3 DEFINITIONS

A. Unsuitable materials:
   1. Existing subgrade: Soft, loose, wet or disturbed ground that is not capable of direct support of slabs, pavement, structures and construction equipment with the exception of improvement by compaction, proof rolling or similar methods of improvements or personnel.
   2. Fill: Topsoil, frozen material; construction materials and materials subject to decomposition; clods of clay and stones larger than 3 inches; organic materials, including silts, which are unstable; and inorganic materials, including silts, too wet to be stable.

B. Rock Excavation:
   1. Solid Rock Ledge (igneous, metamorphic, and sedimentary rock).
   2. Bedded or conglomerate deposits so cemented as to present characteristics of solid rock which cannot be excavated without blasting; or the use of a modern power excavator (shovel, backhoe, similar power excavators) of no less than 1 cubic yard capacity, properly used, having adequate power and in good running condition.
   3. Boulders or other detached stones each having a volume of ½ cubic yard or more.

C. Dry weather/Wet Weather Conditions: Bar run or native fill may be used during dry weather conditions, as per the Geotechnical Report. Crushed rock fill must be used during wet weather conditions. Dry weather conditions shall be assumed until October 1. Wet weather conditions are anticipated during the Wet Weather Period of October 1 through April 30. The contractor may use Bar Run Fill during the Wet Weather Period if dry conditions occur and if approved by the Geotechnical Engineer; however, the contractor is responsible for providing the appropriate material during the Wet Weather Period, and no additional monies will be paid to the contractor for the required use of Crushed Rock during the Wet Weather Period.

1.4 SUBMITTALS

A. Submit the following in accordance with the requirements of Division 01 Section SUBMITTAL PROCEDURES.

B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following requirements indicated:
   1. Imported material gradation reports.
   2. Material compaction test reports.
   3. Rain garden percolation rate verification test report.

C. Field Quality Control Submittals:
   1. Field Test Reports
   2. Special Inspections for Code Compliance.

D. Contract Closeout: Division 01 Section CLOSEOUT PROCEDURES.
   1. Provide record documents.

1.5 QUAILITY ASSURANCE

A. Observation and Inspection: Owner will retain a Geotechnical Engineer to monitor earthwork.

B. Product/Material: Compaction testing shall be in accordance with Division 01 Section QUALITY REQUIREMENTS.

C. Comply with OSHA requirements for excavation and trenching operations.

1.6 PRODUCT DELIVERY, HANDLING, AND STORAGE

A. Protect from damage by the elements and construction procedures.

B. Comply with manufacturer’s recommendations.

1.7 ADVANCE NOTICE

A. Notify Engineer at least 48 hours prior to staring work in this section.

1.8 COORDINATION

A. Coordinate with other trades affecting or affected by work in this section.

B. Existing Utilities; Do not interrupt utilities serving facilities occupied by the Owner or others unless permitted in writing by the Owner and then only after arranging to provide temporary utility service according to the requirements indicated.
   1. Notify Owner not less than two days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without written authorization.
   3. Owner to locate utilities within project area. Coordinate with Owner prior to commencing excavation.

C. Abandon-in-place or demolish and completely remove from site existing underground utilities as indicated on the plans.

PART 2 - PRODUCTS

2.1 FILL AND BACKFILL MATERIALS

A. Stabilization Fill: Imported, clean, angular quarry rock, 3-inch or 6-inch minus material, open gradation.

B. Native Material: Excavated, on-site, native to project site; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter. Material to be approved by Geotechnical Engineer for use as fill.

C. Crushed Rock Fill: Imported clean ¾”-0 or 1½ ”-0 crushed rock or crushed gravel, free from foreign material and conforming to the requirements of ODOT Standard Specifications (current edition) 02630.

D. Bedding/Base Rock:
Crushed Rock: Imported clean ¾”-0 crushed rock or crushed gravel, free from foreign material and conforming to the requirements of ODOT Standard Specifications (current edition) 02630.

E. Top Soil: Imported, natural, fertile, friable, sandy loam with at least 10 percent humus, free of rock, clay subsoil, clods, lumps, plant, roots, sticks, weeds, seeds, and other deleterious material. Existing topsoil may be stockpiled and reused, as shown on the drawings and approved by the landscape architect. Refer to Division 32, Section LANDSCAPING, for soil submittal and amendment requirements.

F. Drain Rock: Imported, clean, ½” to 1-1/2” uncrushed, nearly round aggregate free from foreign materials and meeting the requirements of ODOT Standard Specifications (current edition) 0109.12.

G. Riprap: Riprap: Class 0, angular rock, per ODOT standard specifications. Average rock size 4 inches.

H. Rain Garden/ Filter Strip Growing Medium/Top Soil: Imported soils shall be a sandy loam mixed with compost or a sand/soil/compost blend. It shall be roughly one-third compost by volume, free-draining, and support plant growth. The compost shall be derived from plant material; animal waste is not allowed. The soil shall be a uniform mix, free of stones, stumps, roots or other similar objects larger than two inches. Growing medium shall be 12 inches deep for filter strips and 18 inches deep for rain gardens.

2.2 DRAINAGE GEOTEXTILE

A. Non-woven geotextile; grab tensile strength 90 lb minimum per ASTM D4632 each direction; burst strength 185 psi per ASTM D3786; puncture strength 55 lb per ASTM D4833 or ASTM D3787 Mod. OSHD TM 816; No. 70 sieve or similar opening; minimum 150 gal/min/ft^2. Amoco 4545 or approved.

2.3 SUBGRADE GEOTEXTILE

A. Subgrade woven geotextile; grab tensile strength 200 lb minimum per ASTM D4632 each direction; burst strength 400 psi per ASTM D3786 Mod. (OSHD TM814) (TF 25. method 3); puncture strength 90 lb per ASTM D4833 or ASTM D3787 Mod. (OSHD TM 826); No. 50 sieve or smaller opening; 0.05 sec water permittivity. Amoco 2002 or approved.

2.4 EROSION BLANKET

A. Erosion blanket shall be Type 2, straw and coconut. Furnish blanket consisting of undyed, untreated, biodegradable, jute, coconut coir, synthetic polypropylene fibers, or approved yarn woven into a plain weave mesh with 5/8- to 1-inch square openings. Ensure the following:

Material	Specification Minimums
Straw 70%*	Straw and Coconut mass to be 0.5 lb/sy
Coconut 30%	(0.25" min thickness)
Netting	Photodegradable netting on the bottom side.
5/8 to 1-inch square mesh** with 0.3 oz/sy weight.	

*Moisture content shall not exceed 20%.
**Dimensions are approximate and may vary to meet manufacturer's standards.
Contech's 70% straw / 30% coconut meets these requirements.

2.6 TRACER WIRE

A. Electrically conductive tracer wire, 18 - gauge, insulated copper or heavier, or other approved material. To be placed full length of trench with non - metallic pipe. Color as specified below:
   1. Green: Sewer systems (sanitary and storm)
   2. Blue: Water (domestic and fire)

2.7 EROSION CONTROL

A. Provide mulch biobags, sand bags, silt fences, straw bales, plastic sheeting, tape, stakes, mulch, and other items as required to meet the requirements for construction erosion control plan.

PART 3 – EXECUTION

3.1 PREPARATION

A. Prepare subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from the ground surface.

B. Verify existing grades and field conditions agree with the drawings prior to starting work of this section. Notify Engineer of any discrepancies.

C. Do not start work of this section until any unsatisfactory conditions have been corrected. Commencing work implies acceptance of existing conditions.

D. Locate and mark existing utilities within the project area prior to commencing excavation work.

3.2 PROTECTION

A. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlements, lateral movement, undermining, washout, and other hazards created by earthwork operations. Repair or replace items damaged by work of this section.

B. Preserve staking, marking, or other designation until designation is no longer required. If disturbed or destroyed, replace as directed.

C. Dust Control: Protect persons and property against damage and discomfort caused by dust. Water construction area and accesses as necessary and as directed.

3.3 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding areas.

B. Protect subgrades and trenches from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install dewatering system to keep subgrade dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.4 GENERAL REQUIREMENTS

A. Contractor shall perform all excavation and trenching necessary or required for proper construction of the work and placement or installation of materials. Tunneling or jacking shall not be used unless approved in writing by the Engineer.

B. Cutting Pavements: Cut vertical, straight-line joints using power saw designed for cutting pavements.

C. Line and Grade: Excavate to lines and grades shown on the drawings or as established by the Engineer.

D. Shoring: Shore excavations and trenches when necessary to prevent caving during excavation in unstable material, or to protect adjacent structures, property, workers, and the public or as required by local, state, or federal agencies. Shoring shall be removed, as the backfilling is done, in

a manner that does not damage work or permit voids in the backfill. It shall be the sole responsibility of the Contractor to see that safety requirements are met.

E. Temporary stockpiling of Excavated Materials: Locate at least 2 feet from trench edges. Excavated materials may be placed in approved areas. Do not obstruct roadways, bikeways, or pedestrian walkways. Conform to all federal, state and local codes governing the safe loading of excavated materials adjacent to excavations.

F. Excess Excavation: Where excavation, through the Contractor's error, is carried to levels lower than those shown on drawings, backfill with specified bedding material to proper levels at Contractor's expense.

G. Backfilling shall not commence until after excavations have been inspected. Backfill shall be placed in such a manner as not to disturb, damage, or subject such facilities to unbalanced loads or forces. Make fills as soon as feasible after Engineer's review and acceptance.

H. If rock or unstable soils are encountered, notify Engineer. Removal of rock or unstable soil will be paid for as an addition to the contract.

I. Over-excavate all test pits that extend beneath building areas and replace with compacted crushed rock.

3.5 CONSTRUCTION EROSION CONTROL

A. Construction erosion control shall comply with the outcome requirements of any permits or the erosion control plan, whichever is more stringent. The contractor shall be responsible for monitoring the construction erosion control measures and shall make adjustments to measures, in accordance with the plans and permit, to accommodate changes in earthwork operations and weather conditions.

B. Upon completion of the project, remove all temporary erosion control items from the site. Permanent erosion control items to remain in place.

3.6 CLEARING AND GRUBBING

A. Clear and grub all areas to receive improvements or in areas indicated on plans for regrading. Clearing shall include the removal of all brush, grass, shrubs, trees, weeds, rubbish, structures, pavements, and debris flush with or slightly below original ground surface. Remove willow and blackberry, if any, to not less than 18 inches below original ground surface. Grubbing shall include the removal of all stumps and roots larger than 1/2 inches in diameter, rocks larger than 6 inches, and existing structures to the following level:
   1. Landscape areas: To not less than 6 inches below finish grade.
   2. Pavement areas: To not less than 6 inches below finish grade.

B. Dispose of all cleared and grubbed material off-site.

3.7 SUBGRADE INSPECTION

A. Notify Owner when excavations have reached required subgrade. Do not traffic the subgrade with construction equipment or vehicles.

B. If the Geotechnical Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Geotechnical Engineer. Use crushed rock fill to fill the voids left after overexcavation. Place in 12-inch maximum loose lifts and compact to a minimum density of 92 percent relative compaction, per a maximum dry density of ASTM D-1557 at an optimum moisture content of $\pm$2 percent.

D. Authorized additional excavation and replacement material will be paid for as an addition to the contract.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed, without additional compensation.

F. Subgrades in pavement and structural areas that have been disturbed during stripping or cutting operations shall be scarified to a depth of at least 8 inches and then compacted to a minimum density of 95 percent relative compaction, per a maximum dry density of ASTM D-1557 at an optimum moisture content of $\pm$2 percent. Minimum compaction for the eight inches immediately underlying pavement sections to be compacted to 95%.

3.8 STORAGE OF SOIL MATERIALS

A. Stockpile materials without intermixing. Place, grade, and shape stockpiles to drain surface water.

B. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.9 GEOTEXTILE PLACEMENT

A. Acquisition and Storage: Provide complete rolls of geotextile as furnished by the manufacturer, and protected against damage and deterioration. Store all geotextile rolls in a dry place and off the ground at all times according to ASTM D4873. Cover all rolls and partial rolls with a dark protective covering when received. The geotextile will be rejected for use if the Engineer determines it has defects, deterioration, of has been damaged.

B. Surface Preparation: Prepare the surface receiving the geotextile to a smooth condition free of obstructions, depressions, and debris unless otherwise directed. Do not drag the geotextile on the ground or mishandle it in any way.

C. Loosely place the geotextile without wrinkles so placement of the overlying material will not tear the geotextile. Lap or sew the geotextile at the ends and sides of adjoining sheets as specified.

D. On slopes: Place the geotextile with the machine direction oriented up-down the slope. Lap the upper sheets over the top of the lower sheets. When the geotextile is placed on a slope steeper than 6:1, securely anchor the laps to the ground surface with pins or stakes as necessary to prevent

slippage and tearing of the geotextile. Start placement of the fill material on the geotextile at the toe of the slope and proceed upwards.

E. Overlay: Minimum overlap shall be 24 inches.

F. If the Engineer determines the specified overlap is not sufficient, increase the overlap to provide adequate coverage or sew the geotextile together in the field. If field-sewn, the provisions of ODOT 00350.20 and 00350.40(d) apply.

G. Protection of Geotextiles: Protect the geotextile at all times from ultraviolet (UV) rays, contamination by surface runoff, and construction activities.

H. Traffic or construction equipment will not be permitted directly on the geotextile except as authorized by the Engineer. When placed for construction, cover the geotextile with specified cover material as soon as possible.

I. Place cover material on the geotextile in a manner that the geotextile is not torn, punctured, or shifted. Use a minimum six inches thick cover layer or twice the maximum aggregate size, whichever is thicker. End-dumping cover material directly on the geotextile will not be permitted.

J. Limit construction vehicles in size and weight so rutting is the initial layer above the geotextile is not more than three inches deep or one half the layer thickness, whichever is less. Turning of vehicles on the first layer will not be permitted.

K. Repair of Geotextile: Repair or replace all torn, punctured, or contaminated geotextile during construction at no cost to the Owner. Repair by placing a patch of the specified geotextile over the affected area. When geotextile seams are required to be sewn, repair any damaged sheet by sewing unless otherwise indicated on the plans or special provisions or as directed.

3.10 EXCAVATION AND BACKFILL FOR BUILDING FOUNDATION

A. Subgrade: After stripping, proof roll. Subgrade to be approved by geotechnical engineer prior to placing any fill.

B. Building Pad: Place ¾”-0 *Crushed Rock Fill.* Place material in 8-inch maximum loose lifts and compacted to 95% relative compaction according to ASTM D1557. A 12-inch minimum under slab section of ¾”-0 *Crushed Rock Fill* is to be used throughout.

C. Extend the outside edge of any new fill a minimum of 5 feet beyond the building perimeter and slope no greater than 2:1.

D. Footing Preparation: Excavate for footings directly in native soil or approved building pad fill. Footings shall extend at least 18 inches below the exterior finish grade. Over-excavate beneath footings a minimum of 6 inches to allow for placement of *Crushed Rock Fill*. Over-excavate any unstable soils, as required by geotechnical engineer. Place and compact *Crushed Rock Fill* to the designed footing grades. Construct footings directly on fill material.

E. Construct building slabs directly on the granular fill building pad.

3.11 EXCAVATION AND BACKFILL FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks to indicated lines, cross sections, elevations, and subgrades.

B. Use crushed rock fill to raise the grade to the bottom of the pavement section elevation. Place in 8-inch maximum loose lifts and compact to a minimum density of 95 percent relative compaction, per a maximum dry density of ASTM D-1557 at an optimum moisture content of ±2 percent. Fill that cannot be tested shall be compacted to the approval of the Engineer or Geotechnical Engineer.

3.12 EXCAVATION AND FILL AT LANDSCAPE AREAS

A. Excavate to the grades required on the plans. Scarify subsoil to a depth of 6 inches in all landscape areas.

B. When necessary, eliminate uneven areas and low spots in subsoil. Remove debris, roots, branches, stones, etc. Notify Owner if subsoil contaminated with petroleum products is encountered.

C. Fill to required elevations with stockpiled native material or excavated fill. Place fill in relatively dry state and compact to a minimum density of 80 percent relative compaction, per ASTM D - 698 at an optimum moisture content of ±2 percent. Fill that cannot be tested, or at the option of the Owner, shall be compacted to the approval of the Engineer and Geotechnical Engineer.

D. Establish levels, profiles, slopes, and contours shown on the plans. Establish uniform gradients between given grade points.

E. Refer to landscape plans and specifications for top soil requirements and depths. Compact to soil to a minimum density of 80 percent relative compaction, per ASTM D - 698 at an optimum moisture content of ±2 percent.

3.13 EXAVATION AND BACKFILL FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines depths, and elevations.

B. Excavate trenches to uniform widths to provide the following on each side of the pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless indicated otherwise:
   1. Clearance: 12 inches each side of pipe or conduit.
   2. Maximum trench width at top of trench shall not be limited except where excess width of excavation would cause damage or create damage to adjacent structures or facilities.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduits. Shape subgrade to provide continuous support for bells, joints, and barrels of the pipes and for joints, fittings and bodies of conduit. Remove projecting stones and shape objects along trench subgrade.

D. Obstructions: Remove all obstructions encountered within the trench area or adjacent thereto. If requested by Contractor, Engineer may make minor changes in trench alignment to avoid major

obstructions, provided such alignment changes can be made without adversely affecting the intended function of the facility. Contractor shall pay any additional costs resulting from such alignment changes.

E. Backfilling shall not commence until after pipe, conduit, structures, and other equipment and appurtenances placed in trench or similar excavations have been properly constructed or installed, as applicable, and inspected. Backfill shall be placed in such a manner as not to disturb, damage, or subject such facilities to unbalanced loads or forces. Make fills as soon as feasible after Engineer's review and acceptance.

F. Pipe Base: Place required thickness of pipe base material over full width of trench. Provide uniform bearing under entire length of each pipe.

G. Pipe Zone: Place required thickness of pipe zone material over full width of trench.

H. Above Pipe Zone: Backfill full width of trench to paving subgrade elevation or to within depth of loam in landscaped areas.

I. Compaction: Trench backfill shall be compacted in maximum 18 - inch lifts to:
   1. 95 percent compaction under pavement areas per ASTM D - 1557 at an optimum moisture content of ±2 percent.
   2. 90 percent compaction elsewhere per ASTM D - 698 at an optimum moisture content of ±2 percent.
   3. Water settling of trench backfill will not be considered an acceptable compaction procedure.

3.14 INFILTRATION RAIN GARDEN

A. Backfill Material: **The test pits for the infiltration tests were excavated to a depth below the less pervious, denser surface soils. All areas to be used as surface infiltration facilities shall be excavated to remove all less pervious surface materials and backfilled with a suitable sandy loam planting/filtration material. Based on the infiltration tests (refer to Geotechnical Report), it is anticipated over excavation will be required to the Silty Clay material which is approximately 2-feet below the existing grades at the infiltration pond location.** The geotechnical engineer shall approve the excavated infiltration area prior to backfill. Backfill material to be as specified in the Eugene Stormwater Management Manual and as approved by the geotechnical engineer.

   The soil shall be a uniform mix, free of stones, stumps, roots or other similar objects larger than two inches.

   Requirements
   Sand 35-60%
   Silt 30-55% (Loam)
   Clay 10-25%

B. Construction Traffic: Surface infiltration facility areas shall be clearly marked before site work begins to avoid soil disturbance during construction. No vehicular construction traffic, except that specifically used to construct the facility, shall be allowed within 10 feet of the surface infiltration facility.

If vehicular construction traffic has occurred within the areas noted above, these areas may require restoration. Restoration should be as recommended by the geotechnical engineer, to achieve a "predisturbance condition" and assure the required infiltration rates are achieved.

C. Post-Construction Testing: The constructed infiltration rate of the facility needs to meet or exceed the site infiltration rate of 2.5 inches per hour assumed for design. For surface infiltration facilities, post-construction field infiltration testing will be required. Methods consistent with those used during design of the facility shall be used (refer to Geotechnical Report). The resulting infiltration rate must show that the facility drawdown time does not exceed 30 hours.

D. Top 18 inches of basins to be growing medium/loam/topsoil. Refer to Landscape plans and specifications for rain garden plantings and mulch material and application.

3.15 GRADING

A. Perform all earthwork to the lines and grades shown on the drawings. Shape and finish slopes to conform to the lines, grades, and cross sections as shown or approved by Engineer. Provide positive drainage away from retaining walls and walks.

3.16 SEEDING

A. Plant only at times when local weather and other conditions are favorable to the preparation of soil, germination and growth. Refer to Division 32, Section LANDSCAPING, for seeding requirements and rates.

3.17 EROSION BLANKET PLACEMENT

A. Erosion blanket is to be installed per manufacturer's specifications, where indicated on the drawings. Assure blanket overlap and staple frequency meet manufacturer's application guidelines. Apply seed to bare slope prior to blanket installation.

3.18 MAINTENANCE OF EARTHWORK

A. Contractor shall maintain all earthwork surfaces until all work has been completed and accepted. Such maintenance shall include, but not be limited to, addition of appropriate backfill material above the pipe zone to keep backfilled trench surface smooth, free from ruts and potholes, and suitable for traffic flow.

3.19 DISPOSAL OF WASTE MATERIAL AND EXCESS EXCAVATION

A. Remove from site excess material and material that is unsuitable for backfilling.

3.20 SETTLEMENT

A. Any settlement in trench backfill which occurs during the warranty period and is attributable to construction procedures, such as improper removal of shoring or insufficient compaction, shall be corrected by the contractor at his own expense. Any piping or facilities damaged by such settlement shall be restored to their original condition at the Contractor's expense.

3.21 FIELD QUALITY CONTROL

A. Refer to Division 01 Section QUALITY REQUIREMENTS for responsibilities for arranging, supervising, and payment of field quality control requirements.

B. Field Tests:
   1. Material compaction testing:
      a. Trench Compaction: A minimum of one field density test shall be conducted on compacted material for every 100 linear feet, or fraction thereof, of trench and for every 3 feet, or fraction thereof, of fill placed.
      b. Subgrade compaction
      c. Fill material compaction
   2. Imported material gradation testing.

C. Field Inspections: Notify Engineer prior to work of this section.

D. Special Inspections for Code Compliance: Obtain building inspector approvals.

3.22 CLEANING

A. Upon completion of the work of this section promptly remove from the working area all scraps, debris, and surplus material.

3.23 PROTECTION

A. Protect all work installed under this section.

B. Replace, at no additional cost to Owner, any damaged work of this section.

END OF SECTION 31 00 00

ASPHALTIC CONCRETE PAVING

SECTION 32 12 16

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Furnishing all materials, labor, and equipment required to construct asphalt concrete pavement, complete, as shown and herein specified.

1.02 RELATED DOCUMENTS

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

B. RELATED SECTIONS include the following:

1. Earthwork, Section 31 00 00.

C. REFERENCED SPECIFICATIONS:

1. Oregon Standard Specifications for Construction, Current Edition (ODOT/APWA) – Section 00745

1.03 SUBMITTALS

A. Submit the following in accordance with the requirements of Division 01 Section SUBMITTALS.

B. Data and Test Reports:
1. Aggregate base gradation report.
2. Job Mix formula (JMF).
3. Field tests as specified in Part 3 of this Section.

C. Contract Closeout: Comply with Division 01 Section CONTRACT CLOSEOUT.
1. Provide record documents.
2. Provide warranties

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Firms experienced in installation of systems similar in complexity to those required for this project.

B. Product/Material: Compaction testing shall be in accordance with Division 01 Section QUALITY CONTROL.

C. Pre-installation Conference: Contractor, installer, engineer, and representatives of other effected trades shall meet on-site to review paving operations, acceptance of substrata surfaces and coordination with other trades.

D. Alignment and Grade Control: The Contractor's Registered Professional Land Surveyor shall establish and control the pavement (aggregate or asphalt base course and asphalt surface course), alignments, grades, elevations, and cross sections as shown on the drawings.

E. Special Warrantee: Contractor shall warrantee installed pavement for a period of 2 years from the date of Substantial Completion. When notified in writing from the Owner, they shall promptly and without inconvenience and cost to the Owner correct said deficiencies to comply with the requirements.

1.05 PRODUCT DELIVERY, HANDLING, AND STORAGE

A. Delivery, storage and Protection: Protect materials and maintain product temperature during delivery.

1.06 ADVANCE NOTICE

A. Notify owner's representative at least 48 hours before pavement placement.

1.07 COORDINATION

A. Coordinate with other trades affecting or affected by work in this section.

PART 2 - PRODUCTS

2.01 CRUSHED ROCK PAVEMENT BASE

A. Under Dense Graded HMAC: Imported, clean ¾"-0 or 1"-0 dense graded crushed rock or crushed gravel, free from foreign material and meeting the requirements of ODOT/APWA, 02630-Base Aggregate.

2.04 ASPHALT CONCRETE MIX

A. Asphalt concrete shall be a mixture of cement, aggregate, mineral filler, and additives as required, heated and plant mixed into a uniformly coated mass.

B. Asphalt Wearing Course: 1/2" Dense Level 3 HMAC (Standard Duty Class "C" Mix) with PG 64-22 asphalt cement conforming to Section 00745 of ODOT/APWA.

C. Asphalt Base Course: 3/4" Dense Level 3 HMAC (Standard Duty Class "B" Mix) with PG70-22 asphalt cement conforming to Section 00745 of ODOT/APWA.

2.05 TACK COAT

A. Type CSS-1 or CSS-1h and shall meet the requirements of ODOT/APWA, Section 00730.

2.06 JOINT SEAL

A. Joint Seal shall meet the test requirements of ASTM D-244.

B. Joint seal material shall be CRS-1 or CRS-2 and shall meet the requirements of ODOT/APWA, Section 02710 for cationic emulsified rapid setting asphalt.

2.07 RECLAIMED ASPHALT PAVEMENT (RAP) MATERIAL

A. Shall not exceed 30%, in the new pavement.

B. Asphalt containing RAP to meet all normal specifications and requirements of ODOT/APWA.

2.08 PAVEMENT MARKINGS

A. Traffic paint shall be white, water borne, traffic marking paint, unless otherwise noted on drawings, two (2) coats, 18.0 mil minimum dry film thickness. Paint to meet the requirements of ODOT specification 02840.10 and shall be listed as approved on ODOT's Construction Materials Qualified Products List. Columbia17-123 meets these requirements.

PART 3 – EXECUTION

3.01 JOB MIX FORMULA

A. Contractor shall submit a JMF for each mixture to be used on the project and meeting the Level 3 criteria of ODOT/APWA.

B. The Contractor shall supply the JMF ten (10) work days prior to production. The JMF shall be no more than five (5) years old.

C. No paving shall occur until the Contractor receives written approval of the JMF.

3.02 MODIFICATION OF MIXTURES

A. The owner reserves the right to modify specified mixes for use under various traffic conditions on various segments of the work and for feathering, spot patching, and other such purposes. The Contractor shall provide mixes proportioned as directed for such purposes.

3.03 CRUSHED ROCK PAVEMENT BASE

A. Placement and compaction shall conform to the requirements of Section 31 00 00, EARTHWORK.

3.04 PREPARATION OF UNDERLYING SURFACES

A. All bases and foundations are to meet the applicable specifications and approved prior to beginning paving. Existing bases and foundations shall be reconditioned as specified or directed.

B. Prepare contact surfaces per ODOT/APWA subsection 00745.42.

C. Apply tack coat to contact surfaces per Section 00730 of ODOT/APWA. The tack coat shall be cured thoroughly prior to applying the asphalt overlay. Do not place on wet surfaces.

3.05 ASPHALT CONCRETE PAVEMENT

A. Mix, process, place and compact in compliance with Section 00745 of ODOT/APWA.

B. Quality Control: Provide per subsection 00745.49 of ODOT/APWA. The intent of this project is for the Contractor to provide a certified ODOT mix design and compaction tests as provided in Section 00745.16. 745.49(b) applies to all pavement thicknesses and 745.49 (c) does not apply. Other testing by Section 00745.16 may be required at the discretion of the Engineer.

C. The existing surface shall be dry prior to paving. Place asphalt within 24 hours of applying tack coat.

D. Do not place material during rain or other adverse weather conditions. Seasonal and temperature limitations for placement limitations as per subsection 00745.40 of ODOT/APWA.

E. Install drainage covers and frames in correct position and elevation.

F. Compact pavement by rolling as per APWA/ODOT subsection 00745.49. Use hand operated compacting equipment in areas inaccessible to rolling.

G. Compaction shall be at least 91% as determined by AASHTO T209, as modified by ODOT/APWA. Compaction shall be completed before the placed temperature drops below 180 degrees F.

H. Contractor shall perform compaction quality control per subsection 00745.49 of ODOT/APWA using the Random Testing and Moving Maximum Density methods. If tests fail to achieve the target densities take all necessary actions to resolve compaction problems. Do not resume paving without approval.

I. Prior to placement of wearing course, locate and adjust to finish grade all appurtenances with the pavement area.

J. The Owner shall take acceptance tests to verify that the work meets specifications.

3.06 FINISHING AND CLEANING UP

A. Test the top surfaces with a 12-foot long straight edge in conformance with Section 00745.70 of ODOT/APWA. The finish grade shall have a smooth uniform surface for storm drainage with no low spots that would collect water.

B. Surface of the asphalt concrete after compaction shall be smooth and within 0.02 foot of the established grade and cross section, in compliance with Section 0745.70 ODOT/APWA. These tolerances apply to utility appurtenances within the pavement area.

C. Any mixture that becomes loose or broken, mixed with dirt, or is in any way defective, shall be removed and replaced with fresh hot mix which, when compacted, shall conform to the surrounding areas. There shall be no sign of roller marks. Correction requirements and methods shall comply with Section 00745.75 ODOT/APWA, as approved and to the satisfaction of the owner.

D. Payment may be reduced if the material proves to be outside of the specification limits, in accordance with Section 00745.95 and calculated per Section 00165.40 ODOT/APWA.

E. All costs for the repair of deficiencies or damages is the responsibility of the Contractor. No additional compensation or adjustment to contract time will be made for corrective work.

F. Trim and remove excess asphalt concrete from abutting structures and appurtenances.

G. The Contractor shall remove all debris resulting from the Contractor's operation from the project site.

3.07 PAVEMENT MARKINGS

A. Prior to the application of traffic paint, the pavement shall cleaned to be free of dirt, grease, moisture or any other foreign material to insure proper bonding of the traffic paint. Area to be striped will be swept and flushed clean for proper adhesion.

B. All new asphalt surfaces shall be properly cured a minimum of two weeks before striping. To keep Fresh asphalt surfaces from bleeding, apply a thin first coat (approximately 5 mils) on the surface, and allow it to cure one week prior to applying the final striping.

C. Allow new concrete surfaces to cure a minimum of 3 months prior to painting. If painting must be done sooner, please contact manufacturer for recommended paint and application procedures and submit to the Engineer for approval.

D. All paint should be stirred thoroughly before use. Thinning is not recommended; however, if necessary, no more than 2 quarts of water per 5 gallons of paint (5 gallons per 55 gallon drum) should be added. Addition of water may make paint dry slower and is to be done only with prior approval from Engineer.

E. All paint should be applied at 15 mils + 1 mil wet. The spreading rate is 350 linear feet per gallon of 4-inch line.

F. For reflectorization, drop-on glass beads should be applied immediately after the paint with the optimum amount being 6 lbs. per gallon of paint uniformly spread over the entire line.

G. All paint lines should be adequately protected until they are track free before traffic is allowed over the line.

H. When applying waterborne paints, the air temperature should be 50 degrees F minimum, and the surface temperature 50 degrees F minimum. The application temperature of heated paints should not exceed 120 degrees F.

I. When new layouts are necessary, pavement markings shall be accurately measured and marked. On restriping of existing lines, existing stripes shall be located and marked.

J. Striping will be applied using a walk-behind-striping machine to ensure crisp straight lines. Pavement markings will be placed using air spray equipment or a gravity striping machine which insures uniform line width, clean edges, and proper paint coverage rates. Stenciling will be masked with plastic stencils and sprayed on by machine.

K. Parking Lane stripes to be 4 inches wide.

3.08 PROTECTION

A. No traffic shall come in contact with newly paved surfaces until the surface has cooled and set sufficiently to prevent marking. Edges shall be protected from breakage. The Contractor is responsible for this traffic control.

B. Protect all work installed under this section.

C. Replace at no additional cost to the Owner, any damaged work of this section.

END OF SECTION 31 12 16

SECTION 32 16 13

CONCRETE WALKS, CURBS, GUTTERS, AND PAVEMENTS

PART 1 – GENERAL

1.1 DESCRIPTION

Work includes but is not limited to the following:

A. Site work cast-in-place concrete to be constructed upon prepared subgrade, including: curb, gutter, walks, and pavements.

1.2 RELATED DOCUMENTS

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

A. RELATED SECTIONS include the following:
   1. Division 31 Section EARTHWORK.
   2. Division 03 Sections CAST-IN-PLACE CONCRETE, CONCRETE REINFORCING, CONCRETE FORMING AND ACCESSORIES.
   3. Division 07 Section JOINT SEALANTS.

1.3 DESIGN AND ENGINEERING

A. Formwork design and engineering, as well as construction, are the sole responsibility of the Contractor.

1.4 SUBMITTALS

A. Submit the following in accordance with the requirements of Division 01 Section SUBMITTAL PROCEDURES.

B. Base rock compaction test reports.

C. Field Quality Control Submittals:
   Before starting work and in accordance with Division 01 QUALITY REQUIREMENTS, prepare mockups for Owner's review and acceptance of concrete walk surface texture.
   Minimum Panel Size: 4 square feet
   Re-prepare, if directed, until accepted.
   Accepted mockup represents minimum quality standard. Work of lesser quality will be subject to rejection and replacement.
   Accepted mockup, in like new condition, may be used in contract work.

D. Contract Closeout: Comply with Division 01 Section CLOSEOUT PROCEDURES. Provide record documents.

1.5 WEATHER PRECAUTIONS

A. Provide cold weather and/or hot weather protection as recommended in ACI 305 and ACI 306.

B. Unless adequate protection is provided, concrete shall not be placed during rain, sleet, or snow. Protect concrete from rain water, maintain concrete water ratio and protect concrete surface.

C. All concrete shall be adequately protected after pouring to prevent damage from freezing, by the use of suitable cover. Frozen and damaged concrete must be removed and replaced at the Contractor's expense. Do not place concrete on frozen earth.

1.6 QUAILITY ASSURANCE

A. Installer Qualifications: Firms experienced in installation of systems similar in complexity to those required for this project.

B. Product/Material:
   1. Compaction testing shall be in accordance with Division 01 Section QUALITY REQUIRMENTS.
   2. Provide job mix test reports.

1.7 PRODUCT DELIVERY, HANDLING, AND STORAGE

A. Protect from damage by the elements and construction procedures.

1.8 ADVANCE NOTICE

A. Notify Engineer/Owner at least 48 hours before concrete placement.

1.9 COORDINATION

A. Coordinate with other trades affecting or affected by work in this section.

B. Engineer/Owner to inspect and approve formwork and reinforcement prior to concrete placement.

PART 2 - PRODUCTS

2.1 CRUSHED ROCK PAVEMENT BASE

A. Imported, clean ¾"-0 crushed rock or crushed gravel, free from foreign material and meeting the requirements of ODOT Standard Specifications (current edition) 02630.

2.2 CAST-IN-PLACE CONCRETE FOR CURBS, GUTTER AND WALKS

A. Concrete shall be ready-mixed conforming to Division 03 Section CAST-IN-PLACE CONCRETE, and shall have a minimum compressive strength of 3,000 psi at 28 days.

2.3 CAST-IN-PLACE CONCRETE FOR PAVEMENTS

A. Concrete shall be ready-mixed conforming to Division 03 Section CAST-IN-PLACE CONCRETE, and shall have a minimum compressive strength of 4,000 psi at 28 days and a minimum flexural strength of 600 psi at 28 days.

2.4 JOINT SEALANT

A. Joint sealant shall be cold applied, low modulus, self leveling silicone meeting the requirements of ASTM Type SL.

B. Joint sealant backer rod shall be closed cell, expanded polyethylene foam material meeting the requirements of ASTM D5249 Type 1 and 3. The uncompressed diameter of rod shall conform to the dimension shown on the constructions drawings.

2.5 JOINT FILLER

A. Expansion Joint Filler shall be asphalt-impregnated Cane Fiber per ASTM D-1751; 3/8" thickness, unless otherwise indicated. Depth as required to extend through full slab depth and to position filler top ½ inch below slab.

2.6 FORMS

A. Conform to Division 03 Section CONCRETE FORMING AND ACCESSORIES.

2.7 REINFORCEMENT

A. Conform to Division 03 Section CONCRETE REINFORCING.

B. Provide where shown on drawings.

2.8 CURING COMPOUND

A. Curing compound for all other concrete shall conform to AASHTO M 171, White Polyethylene Film for curing concrete or AASHTO M148, Liquid Membrane-Forming Compounds for Curing Concrete.

2.9 TACTILE WARNINGS

A. Concrete surfaces: Concrete tactile warning panel, compressive strength 10,000 psi minimum ASTM C140. Size 36 x 24 inches. Color as selected from manufacturer's standards. Masons Supply Co, CASTinTACT, or approved.

PART 3 – EXECUTION

3.1 EXISTING CONDITIONS

A. Prior to starting work of this section verify that existing grades and field conditions agree with drawings. Notify Engineer of deviations.

B. Do not start work of this section until all unsatisfactory conditions have been corrected. Commencing work implies acceptance of existing conditions.

C. If field measurements differ slightly from drawing dimensions, modify work as required for accurate fit. If measurements differ substantially, notify Engineer prior to starting work of this section.

3.2 EXCAVATION

A. All excavation shall be in accordance with Division 31 Section EARTHWORK.

3.3 CRUSHED ROCK PAVEMENT BASE

A. After the subgrade is compacted and at the proper grade, spread required thickness of 3/4-inch minus crushed rock. Compact by rolling or other approved method. Surface of the compacted base shall be at the proper level to receive the concrete. Manholes, catch basins, inlets, and other such structures shall be completed, adjusted, cured, and otherwise prepared, as applicable, and made clean and ready to have concrete placed in contact with them.

3.4 FORMWORK

A. Conform to the requirements of Division 03 Section CONCRETE FORMING AND ACCESSORIES. Construct forms to the shape, lines, grades, and dimensions called for on the Drawings. Stake wood or steel forms securely in place, true to line and grade. Brace forms to prevent change of shape of movement in any direction resulting from the weight of the concrete during placement.

B. Allowable Tolerances: Tops of forms shall not depart from grade line more than 1/8-inch when checked with 10-foot straightedge. Alignment of straight sections shall not vary more than 1/8-inch in 10 feet.

3.5 REINFORCEMENT

A. Reinforcement shall conform to the requirements of Division 03 Section CONCRETE REINFORCING. Provision shall be made for placing dowels, tie bars, and other devices called for by the Contract Documents, during placement of the pavement. Reinforcement shall be placed on supporting devices, or "chairs," and maintained in position while the pavement is being placed.

3.6 FINISHING

A. After the pavement has been struck off and consolidated, it shall be scraped with a straightedge equipped with a handle to permit operation from the edge of the pavement. Any excess water shall be removed from the surface of the pavement. Irregularities shall be corrected by adding or removing concrete. All disturbed places shall be again straight-edged.

B. After the concrete has been given a preliminary finish, the surface of the pavement shall be checked by the contractor with a straightedge device. Each successive check with the straight-edge device shall lap the previous check path by at least half the length of the straightedge. Surface deviations exceeding 0.01 foot shall be corrected. Upon completion of the surface floating, but before any required edge tooling or joint tooling, and before initial set of the surface pavement, the pavement shall be given a textured finish perpendicular to match the existing. The textured finish shall be accomplished by a steel tine tool that will mark the finished pavement to a depth of 1/8 inch plus or minus 1/16 of an inch. Match finish of existing pavement where new pavement is adjacent. The surface of the pavement shall not vary from a true surface, when tested with a 12 foot testing straightedge, more than 1/8 inch in 12 feet.

C. Finish shall be a light broom finish for slip resistant surface. Broom pattern to be parallel to slope.

D. Accessible Ramps: Steel trowel finish. Apply tactile warning finish.

3.7 JOINTS

A. Construction joints, expansion joints, transverse contraction joints, and all longitudinal contraction joints shall be placed as indicated in the drawings.

B. Contraction Joints shall consist of planes of weakness created by forming grooves in the surface of the pavement.

C. Longitudinal contraction joints: Maximum joint spacing shall be 5 feet for sidewalks, and as shown on drawings for other work.

D. Construction Joints: Construction joints shall be placed whenever the placing of concrete is suspended for more than 45 minutes. A butt joint with dowels or a thickened-edge joint shall be used if the joint occurs at the location of a contraction joint.

3.8 SEALING JOINTS

A. Seal joints for curb, gutters, and walks in conformance with Division 07 Section JOINT SEALING.

B. Saw cut sealant reservoir for pavement joints using a double cut per the details shown on the construction drawings. Clean reservoir, prepare joints, install backer rod and silicone sealant all in strict accordance with the recommendations in the joint sealant manufacturer's installation or application guide and in accordance with the appendix to ASTM D5893.

C. Joints to be sealed shall be filled with joint-sealing material before the pavement is opened to traffic and as soon after completion of the curing period as is feasible.

D. Each joint shall be thoroughly cleaned of all foreign material, including membrane curing compound, and joint faces shall be clean and surface-dry when seal is applied.

3.9 WALK AND PAVEMENT EDGING

A. Before final finishing is completed and before final concrete set has occurred, finish concrete edges with edging tool shaped with 1/4 inch radius.

B. Take particular care to maintain surface on both sides of joint in same plane.

C. Do not use kneeling planks on concrete surface.

3.10 CURING

A. Minimum Curing Period: 3 days.

B. Uniformly apply compound in accordance with manufacturer's instructions, after final Concrete finishing is complete, and after all free water has disappeared from pavement surface.

C. Apply to concrete edges immediately after formwork removal.

D. Do not use membrane compound method if pavement will be exposed to de-icing chemicals within 30 days following curing period completion.

3.11 FIELD QUALITY CONTROL

A. Refer to Division 01 Section QUALITY REQUIREMENTS for responsibilities for arranging, supervising, and payment of field quality control requirements.

B. Field Tests:
   1. Observance and approval of subgrade and base rock compaction.
   2. Concrete cylinder strength tests.
   3. Slump and air tests.

C. Field Inspections: Notify Owner prior to work of this section.

D. Special Inspections for Code Compliance: Obtain building inspector approvals.

3.12 DEFECTIVE WORK

A. Remove and replace any surfaces which show excessive cracks, pavements that do not drain properly, and other defective concrete.

B. Minimum Surface Evenness: 1/8 inch per 10 ft.

C. Payment for portland concrete pavement may be reduced for substandard pavement thickness.

D. Payment reduction will be in accordance with the 1990 Standard Specification for Public Works Construction published by the Oregon Chapter of APWA (amended in 1996), section 212.4.02, Measurement and Payment - Price Adjustment for Variation in Thickness.

E. Payment for portland concrete pavement may be reduced for deviation in compressive strength at 28 days. Payment reduction will be in accordance with the 1990 Standard Specification for Public Works Construction published by the Oregon Chapter of APWA (amended in 1996), section 212.4.03, Measurement and Payment - Price Adjustment for Variation in Compressive Strength.

3.13 CLEANING

A. Including work of other trades, clean, repair and touch-up, or replace when directed products which have been soiled, discolored, or damaged by work of this section.

B. Upon completion of the work of this section, promptly remove from the working area all scraps, debris, and surplus material.

3.14 PROTECTING COMPLETED WORK

A. Protect all work installed under this section.

B. Replace, at no additional cost to Owner, any damaged work of this section.

END OF SECTION32 16 00

SECTION 32 16 14

EXTRUDED CONCRETE CURBS

PART 1 – GENERAL

1.01 DESCRIPTION

A. On-site private extruded, bonded concrete curb improvements.

1.02 RELATED DOCUMENTS

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

B. RELATED SECTIONS include the following:
   1. Division 31 section ASPHALT CONCRETE PAVING.

1.03 SUBMITTALS

A. Submit the following in accordance with the requirements of Division 1 Section SUBMITTALS.

B. Contract Closeout: Comply with Division 1 Section CONTRACT CLOSEOUT.
   1. Provide record documents.

1.04 QUAILITY ASSURANCE

A. Manufacturer's Qualifications: Not less than 5 years experience in the actual production of specified products.

B. Installer's Qualifications: Firm with not less than 5 years experience in installation of systems similar in complexity to those required for this project.

C. Product/Material: Compaction testing shall be in accordance with Division 01 Section QUALITY CONTROL.

1.05 PRODUCT DELIVERY, HANDLING, AND STORAGE

A. Protect from damage by the elements and construction procedures.

1.06 ADVANCE NOTICE

A. Notify Engineer at least 48 hours prior to staring work in this section.

1.07 COORDINATION

A. Coordinate with other trades affecting or affected by work in this section.

PART 2 – PRODUCTS

2.01 CONCRETE FOR CURBS

A. Concrete shall be ready-mixed, no slump mix and shall have a minimum compressive strength of 3,000 psi at 28 days. Water content shall be adequate to produce a smooth slurry finish. Grainy, sandy surface texture not acceptable.

2.02 BONDING AGENT

A. Two-part epoxy suitable for bonding wet concrete to pavement under weather conditions at time of installation.

2.03 CURING COMPOUND

A. Curing Compound for extruded bonded curb shall be clear, resin-based curing compound.

PART 3 – EXECUTION

3.01 EXISTING CONDITIONS

A. Verification of Conditions: Examine areas and conditions under which work is to be performed, and identify conditions detrimental to proper or timely completion.

1. Do not proceed until unsatisfactory conditions have been corrected.

B. Verify that paving is completed to correct line and grade and field conditions agree with drawings. Notify Engineer of deviations.

C. Do not commence work until all unsatisfactory conditions have been corrected. Commencing work implies acceptance of existing conditions.

D. If field measurements differ slightly from drawing dimensions, modify work as required for accurate fit. If measurements differ substantially, notify Engineer prior to starting work of this section.

3.02 PROTECTION

A. Monuments: Carefully maintain bench marks, monuments, and other reference points. If disturbed or destroyed, replace as directed.

B. Pavement Cleaning: Maintain pavements and walkways clean at all times.

C. Other Work and Adjacent Property: Protect against damage caused by work of this section.

3.03 BONDING AGENT

A. Spread uniformly over pavement areas to receive curbs. Coverage shall be minimum ½ of surface area to receive curb.

B. Maximum exposure time prior to curb placement is 20 minutes. If surface is not tacky, reapply agent.

3.04 EXTRUDED CURB CONSTRCTION

A. Install on clean pavement. Mechanically extrude to standard shape and layout shown on drawings. Install with smooth, uniform corners and curves. Maximum variation from straight

line shall be ¼ inch in 10 feet. Irregular direction changes will not be accepted unless shown on drawings.

B. Finish surface to smooth, dense, uniform texture.

C. Joints shall be cold joints at 10 feet maximum spacing and at closer intervals on curves. Cut minimum ½ of curb section and tool smooth.

3.05 CURING

A. Uniformly apply compound in accordance with manufacturer's instructions immediately after curb installation except when in danger of freezing.

B. Cure for 7 days.

C. If epoxy "soaks" through asphalt pavement during warm weather, use a suitable thickener and/or a thicker brand of epoxy. Any thickener employed shall not appreciably decrease the strength of epoxy. Asphalt-type thickeners/extenders are not permitted.

3.06 REPLACEMENT

A. Remove and replace any curbs which show excessive cracks or are otherwise defective.

B. Minimum Surface Evenness: 1/8 inch per 10 ft.

3.07 CLEANING

A. Including work of other trades, clean, repair and touch-up, or replace when directed, products which have been soiled, discolored, or damaged by work of this section.

B. After completing work in this section, remove all scraps and debris from the work area.

3.08 PROTECTION

A. Protect all work installed under this section.

B. Replace, at no additional cost to Owner, any damaged work of this section.

END OF SECTION 32 16 14

SECTION 32 31 13

CHAIN LINK FENCES AND GATES

PART 1 – GENERAL

1.1 DESCRIPTION

Work includes, but is not limited to the following:

A. Galvanized Steel supports.
B. Polyester coated wire fabric.
C. Gates and Accessories.

1.2 RELATED DOCUMENTS

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

B. RELATED SECTIONS include the following:
   1. Division 31 Section, EARTHWORK
   2. Division 03 section, CAST-IN-PLACE CONCRETE
   3. Division 32, CONCRETE WALKS, CURBS, GUTTERS AND PAVEMENTS

1.3 SUBMITTALS

A. Submit the following in accordance with the requirements of Division 01 Section SUBMITTALS.

B. Product Data: Indicate material compliance and specified options.

C. Product Data: Indicate layout, dimensions, and relevant details. Include illustration of equipment and items to be installed including conditions at concrete paving.

D. Installer and Manufacturer Qualifications, if requested.

E. Contract Closeout: Comply with Division 01 Section CONTRACT CLOSEOUT.
   1. Provide record documents.

1.4 QUALIFICATIONS

A. Manufacturer's Qualifications: Minimum five (5) years documented experience in actual production of specified products.

B. Installer Qualifications: Minimum three (3) years documented experience in actual systems similar in complexity to project requirements.

1.5 PRODUCT DELIVERY, HANDLING, AND STORAGE

A. Deliver, store and protect materials in accordance to manufacturer's directions. Protect from damage by the elements and construction procedures.

1.6 COORDINATION

A. Coordinate with other trades affecting or affected by work in this section.

PART 2 - PRODUCTS

2.1 CHAIN LINK FENCE

A. Fabric:
   1. Galvanized Steel, comply with ASTM F688, Class 2A or 2B, one (1) piece over full fence height. Black color, polyester coated.
   2. Steel Core: 0.120 diameter minimum.
   3. 48-inch fabric by 2-inch by eight (8) gauge mesh, with knurled top and bottom.

B. Posts and Caps – Black color
   1. Line posts: 2-3/8 inch schedule 40 galvanized.
   2. Corner/End Posts: 2-7/8 inch schedule 50 galvanized.
   3. Top, Bottom and Brace Rail: 1-5/8 inch schedule 40 galvanized.
   4. Line Post Cap: 2-3/8 x 1-5/8 inch pressed steel galvanized.
   5. Post Cap: 2-7/8 inch pressed steel galvanized.
   6. Rail End: 1-5/8 inch pressed steel galvanized.

C. Accessories – Black color
   1. Truss Rod: 3/8 inch threaded galvanized steel rod.
   2. Brace Band: 2-7/8 x 1/8 inch x 1inch.
   3. Tension Wire: Nine (9) gauge.
   4. Fabric Ties: Nine (9) gauge.
   5. Gates: prefabricated, matching posts, caps and fabric, by same manufacturer.

D. Posts, caps, accessories and other exposed materials shall be black polyester coated.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify areas to receive fencing are completed to final grades and elevations.

B. Ensure property lines and legal boundaries of work are clearly established.

C. Confirm locations of underground utilities and other obstructions prior to work.

3.2 PREPARATION

A. Erect and maintain temporary barriers to secure work area.

B. Protect existing items from construction debris.

3.3 CHAIN LINK FENCE FRAME INSTALLATION

A. Install rigid, plumb, and level, according to manufacturer’s directions, referenced specifications, plans and details.

B. Locate terminal post at each fence termination and change in horizontal and vertical direction of 30 degrees or more.

C. Space line posts uniformly and equally spaced as shown on drawings.

D. Concrete posts: Drill holes in firm undisturbed soil. Dimension holes as shown on the drawings. Place concrete around posts in continuous pour. Trowel finish around post and slope to direct water away from posts or as shown in drawings.

E. Tension wires: Provide tension wire at bottom of fabric. Install tension wire before stretching fabric and attach to each post with ties – secure tension wire to fabric.

F. Top rail: Install lengths and connect joints with sleeves for rigid connections for expansion and contraction.

G. Bottom rails: Install bottom rails between posts with fittings and accessories.

3.4 CHAIN LINK FABRIC INSTALLATION

A. Fabric: Install fabric on security side and attach so that fabric remains in tension after pulling force is released. Leave approximately 12 inches between finish grade and bottom selvage. Attach fabric with wire ties to line posts at 15 inches on center and to rails, braces, and tension wire at 24 inches on center.

B. Tension (stretcher) bars: Pull fabric taut; thread tension bar through fabric and attach to terminal posts with bands or clips spaced maximum 15 inches on center.

C. Tie wires: Bend ends of wire to minimize hazard to persons and clothing.

3.5 CLEANING

A. Repair, touch up, or replace products which have been soiled, discolored, or damaged from work of this section.

B. After completing work in this section, remove all scraps and debris from the work area.

3.6 PROTECTING COMPLETED WORK

A. Protect all work installed under this section.

B. Replace, at no additional cost to Owner, any damaged work of this section.

END OF SECTION 32 31 13

SECTION 32 84 00

PLANTING IRRIGATION

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. Piping.
2. Encasement for piping.
3. Manual valves.
4. Pressure-reducing valves.
5. Automatic control valves.
6. Transition fittings.
7. Dielectric fittings.
8. Miscellaneous piping specialties.
9. Sprinklers.
10. Controllers.
11. Centrally Controlled System Components.
12. Valve Boxes

1.3 DEFINITIONS

A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.

B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.

C. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.

D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.4 PERFORMANCE REQUIREMENTS

A. Irrigation zone control shall be automatic operation with controller and automatic control valves.

B. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain head to head irrigation coverage of areas indicated.

1.5 REGULATORY AGENCY REQUIREMENTS

A. Obtain and pay for any permits and inspections required by Governing Agencies and Utility Companies.

1.6 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics**,** and furnished specialties and accessories.

B. Record Drawings

1. Contractor shall maintain a current legible set of irrigation plans in a safe and accessible location on site at all times for review by Landscape Architect or inspector. Design and actual locations of pipe and valves shall be noted on the plans daily as the irrigation system is constructed.
2. Record actual locations of all concealed components, piping system, sleeves, control wires, communication wires and drain valves. Indicate two dimensions for all valves (including quick coupling valves and drain valves), stub-outs, and main line T's, L's, and ends. Dimension mainline pipes and wire runs at the beginning, mid-point, and end of each curve, or at each change of direction, or at 25' intervals along the curve if longer than 50'. Submit to Landscape Architect for approval.
4. **Record Drawings to be updated daily prior to backfilling.**

C. Operation and Maintenance Data: Provide instructions for operation and maintenance of system and controls, seasonal activation and shutdown, and manufacturer's parts catalog.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A Licensed Landscape Professional. A qualified professional landscape installer whose work has resulted in successful establishment of similar landscape installations.
1. For irrigation work: Valid Oregon Landscape Professional’s License for irrigation, and a valid Oregon Landscape Business License.
2. For plumbing work: Valid Oregon Plumbing License. This includes all potable water lines. For backflow preventer installations, a valid Oregon Landscape Professional’s License for irrigation and backflow or a valid Oregon Plumbing License.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.8 REGULATORY REQUIREMENTS

A. Conform to applicable code for piping and component requirements.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.9 PRE-INSTALLATION MEETING

A. Convene on site meeting with general contractor, irrigation contractor, and landscape architect one week before starting work of this section.

1.10 NOTICES

A. Notify Landscape Architect at least 2 business days before the following. Request inspections at the following times:
   1. Upon completion of the main line, with all valves installed, prior to backfilling.
   2. At start and end of pressure test prior to backfilling.
   3. System performance inspection upon completion of the entire system.
      Provide 48 hour notice:
   4. Prior to disruption of irrigation water to baseball field water supply.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.12 SPECIAL WARRANTY

A. Warranty all material for one year after date of completion or longer if manufacturer furnishes a longer guarantee.

B. Correct immediately any failure caused by poor material or workmanship during warranty period. "Immediately" shall mean within 72 hours, as determined by the Owner depending upon the immediacy of the needed repair

C. Owner shall proceed with repairs and bill Contractor for costs and any damages when Contractor fails to comply.

1.13 TREE PROTECTION

A. Protect trees and roots over 2” in diameter from damage. Route pipes under roots over 2” in diameter. Do not trench within the drip line of trees without prior approval. All trenching within critical root zones of trees to be performed by hand.

1.14 PROJECT CONDITIONS

A. Environmental Conditions:
   1. In freezing weather: Do no P.V.C. solvent welding.
   2. In Rainy Weather: Don no P.V.C. solvent welding, except under cover.
   3. Maximum temperature of mating surfaces of Plastic Pipe and Fittings: 110 º F.

B. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

   1. Notify Owner no fewer than two days in advance of proposed interruption of water service.
   2. Do not proceed with interruption of water service without Owner's written permission.

1.15 EXISTING UTILITIES

A. Locate existing utilities prior to work. Protect active Pipes encountered; notify Pipe Owners. Repair or replace Utility lines damaged by Work of this Section. Remove inactive or abandoned Utilities.

1.16 CLEANING AND PROTECTION

A. Maintain Public Streets and Driveways clean and Drains open at all times.

B. Protect Persons and Property from damage and discomfort caused by dust; water as necessary and when directed.

C. Protect other work against damage and discoloration caused by work of this Section.

1.17 MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents if provided.

   1. (1) Sprinkler heads of each type and size.
   2. (2) Nozzles of each type and size.
   3. (2) Valve keys for manual valves.
   4. (4) Valve Box Keys.
   5. (1) Wrenches for each type of head core and for removing and installing each type of head.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Main Lines: Polyvinyl Chloride (PVC) 1120, Schedule 40, ASTM D-1785

B. Lateral Lines: Polyvinyl Chloride (PVC) 1120, Schedule 40, ASTM D-1785

C. Swing Joints at Spray Head Sprinklers: Triple elbow assembly using Rain Bird SA Series or Rain Bird SPX-100 flexible tubing. 18" minimum length, 30" maximum.

D. Swing Joints at Rotary Head Sprinklers: Triple elbow assembly using Rain Bird TSJ Series or ASTM D-2466, Schedule 40 piping.

E. Offsets at Quick Couplers: Triple elbow assembly using ASTM D-2466, Schedule 40 piping.

F. Socket Type Fittings: ASTM D-2466, Schedule 40 P.V.C.

G. Threaded Fittings: ASTM D-2464 Schedule 80 P.V.C.

H. Sleeve Piping: Polyvinyl Chloride (PVC) 1120, Schedule 40, ASTM D-2466.

2.2 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick unless otherwise indicated; full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, stainless steel unless otherwise indicated.

C. PVC Cleaner and Primer: R. G. Sloan "Weld-on P-70" or equal.

D. Solvent Cements for Joining PVC Piping: R. G. Sloan "Weld-on 711" or equal. Ensure that manufacturer's expiration date is not exceeded.

E. Pipe Joint Tape: Teflon tape or virgin Teflon paste on all threaded joints. Minimum of 4 wraps. No pipe dope.

F. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.3 MANUAL VALVES

A. Isolation Valves: Nibco T-113.

B. Manual Drain Valves: Bronze construction, angle type, 150 lb. class, threaded end connections, with cross type Operating Handle designed to receive Operating Key. All valves to have non-floating seat disk that allows positive drainage.
   1. Nibco T311-Y or approved.
   2. Provide at Main Line low points.

C. Backflow Preventer: Existing 2” Double Check Valve to Remain

2.4 AUTOMATIC CONTROL VALVES

A. Plastic, Automatic Control Valves:

1. Pop-up Spray and Rotary Sprinkler Zones: Rain Bird PEB-PRSD – Not Used

B. Automatic Control Valve Tags: Christy's ID-STD-Y1 or other permanent hang tag indicating zone number

C. Valve Sump: Provide inverted valve box sump as detailed on drawings.

2.5 MAXICOM SUPPLY AREA COMPONENTS – Existing to Remain

2.6 SPRINKLERS

A. Makes and models specified on plans.

2.7 CONTROLS

A. Automatic Controllers: Existing to Remain.

B. Maxicom Control Components: Existing to Remain.

C. Wire Conductors: 14 gauge, single strand. Color-coded: White - common, Red - zones, Black – spare, Yellow – master shut-off valve (not used).

D. Wire Connectors: DBY by 3M, Scotch Lok 3570 or approved.

E. Splice Kit: DBY by 3M, Scotch Lok 3570 or approved in 6" round valve box.

F. Maxicom Communication Cable (Exterior): PE-39 (existing to remain).

G. Maxicom Communication Cable Splice Kit: Preformed Line Products, Super Serviseal Closure (not used)

L. Conduit and Fittings:
1. Under ground: Plastic, Class III, Federal Specification W-C-1094.
2. Above ground: Aluminum, Federal Specification WW-G-540.
3. Conduit Supports: Galvanized.

2.8 TRACER WIRE AND TRACER WIRE BOX

A. Contractor shall place a UF #18 minimum blue tracer wire to allow for location and marking of all otherwise unlocatable buried pipe containing pressurized water. Tracer wire shall be continuous without splices unless approved prior to the work. If approved, splices shall be made using a high-pressure type solderless connector. All splice kits shall be approved.

2.9 VALVE BOXES

A. Automatic and Manual Control Valves: Rain Bird VB Series Standard Rectangular (VB-STD) w/ locking lid. Double box assembly, see details.

B. Isolation Valves: Rain Bird VB Series 10” round w/ locking lid and “irrigation main” labeled on inside of lid.

C. Manual Drain Valves: Rain Bird VB Series 10” round w/ locking lid and “irrigation main” labeled on inside of lid.

D. Valve Box Lid Colors: Green in lawn, black in plant bed.

E. Drainage Backfill at Manual Drain Valves: (1) cu. foot cleaned ¾”-1” round rock with filter fabric surround.

2.10 BACKFILL MATERIALS

A. Planting Areas Subgrade: 3” sand bedding at all piping and wires; 3” debris free cover at all piping and wires; Remainder of trench up to specified topsoil depth to be native on-site soil, free of rocks and other deleterious materials.

B. Planting Areas Finished Grade: Top layer depth and soil material to be amended topsoil as specified.

C. Paved Areas: All backfill to be fill sand under paved areas.

D. Drain and Sump Areas: Pea gravel, 3/4" - 1/2" washed round rock.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

B. Provide minimum cover over top of underground piping according to the following:

1. Irrigation Main Piping: Minimum depth of 24”below finished grade to top of pipe.
2. Circuit Piping: Minimum depth of 18” below finished grade to top of pipe.
3. Sleeves: Minimum depth of 24” below finished grade to center of pipe.

3.2 PREPARATION

A. Unearth existing supply area components and set stakes to identify locations of proposed supply system components. Obtain Architect's approval before installation.

B. Set stakes to identify locations of proposed irrigation system. Obtain Architect's approval before excavation.

C. Review layout requirements with plantings and other affected work. Contractor is responsible for insuring irrigation equipment locations do not conflict with proposed plant locations.

3.3 PIPING INSTALLATION

A. Location and Arrangement:
   1. Piping layout indicated is diagrammatic.
   2. Route piping and valve boxes to avoid trees, shrubs, ground cover, and structures.
   3. If conditions differ significantly from those shown on plan, contact Landscape Architect immediately.

B. Install pipe, valves, controls, and outlets in accordance with manufacturer's instructions and details on drawings.

C. Provide 3” sand bedding below all main and lateral line piping.

D. Provide 3” minimum debris free cover over all main and lateral line piping.

E. Provide thrust blocks at all changes in direction of all piping 4” and larger.

F. Maintain trenches free of debris, material, or obstructions that may damage pipe.

G. Install piping at minimum uniform slope of 0.5 percent down toward drain valves.

H. Install piping free of sags and bends.

I. Snake piping slightly to provide for thermal movement of components in system.

J. Install groups of pipes parallel to each other, spaced to permit valve servicing. (2) pipes may be stacked vertically if 4-inches of soil separates them; (3) or more pipes must be laid 4-inches apart horizontally in trench.

K. Install fittings for changes in direction and branch connections.

L. Lay piping on even bed, uniformly sloped without humps or depressions.

M. Install PVC piping in dry weather when temperature is above 40 deg F. Allow joints to cure at least 24 hours at temperatures above 40 deg F before testing.

3.4 SLEEVE INSTALLATION

A. Bore beneath existing paving or use other methods as required to accomplish sleeving installation where necessary.

B. If concrete is cut to install sleeving, paving must be cut to next logical joint and replacement paving surface finish to match existing. Cut paving with prior approval only. Concrete to be doweled both sides.

C. Install sleeves under parking lots, roadways, sidewalks and elsewhere shown on drawings.

D. Contractor responsible for installing sleeving in addition to that shown on drawings as necessary for complete installation of system as designed.

E. Provide visible markers where sleeve ends are concealed.

F. Extend sleeves a minimum of one-foot beyond sidewalks on each side.

G. Run sleeves level and perpendicular to sidewalks and pavement unless shown otherwise on drawings.

H. Install sleeves at depth necessary to accommodate required mainline depth.

3.5 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Use Teflon tape or virgin Teflon paste on all threaded joints unless dry seal threading is specified. Minimum of 4 wraps. No pipe dope.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Flanged Joints: Select rubber gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

E. Ductile-Iron Piping Gasketed Joints: Comply with AWWA C600 and AWWA M41.

F. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Pressure Piping: Join schedule number, ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
3. PVC Nonpressure Piping: Join according to ASTM D 2855.
4. Allow 24 hours drying time prior to pressurizing pipe.

3.6 VALVE INSTALLATION

A. Automatic Control Valves:
1. Install in double valve box assembly as detailed on drawings.
2. Coil 48” length of control wires around ¾” pipe in box.

B. Main Line Manual Drain Valves:
1. Provide at main line low points.
2. Install in 10” round valve box.
3. Provide specified gravel sump.
4. Provide 8” corrugated pipe from valve box elevation to drain valve.

C. Isolation Valves:
   1. Install in 10” round valve box.
   2. Provide 8” corrugated pipe from valve box elevation to drain valve.

3.7 VALVE COVERS AND BOXES INSTALLATION

A. Set all valve boxes at grade of lawn or shrub mulch surface unless otherwise noted.

B. Minimum coverage 18-inches finished grade to lateral pipe.

C. Install (2) valve boxes for each control valve. Set one upside down and attach top box with (6) stainless steel screws. Bed with 2” of sand. Use landscape fabric to cover holes in box and around pipe. See detail.

3.8 SPRINKLER INSTALLATION

A. Install sprinkler nozzles after system flushing is completed.

B. Install sprinklers at manufacturer's recommended heights.

C. Locate part-circle sprinklers to maintain a minimum distance of 4 inches from walls and 2 inches from other boundaries unless otherwise indicated.

D. Install sprinkler heads plumb or perpendicular to slope of adjacent grade.

3.9 BACKFILLING

A. Do not backfill until approved.

B. Remove all scrap pipe from trench.

C. Do all backfilling necessary to bring all surfaces to finished grades.

D. Wet and tamp earth using mechanical compactor, or approved, in layers not over 8-inches until thoroughly packed and settled.

E. Backfill within 3-inches of pipe to be free of any rock or debris which might mar the pipe.

F. Backfill trenches in lawn and plant bed areas with approved topsoil to specified depth.

G. Refill trenches that have settled with approved topsoil to bring them flush with the surrounding grades.

3.10 AUTOMATIC CONTROLLER WIRE INSTALLATION

A. Install wire beneath main line pipe and coil 18” extra wire at 100’ intervals and each turn to allow for contraction of wire.

B. Bundle wire together at 5-foot intervals with plastic tape or similar.

C. Install wire in continuous runs with no splices unless approved.

D. Ensure minimum additional 48-inches of wire above finished grade is coiled around ½-inch pipe in boxes.

E. Make all splices in a valve box and note these on record drawing when approved. Control wiring runs to be continuous unless site conditions do not permit.

F. Provide an extra coil of each wire at each splice to allow for contraction of wire due to temperature or settlement of backfill, when approved

G. Label wires on both sides of splice with permanent, water-proof tag.

H. Install waterproof connections at the end of extra wires.

I. Provide spare control wires as indicated on drawings.

3.11 TRACER WIRE INSTALLATION

A. Blue tracer wire shall be placed below the pipe and shall be continuous along otherwise unwired pieces of pipe so that it can be connected to an electrical current imposed on it for the purpose of determining its location.

B. Tracer wire shall be extended into valve boxes and shall wrap around fixture with sufficient length to extend 48” above finished grade.

C. If approved, splices in tracer wire shall be insulated and waterproofed. Tape wrapped around splices will not be accepted as waterproofing.

3.12 CONNECTIONS

A. Install piping adjacent to equipment, valves, and devices to allow service and maintenance.

B. Connect wiring between controllers and automatic control valves.

C. Use specified splice kits only.

3.13 IDENTIFICATION

A. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tapes over underground piping during backfilling of trenches.

B. Provide reduced, laminated copy of irrigation plan with valve schedule on each automatic controller.

C. Provide permanent hang tags at automatic control valves indicating zone number and correlating to controller chart. Coordinate numbering with 4J staff. (Not Used)

3.14 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Leak Test:

a. Leak Test: After installation, charge system to 100 psi and test for leaks. Pressure piping to lose no more than 4 PSI in 24 hours. Repair leaks and retest until no leaks exist. Test new areas of work using isolation valves to determine soundness of new work.

2. Operational Test: After electrical circuitry has been energized, operate flow sensors, well, master valve and automatic control valves to confirm proper system operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls, wiring and equipment.

D. Any irrigation product will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.15 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Verify that controllers are installed and connected according to the Contract Documents.
3. Verify that electrical wiring installation complies with manufacturer's submittal.

3.16 ADJUSTING

A. Adjust settings of controllers.

B. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit.

C. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with finish grade.

D. Coordinate with owner’s system operator for Maxicom control system setup.

3.17 CLEANING

A. Flush dirt and debris from piping before installing sprinklers and other devices.

3.18 RESTORATION

A. Grade smooth all disturbed areas. Provide additional soil as necessary to provide smooth seed bed.

B. Re-seed as necessary to provide heathy full stand of grass

C. Replace any other plant material disturbed with new plant material to match existing.

3.19 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain automatic control valves and controllers.

END OF SECTION 328400

SECTION 32 93 00

LANDSCAPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.3 SUMMARY

A. Section Includes:

1. Plants.
2. Topsoil and Soil Preparation.
3. Seeding.

B. Related Sections:

1. Section 31 10 00 "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
2. Section 31 20 00 "Earth Moving" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
3. Section 32 84 00 “Planting Irrigation”.

1.4 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required.

D. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

E. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

F. Finish Grade: Elevation of finished surface of planting soil.

G. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

H. Planting Area: Areas to be planted.

I. Topsoil: As defined in PART 2 - PRODUCTS.

J. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

K. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

L. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated, including soils.

B. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience if requested. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of similar landscape installations.

1. Experience: Five years experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."
2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
3. Pesticide Applicator: State licensed, commercial.

B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

C. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Architect retains right to observe trees and shrubs further for size and condition of

balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site. See also: Required Inspections for Approval.

D. Preinstallation Conference: Convene on site meeting with General Contractor, Landscape Contractor and Landscape Architect two weeks before starting work of this section, see also Irrigation Specifications. Combine and coordinate with irrigation conference per section 32 84 00.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

C. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
2. Do not remove container-grown stock from containers before time of planting.
3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1.9 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
    b. Structural failures including plantings falling or blowing over.
    c. Faulty performance of tree stabilization.

2. Warranty Period: 1 year from Date of approved Final Completion.

3. Include the following remedial actions as a minimum:

    a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
    b. Replace plants that are more in an unhealthy condition at end of warranty period.
    c. Provide extended warranty for period equal to original warranty period, for replaced plant material.

1.10 MAINTENANCE SERVICE

A. Initial Maintenance Service for all plant materials: Provide maintenance by skilled employees of landscape installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period at Irrigated Landscape Areas: Through Final Completion.

1.11 REQUIRED INSPECTIONS FOR APPROVAL

A. Request visitation by the Landscape Architect 3 days minimum in advance of the following:

1. Materials and Layout Inspection: Immediately prior to installation, place (but do not install) plant material for approval by the Landscape Architect. All materials shall be reviewed by Landscape Architect for compliance with specifications and submittals. Layout will be approved by Landscape Architect prior to continued work.

2. Installation Inspection: At time of Substantial Completion Inspection, Landscape Architect will review installation of all work of this Section. Installation Review will not occur until completion of all planting. A punchlist will be prepared by Landscape Architect. All punchlist items must be satisfactorily completed to obtain Final Completion.

3. Warranty Inspection: Immediately prior to the expiration of the Project Warranty, review all work of this Section for compliance with requirements. Make any corrections required by these reviews.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless approved by Landscape Architect.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.

2.2 LAWN SEED

A. Provide only current or last season’s crop at manufacturer’s high rate.

B. Purity: 98% by volume.

C. Germination: 92 percent.

D. 100% turf type Ryegrass blend available as ‘JB Signature’ manufactured by JB Instant Lawn Sod and Seed. Phone: 1-800-527-1439.

E. Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 16 percent nitrogen, 16 percent phosphorous, and 16 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.3 SOIL

A. Topsoil (at disturbed areas to be seeded): Imported, natural, fertile, friable, topsoil loam with at least 10% humus, free from subsoils, clay, stones, lumps, roots, clods, sticks, weeds, weed seed and other foreign matter. Submit sample for approval. Available as "Processed Loam" by Eugene Sand and Gravel or approved.

B. Soil (growing medium) at Storm water planters: See Earthwork Specifications.

2.4 MULCHES

A. Mulch at Plant Beds: Shredded fir bark 5/8" – ¼" diameter, free of growth or germination inhibiting ingredients. Available as premium "Bark-O-Mulch" from Rexius Forest Bi-Products or approved.

B. Mulch at Storm water Planters: Pea Gravel Mulch: Round 3/8" – No. 4 pea gravel. Provide material that is free from fines and other deleterious substances.

C. At lawn and Seeded Areas: Clean, seed-free hay, straw, fiber or well-composted organic material.

2.5 TREE STABILIZATION MATERIALS

A. Stakes and Guys:

1. Upright and Guy Stakes: Rough-sawn, sound, new softwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.
2. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or turnbuckles.
3. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch in diameter.
4. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
5. See also details in drawing set.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive landscaping for compliance with requirements and conditions affecting installation and performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
5. Verify that previous subgrade grading operations satisfactorily meet specifications and have been approved by Landscape Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual shrub locations according to required layout.

3.3 SOIL PLACEMENT SCHEDULE

A. At Plant Beds and Parking Lot Planting Islands:
1. Confirm sub-grade material is acceptable to Architect before placing any fill.
2. Fill with compacted imported topsoil to a minimum depth of 18” at plant beds and 24” at parking lot planting islands.
3. Gravel backfill and foreign material are not permitted within 24” of finished grade. Contractor is to ensure that soil is free of gravel or foreign materials.

B. At Lawns:

1. Confirm sub-grade material is acceptable to Architect before placing any fill.
2. Fill with minimum 8” imported topsoil at new lawns. Fill with compacted imported topsoil to flush with adjacent finished grade or adjacent curb at restored lawns.

C. At Stormwater Planters:

1. See Civil Engineer’s documentation for required subgrade preparation.

D. PLANT BED PREPARATION

1. At Plant Beds:
   a. Loosen subgrade of planting areas to a minimum depth of 8 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
   b. Apply the following soil amendments and fertilizer on surface, and thoroughly blend into top 8” min. of planting soil: 3” Compost; Fertilizer at the rate of 20 lbs. per 1000 sf.

c. Spread planting soil to a depth of 18 inches at plant beds and 24" at parking lot planters but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
d. Spread approximately one-third the thickness of planting soil over loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil in two additional lifts. Compact each lift to 85%.

2. At Storm water Planters: See Civil Engineer's documentation

3.4 EXCAVATION

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle or as shown on drawings. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1. Excavate two times as wide as ball diameter for rootball or container minimum or as shown in details.
2. Excavate at least 12 inches wider than root spread.

B. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

C. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 PLANTING

A. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

B. Balled and Burlapped Stock: Set plumb and in center of planting pit or trench with root flare 2 inches above adjacent finish grades

C. Container Grown Stock: Carefully remove root ball from container without damaging root ball or plant.

D. Water thoroughly after planting.

3.6 PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape without approval of Landscape Architect.

3.7 SEEDING

A. Immediately prior to seeding, till into top 4" of soil:
1. Fertilizer: 15 lbs. per 1000 sq. ft.

2. Organic Material: 1 inch spread over entire area

B. Rake and drag to remove from top one inch of soil: Stones, clods, sticks and other foreign matter larger than 1 inch in any dimension; establish smooth, fine textured seed bed. Compact as necessary to prevent future settling.

C. Planting Season – Between March 15th and October 15th.

D. Do not sow immediately following rain, when ground is too dry, or during windy periods.

E. Apply half of seed in one direction and remaining at right angles to first seeding at the specified rates.

F. Lightly rake to cover seed, roll, mulch and water with a fine spray.

3.8 GROUND COVER AND PERENNIAL PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines at indicated spacing in even rows with triangular spacing and as shown in details. Conduct layout inspection as specified.

B. Use growing medium for backfill.

C. Dig holes large enough to allow spreading of roots.

D. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

E. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

F. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.9 MULCHING

A. Mulch all plant beds and tree mulch circles to a depth of 3” minimum thickness within 24 hours after planting.

B. Where plant beds meet sidewalks or mowing edges, provide a vertical spaded edge 2” deep along edge to lock mulch in place.

C. At Storm water planters: Mulch with pea gravel mulch to a depth of 2 inches minimum within 24 hours after planting.

D. At seeded area (new and restored lawn): Immediately following seeding and compacting, apply mulch to a thickness of 1/8 inches.

3.10 LANDSCAPE MAINTENANCE

A. During specified maintenance period, maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.

B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. At Lawns Areas: During specified maintenance period, water, weed, mow and fertilize as necessary to establish healthy, thick, even grass stand, 1-1/2 inches high. Contractor shall provide (2) mowings minimum.

D. Grass Mowing: Do not attempt first mowing until grass is firmly rooted and secure in place.

3.11 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in orderly condition.

B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

C. After installation and before Final Completion remove nursery stakes, tie tape, wire, burlap, and other debris from plant material, planting areas, and Project site.

END OF SECTION

SECTION 33 11 00

WATER DISTRIBUTION

PART 1 – GENERAL

1.1 DESCRIPTION

Work includes, but is not limited to the following:

A. Site water distribution piping, fittings and accessories. Includes fire distribution system.

1.2 RELATED DOCUMENTS

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

B. RELATED SECTIONS include the following:
   1. Division 31 Section EARTHWORK, for utility trench excavation and backfill requirements.

C. REFERENCED SPECIFICATIONS include the following:
   1. AWWA Standards (current edition)
   2. NFPA Standards (current edition)

1.3 SUBMITTALS

A. Submit the following in accordance with the requirements of Division 01 Section SUBMITTAL PROCEDURES.

B. Product Data: For the Following:
   1. Pipe materials and fittings
   2. Valves and Valve boxes
   3. Fire hydrants

C. Field Quality Control Submittals:
   1. Field Test Reports
   2. Special Inspections for Code Compliance.

D. Contract Closeout: Comply with Division 01 Section CLOSEOUT PROCEDURES.
   1. Provide record documents.

1.4 QUAILITY ASSURANCE

A. Installer Qualifications: Firm experienced in installation of systems similar to those required for this project.

B. Manufacturer's Qualifications: Not less than 5 years experience in production of the specified products.

C. Product/Material: Compaction testing shall be in accordance with Section Division 01 Section QUALITY REQUIREMENTS.

1.5 PRODUCT DELIVERY, HANDLING, AND STORAGE

A. Protect from damage by the elements and construction procedures.

B. Do not store plastic pipe and fittings in direct sunlight.

C. Protect pipe, pipe fittings and seals from dirt and grease.

1.6 ADVANCE NOTICE

A. Notify Engineer at least 48 hours prior to staring work in this section.

B. Interruption of Existing Water Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
1. Notify Glide Water District (for connection to City main only), Construction Manager and Owner no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without owner's and Glide Sewer District's written permission.

1.7 COORDINATION

A. Coordinate with other trades affecting or affected by work in this section.

PART 2 – PRODUCTS

2.1 GENERAL: Provide pipe materials with a minimum rated working pressure of 150 psi, unless noted otherwise.

2.2 PIPE AND FITTINGS, 4"-12" (UNLESS OTHERWISE NOTED ON DRAWINGS)

A. Polyvinyl Chloride (PVC) Pipe: AWWA C900; Class 150; with bell end and elastomeric gasket, with plain end for cast iron or ductile iron fittings, or with plain end for PVC elastomeric gasket fitting. 350 psi pressure rating.
1. Fittings: AWWA C153, ductile iron
2. Gaskets: ASTM F477, elastomeric seal
3. Joints: ASTM D3139, compression gasket ring.

2.3 GATE VALVES (3 – 12 INCHES)

A. Shall be resilient-seated epoxy coated ductile iron gate valve, bronze stem, stem nut, 200 psi working pressure, extension box and valve key. Shall meet or exceed the provisions of AWWA C509, be UL listed and FM approved. Shall be a nonmetallic seat, non-rising stem type with O-ring seals and a 2-inch square operating nut which opens the valve when turned counterclockwise. With the valve fully open, an unobstructed waterway not less than the full nominal diameter of the valve shall be provided. Valves shall have joint ends as specified on the Plans. Acceptable gate valves:

Kennedy "Ken-Seal" (Similar to models 8561 and 8572)
Clow "Resilient Wedge"
Mueller
Pratt

2.4 VALVE BOXES:

A. Cast-iron, ASTM A48-76, rated for H20 traffic loading, with a rust protective coating, cover with lettering “WATER”. Varicast VB910 Rich Valve Box.

2.5 CHECK VALVES (3 – 8 INCH VALVES)

A. Swing Check Valves: Iron body, bronze mounted, non-assisted, clear waterway design with resilient material-to-metal seat construction, bronze disc with EDPM (ethylene-propylene) rubber facing and a stainless steel shaft. Minimum working pressures shall be 175 psi. Comply with AWWA C508, UL listed and FM approved. Approved manufacturers:

American Darling (Model 50)
Kennedy Valve
M&H Valve (Style 59)
Mueller

2.6 VAULTS FOR CHECK VALVES

A. Precast concrete vaults sized to accommodate check valve and comply with details with diamond plate access hatch, 3’ x 3” minimum opening size, hinged access, locking latches. Utility Vault, PIPE Inc or as approved.

2.7 BALL DRIP VALVE

A. Automatic ball drip - valve automatically closes when pipe pressurized and re-opens when pressure ceases. Brass body and ball, screen, straight connection, NPT threaded both sides, horizontal installation.

2.8 TAPPING / LINE STOP SLEEVES

A. Tapping and line stop sleeves shall be full circle stainless steel construction with a full circle rubber gasket and a flanged outlet for bolting to the tapping / line stop valve. Sealing may be accomplished by either split end gaskets and mechanical joint ends or a single rubber gasket around the tap opening. Bolts and nuts shall be zinc plated or stainless steel. Acceptable tapping sleeves:

Ford Fast
Smith Blair
Romac SST

Acceptable line stop sleeves:
Smith Blair 680 Series

2.9 FIRE HYDRANTS

A. Fire Hydrants: Cast-iron body, compression type valve, opening against pressure and closing with pressure, 6-inch mechanical joint inlet, 150 psi minimum working pressure, conforming to AWWA C502 and City requirements. Nozzle and operating nut per National Standard threading. Hydrants shall be designed as traffic models with a safety breakaway flange. UL listed and FM approved.
B. Hose and Pumper Connections: Two hose nozzles and one pumper nozzle, with nozzle sizes to match City requirements.

C. Acceptable fire hydrants:
Clow Medallion
Mueller Super Centurian
Kennedy K-81
M&H Regent 129I
Subject to approval of the local fire department.

2.10 FIRE DEPARTMENT CONNECTION

A. Double clapper, 2-way, 90 degree Siamese inlet, rough brass, two 2-1/2" inlets, one 4" or 6" outlet (as specified on plans); brass cap with chains, threads conforming to local fire department; UL listed, FM approved, and conforming to City standards. Designated "AUTO SPRINKLER". Star, Grinnell, Standard, or Allenco. **Brass FDC caps to be locking/tamper proof type to protect against theft.**

2.11 THRUST RESTRAINT

A. Concrete Reaction Blocking and Anchorage
1. Concrete for anchorage and reaction blocking shall be a batch mix concrete mix which shall provide a minimum 28 day strength of 3,000 psi.

B. Mechanical Joint Restraint
1. Restrained mechanical joint retainer glands shall be of ductile iron construction and compatible with standard mechanical joint bells. Gland, gaskets, tee head bolts, and hex nut shall be in conformance with AWWA C111 (ANSI A21.11). Retainer glands shall have rated working pressures of 350 psi for pipe sizes 6-inch and smaller, 250 psi for pipe sizes 8-inch through 16-inch, 200 psi for 18- and 20-inch pipe sizes, and 150 psi for pipe sizes 24-inch and larger. Bolt heads are to be "auto-torque" twist off. Acceptable retainer glands:

EBAA Iron - 1100 Series "Mega-Lug"
Romac - Romagrip
Ford- Uniflange Series 1400

2.12 CONCRETE

A. Ready-mixed conforming to Division 03 Section CAST-IN-PLACE CONCRETE. Compressive strength of 3,000 psi at 28 days, maximum aggregate size shall be 1-1/2 inches and slump between 2 and 4 inches.

2.13 OTHER MATERIALS

A. Recommended by manufacturer and subject to Engineer's review and acceptance. Provide all materials to complete an operational water system.

PART 3 – EXECUTION

3.01 EXISTING CONDITIONS

A. Prior to starting work of this section inspect trench, excavations and pipe bedding to verify all such work is complete and installation may commence properly.

B. Do not start work of this section until all unsatisfactory conditions have been corrected. Commencing work implies acceptance of existing conditions.

C. If field measurements differ slightly from drawing dimensions, modify work as required for accurate fit. If measurements differ substantially, notify Engineer prior to starting work of this section.

D. Verify building service connections and municipal utility main size, location and invert are as indicated on drawings.

3.02 TRENCHING AND BACKFILL

A. Trenching and backfill shall be in accordance with Division 31 Section EARTHWORK.

3.03 PIPE INSTALLATION

A. Do not lay pipe on unstable material, in wet trench or when trench and weather conditions are unsuitable for the work.

B. Support pipe on compacted bedding material. Excavate bell holes only large enough to properly make the joint.

C. Inspect pipes and fittings for defects before installation. Defective materials shall be plainly marked and removed from the site. Cut pipe shall have smooth regular ends at right angles to the axis of the pipe.

D. Clean interior of all pipe thoroughly before installation. When work is not in progress, open ends of pipe shall be closed securely to prevent entrance of storm water, dirt or other substances.

E. Lower pipe into trench carefully and bring to proper line, grade, and joint. After jointing, interior of pipe shall be thoroughly wiped or swabbed to remove any dirt, trash or excess jointing materials.

F. Do not walk on pipe in trenches until covered with backfill to a depth of 12 inches over the pipe crown.

G. Install in accordance with manufacturer's recommendations. Maximum deflection of pipe (push-on or mechanical joint pipe) is not to exceed manufacturer's recommendations. Install piping within 0.02 feet of grade and location shown on the drawings.

H. All ductile iron pipe joints and fittings shall be fully covered with asphaltic coating.

3.04 THRUST RESTRAINT

A. Install at all changes in pipe directions and fittings as indicated on the drawings.

B. Concrete thrust blocking to be installed unless mechanical joint restraint is otherwise noted on the drawings. Pre-cast blocking shall not be used.

C. Blocking shall not be covered up until accepted by the Owner's representative.

D. Concrete thrust blocking shall be poured in place. Thrust blocking shall be placed between undisturbed earth and the fittings to be anchored in accordance with drawings. The area in which the blocking is to be placed shall be sufficiently excavated to receive the concrete so that the proper shape and bearing surface is attained. The bearing surface shall be sized and

located and shall be placed so that the pipe and fitting joints will be accessible for repair without removing the concrete

E. Concrete shall in no case extend around more than 1/2 the circumference of the fitting at any point. A plastic shield or other similar protection shall be placed between the concrete and any portions of the pipe, valve, fitting, bolts, or nuts with which it comes in contact to prevent dielectric corrosion damage.

3.05 VALVES, FITTINGS AND CAPS

A. Shall be set and joined to the pipe in the manner previously specified for cleaning, laying, and jointing pipe and as shown on the drawings.

B. Valves shall be provided with a pre-cast concrete pad for support so that the pipe will not be required to support the weight of the valve. All pipe shall be supported to prevent stress on the valves.

C. All dead ends shall be closed with plugs or caps that are suitably restrained to prevent blowing off under test pressure.

D. Following installation, bolts and nuts for flanged and mechanical joint connections shall be coated with a bituminous seal coating and the valve shall be operated from the fully open to fully closed position to assure that the valve does not bind during operation.

E. The area around valves and fittings shall be back filled in the same manner as specified for the adjoining pipe.

3.06 VALVE BOXES

A. Valve boxes and covers shall be provided with all valves.

B. The valve boxes shall be centered over the operating nut of the valve and shall be set so as not to transmit shock or stress to the valve or valve operator.

C. The exposed end of the valve box shall remain accessible at all times. The Contractor shall be responsible for keeping the valve box free of rocks and other debris for the duration of the project. Any misalignment or necessary readjustment of valve boxes shall be corrected by the Contractor at no additional cost to the Owner.

D. Set rim flush with the adjacent finish surfaces unless otherwise noted.

E. A valve operator extension shall be provided for every valve where the operating nut is in excess of 6-feet from finished grade. The extension shall be of such length that its operating nut in place is within 1- to 2-feet of finished grade. The cost of furnishing and installing valve operator extensions shall be considered incidental to and included in the cost of other bid items and no additional payment shall be made.

3.07 FIRE HYDRANTS

A. A solid precast concrete base pier block set on undisturbed earth shall be provided for each hydrant. The vertical barrel of each hydrant shall be well braced with a concrete reaction backing poured against unexcavated earth at the end of the trench and for hydrant installations less than one pipe length from the main, shall be tied to the pipe with mechanical joint restrained retainer glands. Retainer glands shall not be required for installations more

than one pipe length from the main. Minimum pipe thickness where retainer glands are used shall be Class 52.

B. All hydrants shall stand plumb and square with adjacent construction. Hydrants shall be set so that the center of the safety breakaway flange is located a minimum of 2-inches and a maximum of 8-inches above finished sidewalk or ground level. Localized fill or mounding around the hydrant will not be allowed to achieve an acceptable vertical clearance of the breakaway flange.

C. When placed in the open area between the curb and sidewalk or directly behind the curb where no sidewalk is proposed, the hydrant barrel shall be set so that no portion of the pumper or hose nozzle cap will be less than 12-inches nor more than 18-inches from the gutter face of the curb unless otherwise specified. When set behind the sidewalk, no portion of the hydrant or nozzle cap shall be less than 6-inches nor more than 18-inches from the sidewalk unless otherwise specified. It shall be the Contractor's responsibility to assure that such horizontal clearances are satisfied regardless of approximate distances from the main as may be noted on the Plans. The Contractor shall make any necessary horizontal adjustment to improperly set hydrants at no additional cost to the City.

D. Drainage shall be provided for the hydrant by placing crushed rock back fill from the bottom of the trench at the base of the hydrant to at least 6-inches above the inlet pipe. Not less than seven (7) cubic feet of crushed rock shall be placed around the base of the hydrant to insure drainage. Backfill shall be carefully placed in six (6) inch layers and carefully tamped.

E. The interior of the hydrant shall be thoroughly cleaned of all foreign matter prior to installation. After installation, each hydrant and valve shall be inspected in both opened and closed positions to assure that all parts are in satisfactory working condition

F. Hydrants set too high shall be removed and replaced with an appropriate hydrant by the Contractor at his/her own expense. Extensions required for hydrants set too low shall be supplied and installed by the Contractor at his/her own expense. Following installation, the Contractor shall conceal each hydrant with a tarp, plastic sheet, or other suitable covering securely fastened until the hydrant is accepted for use.

G. Hydrant installation shall conform with AWWA M17 Manual and AWWA C600.

3.08 FIRE DEPARTMENT CONNECTIION

A. Conform to AWWA M17 Manual, NFPA 13 and AWWA C600 requirements.

B. Set fire department connection plumb and square with adjacent surfaces.

3.09 IDENTIFICATION

A. Install blue tracer wire directly over non-metallic piping and at the outside edge of underground structures.

3.10 FIELD QUALITY CONTROL

A. Refer to Division 01 Section QUALITY REQUIREMENTS for responsibilities for arranging, supervising, and payment of field quality control requirements.

B. Field Tests:
   1. Hydrostatic test as described below.
   2. Disinfection Test as described below.

C. Field Inspections: Notify Engineer prior to work of this section.

D. Special Inspections for Code Compliance:
1. Hydrostatic test. Testing, acceptance and documentation shall comply with Oregon Plumbing Specialty Code, NFPA and AWWA specifications, as applicable.
2. Observance: Plumbing inspector to observe fire line testing, Fire Department to observe fire line testing. Contractor shall notify plumbing inspector and Fire Department at least 48 hours prior to testing.
3. Obtain building inspector approvals and submit to Engineer.

E. Immediately after testing fire system assure FDC and any other opening are sealed to protect against any debris from entering system.

3.11 HYDROSTATIC PRESSURE TEST

A. Water mains and appurtenances shall be tested in sections of convenient length under hydrostatic pressure. Pressure tests shall be conducted prior to disinfection of the line

B. All equipment necessary for performing the tests shall be furnished and operated by the Contractor.

C. Pipeline shall be backfilled sufficiently to prevent any pipe movement during the test.

D. Thrust blocking required for any reach of pipe shall be allowed a minimum of 3 days cure time prior to pressure testing.

E. All entrained air shall be expelled from the line prior to elevating the internal pressure to the specified test pressure.

F. Pressure Test:

1. The test pressure shall be 150 psi calculated for the point of highest elevation but shall not exceed 200 psi at any point. The City Utility Inspector must witness all pressure tests. Any cracked or defective pipe, fittings, valves, or hydrants discovered during this pressure test, shall be removed and replaced with sound material. The test shall be repeated until satisfactory.

G. Leakage Test:

1. A leakage test shall be conducted concurrently with the pressure test. The duration of the leakage test shall be two (2) hours

2. The test shall be in conformance with AWWA C600 Section 4 and observed by the plumbing inspector. The minimum test pressure shall be 150 psi at the highest elevation of the section being tested, but shall be reduced to avoid test pressures exceeding 200 psi at the lowest elevation of the section being tested.

3. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved section thereof, after the air has been expelled and the pipe has been filled with water to the test pressure. No pipe installation will be accepted until the leakage is less than the number of gallons per hour, as determined by the formula:

$$L=\frac{ND\,(P)^{0.5}}{7{,}400}$$

L = Allowable leakage in gallons per hour.

N = Number of joints in the section of pipe tested.

D = Nominal diameter of pipe in inches.

P = Average test pressure during the leakage test in pounds per square inch gauge.

H. All tests shall be made with the line valves open. After the test has been completed, each valve shall be tested by closing each in turn and relieving the pressure beyond. This test of the valve will be acceptable if there us no immediate loss of pressure on the gauge when the pressure comes against the valve being checked.

I. Sections of testing shall normally be limited to 1,500 feet.

J. Prior to calling out the appropriate parties to witness the pressure test, the Contractor shall have all equipment set up completely for the operation and have successfully performed the test to assure that the pipe is in satisfactory condition.

3.12 FLUSHING AND DISINFECTION:

A. All piping, complete with fittings and appurtenances, shall be flushed until clean and sterilized as specified in AWWA C601 (latest revision) "Disinfecting Water Mains" and per City requirements.

B. Should the initial treatment fail to result in the specified conditions, the original chlorination procedure or another method approved by the Engineer shall be repeated at the Contractor's expense until satisfactory results are obtained. No extra payment or extension of Contract time will be allowed the Contractor for the time elapsed to achieve acceptable disinfection of the pipe.

C. The Contractor shall perform system flushing only during off-peak hours and in the most economical manner.

D. No flushing shall be performed without prior approval of the Owner.

E. Provide written certification from a firm specializing in disinfection that the disinfection has been successfully completed.

3.13 PLACING IN OPERATION

A. Upon completion of work and before final acceptance, the entire system shall be put in operation under normal pressure and operated at that pressure for a period of not less than ten (10) days by the Contractor.

B. Any leaks or defect in the construction of the system that develops shall be repaired and the test continued until the system is practically watertight.

C. The requirements of this Section shall not waive any provision of the Contractor’s guarantee.

3.14 CLEANING

A. All pipe and structures shall be clean and free of all construction debris, rocks, gravel, mud, sand, silt, and other foreign material, as directed by the Engineer.

B. After completing work in this section, remove all scraps and debris from the work area.

3.15 PROTECTING COMPLETED WORK

A. Protect all work installed under this section.

B. Replace, at no additional cost to Owner, any damaged work of this section.

END OF SECTION

SECTION 33 30 00

SANITARY SEWERAGE

PART 1 – GENERAL

1.1 DESCRIPTION

Work includes, but is not limited to the following:

A. Site sanitary sewer piping, fittings and accessories.

1.2 RELATED DOCUMENTS

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

B. RELATED SECTIONS include the following:
   1. Division 31 Section EARTHWORK for utility trench excavation and backfill requirements.

1.3 SUBMITTALS

A. Submit the following in accordance with the requirements of Division 01 Section SUBMITTAL PROCEDURES.

B. Product Data: For the Following:
   1. Pipe and Fittings
   2. Cleanout Covers

C. Field Quality Control Submittals:
   1. Field Test Reports
   2. Special Inspections for Code Compliance.

D Contract Closeout: Comply with Division 01 Section CLOSEOUT PROCEDURES.
   1. Provide record documents.

1.4 QUAILITY ASSURANCE

A. Installer Qualifications: Firm experienced in installation of systems similar to those required for this project.

B. Manufacturer's Qualifications: Not less than 5 years experience in production of the specified products.

C. Product/Material: Compaction testing shall be in accordance with Division 01 Section QUALITY REQUIREMENTS.

1.5 PRODUCT DELIVERY, HANDLING, AND STORAGE

A. Protect from damage by the elements and construction procedures.

B. Do not store plastic manholes, pipe, and fittings in direct sunlight.

C. Protect pipe, pipe fittings and seals from dirt and grease.

1.6 ADVANCE NOTICE

A. Notify Engineer at least 48 hours prior to staring work in this section.

B. Interruption of Existing Sanitary Sewer Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
   1. Notify Architect no fewer than two (2) days in advance of proposed interruption of service.
   2. Do not proceed with interruption of service without Architect's written permission.

1.7 COORDINATION

A. Coordinate with other trades affecting or affected by work in this section.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS (UNLESS OTHERWISE NOTED ON DRAWINGS)

A. PVC Sewer Pipe and Fittings, NPS 15 (DN 375) and Smaller (4" – 15"): ASTM D 3034, SDR 35, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals. Provide manufacturer's fittings.

2.2 PIPE AND FITTINGS (BUILDING APPROVED MATERIAL, 3" – 6", FOR USE UNDER AND WITHIN 5 FEET OF BUILDINGS.

A. Either of the following pipe materials may be used (with solvent cement joints).
   1. PCV Schedule 40/DWV, ASTM D2665.
   2. ABS Schedule 40/DWV, ASTM D 2661.
   3. PVC Schedule 40/DWV Cellular Core Pipe, ASTM F891.

2.3 CLEANOUTS

A. Shall be constructed from solid wall pipe and fittings specified above with traffic grade frame and cover. Frame and cover shall be H-20 rated cast iron valve box with flange top as detailed on the plans with "sewer" marking. Varicast VB910 Rich Valve Box or as approved.

2.4 SERVICE SADDLE (CONNECTION TO EXISTING PIPES)

A. Ductile iron body with rubber gasket and pipe stop molded into inside of gasket wall. Shall be Romac Style "CB" with virgin SBR gasket per ASTM D2000 MBA 710 or as approved.

2.5 FLEXIBLE COUPLING

A. Fernco flexible coupling or as approved.

2.6 RIGID COUPLING

A. Ductile iron end and center rings (ASTM A 536) with virgin gaskets (SBR per ASTM D 2000 MBA 710) an high strength low alloy steel bolts. Romac industries style "501" or as approved.

2.7 CONCRETE

A. Ready-mixed conforming to Division 03 Section, CAST-IN-PLACE CONCRETE. Compressive strength of 3,000 psi at 28 days, maximum aggregate size shall be 1-1/2 inches and slump between 2 and 4 inches.

2.8 OTHER MATERIALS

A. Recommended by manufacturer and subject to Engineer's review and acceptance. Provide all materials to complete an operational drainage system.

PART 3 – EXECUTION

3.1 EXISTING CONDITIONS

A. Prior to starting work of this section inspect trench, excavations and pipe bedding to verify all such work is complete and installation may commence properly.

B. Do not start work of this section until all unsatisfactory conditions have been corrected. Commencing work implies acceptance of existing conditions.

C. If field measurements differ slightly from drawing dimensions, modify work as required for accurate fit. If measurements differ substantially, notify Engineer prior to starting work of this section.

D. Verify building service connections and municipal utility main size, location and invert are as indicated on drawings.

3.2 TRENCHING AND BACKFILL

A. Trenching and backfill shall be in accordance with Division 31 Section EARTHWORK.

3.3 PIPE INSTALLATION

A. Lay pipes true to line and grade. Gravity flow sewer shall be laid with bells facing upgrade.

B. Do not lay pipe on unstable material, in wet trench or when trench and weather conditions are unsuitable for the work.

C. Support pipe on compacted bedding material. Excavate bell holes only large enough to properly make the joint.

D. Inspect pipes and fittings for defects before installation. Defective materials shall be plainly marked and removed from the site. Cut pipe shall have smooth regular ends at right angles to the axis of the pipe.

E. Clean interior of all pipe thoroughly before installation. When work is not in progress, open ends of pipe shall be closed securely to prevent entrance of storm water, dirt or other substances.

F. Lower pipe into trench carefully and bring to proper line, grade, and joint. After jointing, interior of pipe shall be thoroughly wiped or swabbed to remove any dirt, trash or excess jointing materials.

G. Do not walk on pipe in trenches until covered with backfill to a depth of 12 inches over the pipe crown.

H. Install in accordance with manufacturer's recommendations. Install piping within 0.02 feet of grade and location shown on the drawings.

I. Trim pipe ends flush with manhole interior walls.

J. Place plugs in ends of incomplete piping at the end of each work day or whenever work stops. Securely close ends so no water, earth, animal life, or other substance may enter.

3.4 CLEANOUTS

A. Construct on compacted 4" minimum depth, ¾"-0 crushed rock base, level, plumb, and aligned with adjacent surfaces. Set rims flush with adjacent finished surfaces unless noted otherwise on the drawings.

3.5 IDENTIFICATION

A. Install green tracer wire directly over non-metallic piping and at the outside edge of underground structures.

3.6 FIELD QUALITY CONTROL

A. Refer to Division 01 Section QUALITY REQUIREMENTS for responsibilities for arranging, supervising, and payment of field quality control requirements.

B. Field Tests:
   1. Hydrostatic or air test as described below.

C. Field Inspections: Notify Owner prior to work of this section.

D. Special Inspections for Code Compliance:
   1. Hydrostatic or air test per Oregon Plumbing Specialty Code.
   2. Obtain building inspector approvals and submit to Engineer.

3.7 CLEANING

A. Thoroughly flush and clean all system components prior to final acceptance.

B. After completing work in this section, remove all scraps and debris from the work area.

3.8 PROTECTING COMPLETED WORK

A. Protect all work installed under this section.

B. Replace, at no additional cost to Owner, any damaged work of this section.

END OF SECTION 33 30 00

SECTION 33 39 13

MANHOLES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Section Includes: Precast concrete manhole sections and manhole frame and cover castings for use in storm drain systems.

1.2 RELATED DOCUMENTS

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

B. RELATED SECTIONS include the following:
   1. Division 31 Section EARTHWORK
   2. Division 33 Section STORM DRAINAGE

1.3 SUBMITTALS

A. Submit the following in accordance with the requirements of Division 01 Section SUBMITTAL PROCEDURES.

B. Product Data: For the Following:
   1. Manholes, frames and covers

C. Shop Drawings: For the Following:
   1. Manholes: Include plans, elevations, sections, details, and frames and covers. Include design calculations and concrete-mix report for cast-in-place manholes.

D. Field Quality Control Submittals:
   1. Field Test Reports
   2. Special Inspections for Code Compliance.

E. Contract Closeout: Comply with Division 01 Section CLOSEOUT PROCEDURES.
   1. Provide record documents.

1.4 QUAILITY ASSURANCE

A. Installer Qualifications: Firm experienced in installation of systems similar to those required for this project.

B. Product/Material: Compaction testing shall be in accordance with Division 01 Section QUALITY REQUIREMENTS.

1.5 PRODUCT DELIVERY, HANDLING, AND STORAGE

A. Protect from damage by the elements and construction procedures.

1.6 ADVANCE NOTICE

A. Notify Engineer at least 48 hours prior to starting work in this section.

1.7 COORDINATION

A. Coordinate with other trades affecting or affected by work in this section.

PART 2 - PRODUCTS

2.1 MANHOLES

A. Provide precast concrete manhole sections (base, barrel section, risers and conical/eccentric tops, flat slab tops, grade rings, etc) per ASTM C478.
   1. Concrete Compressive strength of 4,000 psi for 28 days. Maximum size of aggregate shall be 1-1/2 inches. Slump shall be between 2 to 4 inches.
   2. No more than 2 lift holes or steel loop shall be cast in each section. Holes shall be located so as not to damage reinforcing or expose it to corrosion.
   3. Consist of circular sections in standard nominal diameters.

B. Provide Steps: Cast into base, riser and top sections sidewalls at 12-inch intervals.

2.2 MANHOLE JOINT CONNECTOR

A. Preformed mastic gasket as manufactured by RAM-NEK or Kent Seal.

2.3 GROUT

A. Cement grout shall conform to ASTM C 387 and consist of one part portland cement and three parts sand by mass (weight), thoroughly mixed with a minimum amount of water to produce a thick, creamy consistency. Sand shall be well graded sand which will pass a 1/8" screen. Mortar shall be used within 30 minutes after it is prepared.

2.8 PLASTIC PIPE CONNECTION

A. At PVC pipe penetrations; KOR-N-SEAL Boot or approved.

2.9 MANHOLE FRAME AND COVER

A. Manhole frames shall have a 24" clear frame opening. Machine or grind the bearing surfaces of the frames and covers to furnish a uniform, flat, non-rocking seat for the cover on the frame.

B. Covers, grates, and frames shall be cast iron conforming to ASTM A48, Class 30. Covers shall be non-locking.

C. Provide cover with the word “Sewer” cast on the sewer manhole cover and “Storm Drain” cast on the storm water manhole cover.

PART 3 – EXECUTION

3.1 EXCAVATION

A. Excavation and backfill shall conform to the requirements of Division 31 Section EARTHWORK.

B. When specified, or directed, remove unstable material that will not support the manhole, excavate below grade and backfill with stabilization material according to Division 31 Section EARTHWORK.

3.2 INSTALLATION

A. Prior to starting work of this section, carefully inspect trench, excavations, and base to verify that all such work is complete to the point where this installation may properly commence.

B. Do not install work of this section until unsatisfactory conditions have been corrected. Commencing work implies acceptance of existing conditions.

C. If field measurements differ slightly from drawing dimensions, modify work as required for accurate fit. If measurements differ substantially, notify Engineer prior to starting work of this section.

D. Invert elevation of pipes entering or exiting manhole and interior inverts shall not vary more than 0.02 foot from the elevations.

E. Use 4,000 psi at 28 days concrete for formed-in-place foundations or bases, concrete shelves, pipe supports, and concrete fill.

F. Depending on size of pipe, make connections to existing and new manholes by either core drilling through manhole wall (perform for new precast units), or carefully chipping wall segment. Take care to avoid unnecessary damage to manhole surfaces or walls.

3.3 MANHOLE BASES (WITH SUMP)

A. Manhole bases shall be precast. Base sections shall be constructed to form a watertight structure.

B. Construct on 4" minimum depth, 3/4"-0 crushed rock base; level and plumb.

3.4 PIPE CONNECTIONS

A. Place connecting pipe at the required alignment and grade. Set the connecting pipe through the full thickness of the wall flush with the inner face of the wall. Ensure that pipe connections to the structure are completely watertight. Connect all pipe to manholes according to the manufacturer's recommendations.

B. For PVC pipe make connections with Kor-N-Seal boot.

C. Grout concrete pipe connections to manholes so they are watertight, using non-shrink grout over waterstop. When grouted into the manhole section, the pipe section shall not extend more than 0.6 m (2 feet) outside the manhole. If an approved flexible connection for concrete pipe is

provided at the manhole, full or partial pipe sections may be stubbed into the manhole as required.

3.5 JOINT SEALING

A. Storm Manholes: Non-shrink grout is allowed on joints, and on 24 inch extension rings above the cone. In roadways and other areas intended for traffic, a minimum of one 24 inch diameter precast riser is required between the cone and manhole cover frame. All grouted joints shall be clean and wet before setting risers and tops in a full bed of Portland cement grout. Joints shall be watertight, grouted inside and have a smooth finish. Outside joints shall be grouted before backfilling.

3.6 GRADE RINGS

A. Grade rings shall be laid in grout with the sides plumb and the top level. The joints shall be sealed with mortar. The extensions shall be watertight.

3.7 MANHOLE FRAMES AND COVERS

A. Set metal frames for manholes on full non-shrink grout beds to prevent infiltration of surface water or groundwater between the frame and the concrete of the manhole section. If concrete is to be poured around the frame, coat the portion of the frame that will contact the concrete with hot asphalt before placing the concrete. Set frames, covers and grate true to the locations and grades established and flush with adjacent surfaces.

3.8 FIELD QUALITY CONTROL

A. Refer to Division 01 Section QUALITY REQUIREMENTS for responsibilities for arranging, supervising, and payment of field quality control requirements.

B. Field Inspections: Notify Engineer prior to backfilling.

C. Special Inspections for Code Compliance:
   1. Obtain plumbing inspector approvals and submit to Engineer.

3.9 CLEANING

A. Upon completion, clean each structure of accumulated silt, debris or foreign matter of any kind and keep clean until final acceptance of the work.

B. Prior to final acceptance, Contractor shall flush and clean all elements of the completed systems.

C. Upon completion of work of this section, promptly remove from the working area all scraps, debris, and surplus material.

3.10 PROTECTION

A. Protect all work installed under this section.

B. Replace, at no additional cost to Owner, any damaged work of this section.

END OF SECTION 33 39 13

SECTION 33 40 00

STORM DRAINAGE

PART 1 – GENERAL

1.1 DESCRIPTION
Work includes, but is not limited to the following:

A. Site storm drainage piping, fittings and accessories.

1.2 RELATED DOCUMENTS

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

B. RELATED SECTIONS include the following:
1. Division 31 Section EARTHWORK for utility trench excavation and backfill requirements.
2. Division 33 Section MANHOLES.

1.3 SUBMITTALS

A. Submit the following in accordance with the requirements of Division 01 Section SUBMITTAL PROCEDURE.

B. Product Data: For the Following:
1. Pipe and Fittings
2. Backwater Valves
3. Drains (area drains, trench drains)
4. Cleanout covers

C. Field Quality Control Submittals:
1. Field Test Reports
2. Special Inspections for Code Compliance.

D. Contract Closeout: Comply with Division 01 Section CLOSEOUT PROCEDURES.
1. Provide record documents.

1.4 QUAILITY ASSURANCE

A. Installer Qualifications: Firm experienced in installation of systems similar to those required for this project.

B. Product/Material: Compaction testing shall be in accordance with Division 01 Section QUALITY REQUIREMENTS.

1.5 PRODUCT DELIVERY, HANDLING, AND STORAGE

A. Protect from damage by the elements and construction procedures.

B. Do not store plastic manholes, pipe, and fittings in direct sunlight.

C. Protect pipe, pipe fittings and seals from dirt and grease.

1.6 ADVANCE NOTICE

A. Notify Engineer at least 48 hours prior to staring work in this section.

B. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect no fewer than two (2) days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without Architect's written permission.

1.7 COORDINATION

A. Coordinate with other trades affecting or affected by work in this section.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS (UNLESS OTHERWISE NOTED ON DRAWINGS)
Any of the following may be used:

A. Polyethylene Pipe: Corrugated polyethylene meeting the requirements of AASHTO M294 Type S. Joint shall be water tight according to the requirements of ASTM D3212. Gaskets shall be made of polyisoprene meeting the requirements of ASTM F477 with the addition that the gaskets shall not have any visible cracking when tested according to ASTM D1149 after 72 hour exposure in 50 PPHM ozone at 104 F. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris. Joints shall remain watertight when subjected to a 1.5 degree axial misalignment. A joint lubricant supplied by the manufacturer shall be used on the gasket and bell during assembly. Fittings shall conform to AASHTO M294. Fabricated fittings shall be welded to the interior and exterior at all junctions. Hancor or ADS.

2.2 STORM DRAIN PIPE AND FITTINGS (BUILDING APPROVED MATERIAL, 3" – 6", FOR USE UNDER AND WITHIN 5 FEET OF BUILDINGS.

A. Either of the following pipe materials may be used (with solvent cement joints).
   1. PCV Schedule 40/DWV, ASTM D2665.
   2. ABS Schedule 40/DWV, ASTM D 2661.
   3. PVC Schedule 40/DWV Cellular Core Pipe, ASTM F891.

2.3 PERFORATED PIPE AND FITTINGS

A. Shall be polyethylene plastic pipe. Co-extruded perforated smooth wall. Manufacturing standard: ASTM F810.Provide with manufactured fittings, unless otherwise noted on the plans.

2.4 CLEANOUTS

A. Shall be constructed from solid wall pipe and fittings specified above with traffic grade fram and cover. Frame and cover shall be H-20 rated cast iron valve box with flange top as detailed on the plans with “storm” marking. Varicast VB910 Rich Valve Box or as approved.

2.5 TRENCH DRAIN

A. Shall be precast polymer concrete pre-sloped channel sections with interlocking joints and horizontal ribs to ensure a positive anchor in the encasement concrete. Provide with end caps as necessary and properly fitting outlets. Provide end outlet.

B. Polycast: Provide Polycast Sections 900 series with 8 inch outlet, slotted grate assembly, load class E. Submit grate options to Owner for selection.

C. Other manufacturers will be considered with approved submittal.

2.6 FLEXIBLE COUPLING

A. Fernco flexible coupling or as approved.

2.7 OTHER MATERIALS

A. Recommended by manufacturer and subject to Engineer’s review and acceptance. Provide all materials to complete an operational drainage system.

2.8 AREA DRAINS

A. Shall be prefabricated steel, 12-inch diameter by 24 (minimum) inches deep, 10 gauge minimum, asphalt paint inside and out, 6-inch minimum water seal with hinged lid on trap, outlet size as specified on the drawings. Cast iron or steel grate with bicycle bars. Lynch or Gibson.

2.9 BACKWATER VALVE

A. In-line valve, cast iron body with bronze backwater valve. Smith 7022 series with extension to finished grade.

B. Install backwater valve in meter box when top of valve is over 18 inches below finished grade.

1. Top of valve less than 18 inches below finish grade: Extension to finish grade.

2. Top of valve 18 to 30 inches below finish grade: Install backwater valve in meter box.

3. Top of valve greater than 30 inches below finish grade: Install backwater valve in 48-inch diameter pre-cast concrete manhole with 48-inch by 24-inch concentric reducing cone to house backwater valve. 24-inch manhole frame and cover to be marked "STORM". Refer to manhole specifications for manhole requirements and installation.

PART 3 – EXECUTION

3.1 EXISTING CONDITIONS

A. Prior to starting work of this section inspect trench, excavations and pipe bedding to verify all such work is complete and installation may commence properly.

B. Do not start work of this section until all unsatisfactory conditions have been corrected. Commencing work implies acceptance of existing conditions.

C. If field measurements differ slightly from drawing dimensions, modify work as required for accurate fit. If measurements differ substantially, notify Engineer prior to starting work of this section.

3.2 TRENCHING AND BACKFILL

A. Trenching and backfill shall be in accordance with Division 31 Section EARTHWORK.

3.3 PIPE INSTALLATION

A. Lay pipes true to line and grade. Gravity flow sewer shall be laid with bells facing upgrade.

B. Do not lay pipe on unstable material, in wet trench or when trench and weather conditions are unsuitable for the work.

C. Support pipe on compacted bedding material. Excavate bell holes only large enough to properly make the joint.

D. Inspect pipes and fittings for defects before installation. Defective materials shall be plainly marked and removed from the site. Cut pipe shall have smooth regular ends at right angles to the axis of the pipe.

E. Clean interior of all pipe thoroughly before installation. When work is not in progress, open ends of pipe shall be closed securely to prevent entrance of storm water, dirt or other substances.

F. Lower pipe into trench carefully and bring to proper line, grade, and joint. After jointing, interior of pipe shall be thoroughly wiped or swabbed to remove any dirt, trash or excess jointing materials.

G. Do not walk on pipe in trenches until covered with backfill to a depth of 12 inches over the pipe crown.

H. Install in accordance with manufacturer's recommendations. Install piping within 0.02 feet of grade and location shown on the drawings.

I. Trim pipe ends flush with manhole interior walls.

J. Place plugs in ends of incomplete piping at the end of each work day or whenever work stops. Securely close ends so no water, earth, animal life, or other substance may enter.

3.4 AREA DRAINS

A. Construct on 4" minimum depth, ¾"-0 crushed rock base, level, plumb, and aligned with adjacent construction. Set rims flush with adjacent finished surfaces unless noted otherwise on the drawings.

3.5 CLEANOUTS

A. Construct on compacted 4" minimum depth, ¾"-0 crushed rock base, level, plumb, and aligned with adjacent surfaces. Set rims flush with adjacent finished surfaces unless noted otherwise on the drawings.

3.6 TRENCH DRAIN

A. Install in accordance with manufacturer's recommendations as detailed on drawings. Utilize manufacturer's approved installation device to assure proper joints, drawn tightly together by device.

B. Construct on compacted 4" minimum depth ¾"-0 crushed rock base level, plumb, and square with adjacent construction. Set rim flush with adjacent finished surfaces unless otherwise noted.

3.7 BACKWATER VALVE

A. Install per manufacturer's recommendations and as detailed on the drawings.

3.8 IDENTIFICATION

A. Install green tracer wire directly over non-metallic piping and at the outside edge of underground structures.

3.9 FIELD QUALITY CONTROL

A. Refer to Division 01 Section QUALITY REQUIREMENTS for responsibilities for arranging, supervising, and payment of field quality control requirements.

B. Field Inspections: Notify Owner prior to work of this section.

C. Special Inspections for Code Compliance: Obtain building inspector approvals.

3.10 CLEANING

A. Thoroughly flush and clean all system components prior to final acceptance.

B. After completing work in this section, remove all scraps and debris from the work area.

3.11 PROTECTING COMPLETED WORK

A. Protect all work installed under this section.

B. Replace, at no additional cost to Owner, any damaged work of this section.

END OF SECTION 33 40 00