NOTICE INVITING SEALED BIDS
Dental Clinic Upgrade Phase 3

Sealed Bids will be received until 3:00 P.M. (Tucson Time), May 12, 2016, by Pima County Community College District ("Owner"), to do the work required for the Owner's Project known as Dental Clinic Upgrade Phase 3 ("Project"), which is located in Pima County, Arizona.

A MANDATORY Pre-Bid Conference will be held April 26, 2016, at 10:00 A.M. (Tucson Time) at the following location:

Pima Community College
West Campus
2202 W. Anklam Rd.
Tucson, AZ 85709
JG05

Attendees will have fifteen minutes after the start time of the meeting to sign in. After that the attendance sheet will close. Failure to attend the mandatory Pre-Bid Conference will disqualify Bids received from any bidder not in attendance.

Questions pertaining to this bid must be communicated in writing and be received via email by May 3, 2016, at 3:00 P.M. (Tucson Time) Questions must be sent to the email address below and include the specified Bid Number, Project Name and Buyer’s name in the subject field of the email. Any questions should include a reference to the appropriate page and section number of the bid. E-Mail questions to: do-bids-proposals@pima.edu. Answers will be posted to our website by 5:00 P.M. (Tucson Time) on May 6, 2016.

Buyers Name/Title: Jan Posz, C.P.M., Sr. Buyer

Bids will be opened publicly at the Owner's office, 4905D East Broadway Blvd, Room D232, Tucson Arizona, at 3:00 P.M. (Tucson Time), May 12, 2016, and read aloud by a representative of the Owner. All information and Bids submitted by bidders will be made available for public inspection during regular business hours after an award is made, if any. Any bid received after the date and time listed above will be returned and not considered.

Copies of the NOTICE INVITING SEALED BIDS, Bid Documents and Forms as well as the College’s CONTRACT AND GENERAL CONDITIONS BETWEEN OWNER AND CONTRACTOR are available on the Pima Community College Website:

http://www.pima.edu/administrative-services/purchasing/current-requests-for-proposals-bids-quotes.html

One copy of the Bid/Proposal specifications and drawings are available at no charge from Reproductions, Inc., at 234 East 6th Street, Tucson, Arizona 85705, phone (520) 622-7747, fax (520) 792-2088.

The Owner intends to contract, if at all, with the lowest responsive and responsible bidder whose bid conforms in all material respects to the requirements of the bid documents, including the Plans and
Specifications. "Responsive Bidder" means the bidder who submits a bid that conforms in all material respects to this Notice Inviting Sealed Bids, Instructions to Bidders and the Plans and Specifications which are incorporated herein by this reference. "Responsible Bidder" means the bidder who has the capability to perform the contract requirements and the integrity and reliability to assure complete and good faith performance and who submits the lowest bid. In order for the bid to be considered, bidders must complete and submit the Bid form and all other required forms, which are incorporated herein by reference.

A certified or cashier's check or Bid bond for ten percent (10%) of the Contract Amount proposed by the bidder must accompany each Bid as a guarantee that the bidder will enter into a contract to perform the work in accordance with the Plans and Specifications or as liquidated damages in the event of the bidder's failure or refusal to enter into a contract. The check or bond will be returned to the unsuccessful bidders. The successful bidder's check or bond will be returned upon the execution of satisfactory bonds and a contract as described by the bid documents.

It shall be mandatory on the contractor to whom the Contract is awarded, and upon any subcontractor under him, to comply in every respect with the applicable provisions of the Arizona Revised Statutes and with all other requirements of the laws of Arizona.

The bidder to whom the Contract is awarded shall furnish the Owner, within five (5) days after the award, satisfactory Payment and Performance Bonds in an amount equal to one hundred percent (100%) of the Contract Amount stated in the Bid. Individual surety bonds are not acceptable.

The Owner reserves the right to reject any or all Bids, to withhold the award of a contract for any reason it may determine and to hold any or all Bids for a period of forty-five (45) days. Any bid protests concerning this bid must be filed with the District Purchasing Director no later than the tenth calendar day following the date of award.

The Owner reserves the right to waive any irregularities in any Bid if such action is determined by the Owner, in its sole discretion, to be in the best interest of the Owner.

Pima County Community College District
District Office – Purchasing
4905 East Broadway, Room 232
Tucson, Arizona 85709-1420
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SECTION ONE
INSTRUCTIONS TO BIDDERS

1. BIDS

To be entitled to consideration, Bids must be made in accordance with the following instructions:

a. Before submitting a Bid, each bidder shall examine the Notice Inviting Sealed Bids, these Instructions to Bidders, the Drawings, Specifications, Contract and General Conditions Between Owner and Contractor, and all other documents comprising the Contract Documents, and fully inform himself of all existing conditions and limitations, and include in the Bid a sum to cover the cost of all work required by the Contract Documents. The failure of any bidder to receive or examine any form, instrument, addendum, or other document, or visit the site and acquaint himself with conditions existing there, shall in no way relieve any bidder from obligations with respect to his Bid or the Contract Documents.

b. Bids shall be made only upon the form provided therefor. All blank spaces in the form shall be filled in completely. If some spaces do not apply, so state. Monetary amounts shall be stated both in writing and in numerals and, in case of any discrepancy between the two, the amounts in writing shall take precedence. The signature shall be in longhand and shall be that of an individual legally authorized to sign such form and bind the bidder. The completed form shall be without interlineation, alteration, or erasure.

c. Bids shall not contain any recapitulation of the work to be done. No oral, telegraphic, fax or telephonic bids or modifications shall be considered.

d. Bids shall be delivered to the place designated in the Notice Inviting Sealed Bids on or before the date and hour set for the opening of bids. Bids shall be enclosed in an opaque, sealed envelope, bearing the Bid Number, the title of the Project and the name of the bidder, except for that portion of the Bid bearing the title "List of Subcontractors and Material Vendors," which shall be enclosed in a separate, opaque, sealed envelope, as hereinafter specified in these Instructions to Bidders. It is the sole responsibility of the bidder to deliver his bid before the scheduled closing time. Any bids received after the scheduled closing time will be returned unopened.

e. The Contract Amount quoted is to include the furnishing of all materials, plant, equipment, tools, and all other facilities called for in the Contract Documents, and the performance of all labor and services necessary or proper for the completion of the Project, except such as may be otherwise expressly provided for in the Contract Documents.

f. The Bid form must be used without alteration.

2. LIST OF SUBCONTRACTORS AND MATERIAL VENDORS

a. For use of the Owner in determining competency and capability of those who will work on the Owner's Project, and quality and workmanship of those who will supply material to the Owner's Project, each bidder is required to submit with his bid a list naming the subcontractors who will be used
in performing the work. The list shall include any subcontractor that might be used in the event any or all of the various alternates are chosen by the Owner. The circumstances under which each subcontractor will be used must be specifically set forth by identifying alternates for which a particular subcontractor would be used.

b. ONE, and only one, subcontractor shall be submitted for each portion of the work for the Base Bid. The listing of more than one Subcontractor for any separate portion of the work shall be considered grounds for rejection of the bid by the Owner at the Owner's sole discretion.

c. The list shall be filled out and enclosed in a separate, opaque, sealed envelope bearing the title "List of Subcontractors and the name of the bidder, and the envelope then inserted in the general bid envelope with the other forms. The list submitted by the successful bidder will be privately opened and will be retained by the Owner for record as a part of the Bid. The lists of other bidders will be returned unopened.

d. No subcontractor not named in such list and approved by the Owner may be employed on the Owner's Project without express written permission of the Owner, notwithstanding any other provision of the Contract Documents which may be interpreted to the contrary. Should a change in the approved list become necessary in the opinion of the successful bidder, a written request shall be submitted to the Owner stating the reason for the change, and written approval of the Owner must be obtained before such change is made. This provision shall apply to work listed to be performed by the bidder, as well as work listed to be performed by vendors or subcontractors.

e. By this requirement of a List of Subcontractors, the Owner does not establish any contractual relation between the Owner and any subcontractor, nor will the Owner inquire into contractual or other relations of the bidder with any subcontractor, nor does this list establish limits to the contracts between the bidder and any subcontractor. The sole purpose and function of such requirement is set forth in the first sentence of the first paragraph of this section.

f. If prior to the signing of the Contract the Owner has a reasonable objection to any person or organization on the List of Subcontractors, the Owner shall notify the apparent successful bidder in writing of such objection. Failure of the Owner to make an objection to any person or organization on the list prior to the award shall constitute acceptance of such person or organization except in the case where a subcontractor is later found not to be qualified by law.

g. If, prior to the signing of the Contract, regardless of whether the Owner has evidenced any intention to award the Contract to Contractor or not, the Owner has a reasonable and substantial objection to any person or organization on such list, and refuses in writing to accept such person or organization except where such refusal is a result of the failure of a subcontractor to qualify by law, the apparent successful bidder may, prior to the signing, withdraw his bid without forfeiture of bid security. If the bidder submits an acceptable substitute the Owner may, at his discretion, accept or disqualify the bid.

3. BASE BID AND ALTERNATES
   The Base Bid shall include all work as set forth on the Drawings, in the Specifications, and in all Contract Documents, plus the specified Contingency Reserve Fund and Cash Allowance, if any.
Alternate bid items are described in the Specifications and indicated on the Bid. The Owner shall have the right to accept Alternates in any order or combination and to determine the low bidder on the basis of the sum of the Base Bid and the Alternates accepted.

4. **BID SECURITY**

   All Bids shall be accompanied by the bid security in the form and amount as published in the Notice Inviting Sealed Bids and as acceptable to the Owner, and shall be payable without conditions to the Owner as a guarantee that the bidder, if awarded the Contract, will promptly execute such Contract in accordance with the Bid and in the manner and form required by the Contract Documents, and will furnish good and sufficient bonds for the faithful performance of the work and payment of all claimants supplying labor or materials. The bid security must be enclosed in the same envelope with the Bid.

   Note: The Notice Inviting Sealed Bids requires that this bid security will also serve as liquidated damages in the event the Contractor fails or refuses to enter into a contract. Mistake shall not excuse any failure or refusal to enter into a contract.

5. **WITHDRAWAL OF BID**

   Any bidder may withdraw his Bid, either personally or by telegraphic or written request, at any time before the scheduled closing time for receipt of Bids. No bid may be withdrawn for at least forty-five (45) days after the date the bids are opened, nor may any bid be withdrawn between the scheduled closing time for receipt of Bids and the time the bids are actually opened.

6. **INTERPRETATIONS AND ADDENDA**

   Following the Mandatory Pre-Bid Conference, all prospective bidders shall have an opportunity to submit questions or request clarifications to drawings or other Contract Documents in writing to the Owner regarding the Project. The due date for these questions or clarifications is specified on the NOTICE INVITING SEALED BIDS for the project. The Owner shall post a response or Addendum to the Bid documentation on the College website under the Bid Number. The bidder submitting a request for interpretations will be responsible for its prompt delivery. All requests for interpretations shall be made in writing. The Owner will not be responsible for any explanations or interpretations except those duly issued in the form of written addenda. Receipt of any addenda so issued during the time of bidding shall be included in the bid and shall be acknowledged in the Bid and be made a part of the Contract Documents.

7. **APPROVAL OF EQUAL ITEMS OF EQUIPMENT AND/OR MATERIALS BEFORE SUBMISSION OF BIDS**

   Products are generally specified by reference standard and/or manufacturer's name and model number or trade name. When specified only by reference standard, the bidder may select any product meeting this standard by any manufacturer. When several products or manufacturers are specified as being equally acceptable, the bidder has the option of using any product and manufacturer combination listed.
When a specific manufacturer, installer (where pre-qualification is required), trade name or material is specified, or indicated, it is to establish a standard of quality and shall not be construed as limiting competition. If the bidder desires to use other than that specified, he shall request approval of such substitution in the manner specified below:

a. **Prior Approvals:** Substitutions will be considered only when a written request has been submitted by a bidder, who shall be a general contractor qualified to submit a bid to the Owner, for approval at least fourteen (14) calendar days prior to the original date for receipt of bids. No approvals will be granted to suppliers, distributors or subcontractors. Each request shall include all information requested hereinafter. If the Owner approves any proposed substitution, such approval shall be set forth in an Addendum.

b. **Submittal Requirements:** All requests shall contain sufficient information, descriptive brochures, drawings, performance and test data, samples or other data as is necessary for complete evaluation and shall indicate by direct comparison how the proposed substitution compares with the specified equipment or material in every material respect with that specified. Each submittal shall be well marked and identified as to the type and kind of items proposed to be substituted. It is the sole responsibility of the bidder to submit complete descriptive and technical information so that the Owner can make a complete evaluation. Lack of sufficient information will be cause for rejection. References to catalogs will not be acceptable. Submittals shall be accompanied by a written statement from the manufacturer or contractor on his letterhead certifying that the proposed substitution meets or exceeds that specified in all aspects and that it will coordinate properly with related construction. Any redesign necessitated by the substitution shall be paid for by the Contractor.

c. **As set forth in the Specifications, the bidder’s request for prior approval shall include,** without limitation:

1. Complete data substantiating compliance of the proposed substitution with the Contract Documents.
2. Product identification, including manufacturer's name, address and telephone number.
3. A tabulation comparing the specified product manufacturer's complete product description, performance test data and reference standards with the same information for the proposed products.
4. Samples and colors of the proposed products.
5. Names and addresses of similar projects in which the proposed product was used and the date of installation.
6. For construction methods, include a detailed description for proposed method and drawings illustrating same.
7. Accurate cost data on proposed substitution in comparison with product or method specified.
d. Any bidders, other than the bidder who requested a particular substitution, who choose to utilize a prior approved item, as approved by Addendum, shall comply with all terms and conditions of the original prior approval submittal. All provisions of this Paragraph 8 regarding using of substitutions shall apply to any bidder who chooses to utilize such substitution.

8. BIDDERS INTERESTED IN MORE THAN ONE BID

No person, firm, or corporation shall be allowed to make, file, or be interested in more than one bid for the same work. A person, firm, or corporation who has submitted a sub-bid to a bidder, or who has quoted prices on materials to a bidder, is not thereby disqualified from submitting a sub-bid or quoting prices to other bidders.

9. ACCEPTANCE OR REJECTION OF BIDS

The Owner reserves the right to reject any or all bids and to waive any informalities in the Bids received. The award of the Contract, if made by the Owner, will be made to the responsible and qualified bidder submitting the lowest bid, but the Owner shall determine in its own discretion whether a bidder is responsible and qualified to perform the Contract, what bid is the lowest, and whether it is in the interest of the Owner to accept the bid.

10. AGREEMENT AND BONDS

The form of agreement which the successful bidder will be required to execute, and the forms and amounts of surety bonds required at the time of execution of the agreement, are included in the Contract Documents and must be carefully examined by the bidder. As noted in the instructions, all bids must include any exceptions requested from the Contract Documents; subsequent requests for deviation from the Contract Document will not be considered. All sureties must be authorized to do business in Arizona, listed on the U.S. Department of Treasury's list of approved sureties, and must be satisfactory to the Owner. No individual sureties are acceptable. The successful bidder must furnish the required bonds and insurance certificates and commence work within five (5) days after issuance of the Notice of Intent to Award and Notice to Proceed. By submission of a Bid, a bidder will be deemed, and agrees to be so treated, to have actual notice of every term of every Contract Document.

11. NON-COLLUSION AFFIDAVIT

The successful bidder, before the award of the Contract, shall submit to the Owner non-collusion affidavits covering the bidder and all subcontractors.

12. LIST OF COMPARABLE PROJECTS

If requested by Owner, the bidder must submit, within 24 hours after bid opening, a list of all projects undertaken within the three (3) years immediately preceding the bid date and a Contractor's Qualification Statement in the form of AIA A-305. Such list shall include the name, address and phone number of the owner and the architect of each project, the contract amount, and the starting date. Bidder consents to the use of the list and Qualification Statement by Owner to inquire into bidder's fitness, capabilities and responsibility in connection with Owner's consideration of the bid. Bidder agrees to hold
harmless the Owner, the Architect, and each owner and architect listed from any action or claim that might arise from any adverse report received by Owner concerning bidder's performance on the projects listed. Failure to furnish a complete list and Qualification Statement as required herein may be considered grounds for rejection of the bid by the Owner, at the Owner's sole discretion.

13. **BID PROTESTS**

Any bid protests concerning this bid must be filed with the District Purchasing Director no later than the tenth calendar day following the date of award at: 4905D East Broadway Blvd, Tucson, Arizona 85708-1420.
ARTICLE 1
THE CONTRACT DOCUMENTS

1.1 CONTRACT DOCUMENTS.

1.1.1 The following listed documents constitute the Contract Documents, and they are all as fully a part of the Contract and General Conditions as if herein repeated:

1. This Contract and General Conditions between Owner and Contractor; Exhibit B to Construction Agreement Supplemental Conditions for Federal Grant-Funded Construction Projects.

2. Project Manual

3. Notice of Award and Receipt of Notice

4. Notice to Proceed and Receipt of Notice

5. Performance Bond and Payment Bond.

6. Addenda Nos. ________________ dated ________________.

7. Specifications and Drawings (as modified by the above-referenced Addenda and selected alternates as listed herein, if any) as set forth in the bid document, incorporated herein by reference.

8. Bid Form, dated ____________________.

9. Instructions to Bidders.


11. Certificates of Insurance.

1.1.2 In the event of any inconsistency between any of the terms of the before enumerated documents, such inconsistencies shall be resolved by giving precedence to the terms of the lowest
numbered of the above numbered documents. Anything in these Contract Documents to the contrary notwithstanding, the provisions of all pertinent general public laws of the State of Arizona in effect at the time of the execution of this Contract shall be a part of the Contract between the parties and shall take precedence over all of the other Contract Documents.

ARTICLE 2
SCOPE OF WORK

2.1 As required by the Contract Documents, the Contractor shall furnish and install all of the materials and labor and perform all of the work for the Owner's Project known as Dental Clinic Upgrade Phase 3 ("Project" herein).

ARTICLE 3
CONTRACT AMOUNT, TIME, LIQUIDATED DAMAGES AND EARLY COMPLETION BONUS

3.1 CONTRACT AMOUNT. The Owner shall pay the Contractor the sum of ______________________ Dollars ($_______) for the Base Bid and alternates __________, which is the Contract Amount. This sum is subject to additions or deductions made in accordance with the provisions of the Contract Documents.

3.2 CONTRACT TIME. The Contract Time as used and defined in Article 11 herein shall be __________ (____) calendar days.

3.3 LIQUIDATED DAMAGES AND EARLY COMPLETION BONUS.

3.3.1 Liquidated damages N/A

3.3.2 An Early Completion Bonus N/A

3.4 CHANGE ORDERS. Limits on the amount of overhead and profit allowed on Change Orders are specified in Article 15. An item of additional work or change in Plans and Specifications which involves an extra cost shall be valid only if authorized by Change Order in accordance with Article 15 of this Contract and General Conditions.
ARTICLE 4
DEFINITIONS AND GENERAL PROVISIONS

4.1 OWNER, OWNER’S REPRESENTATIVE AND CONTRACTOR. The Owner, Owner’s Representative and the Contractor are those herein defined in this Contract and General Conditions. They are treated throughout the Contract Documents as though each were of the singular number and masculine gender.

4.2 SUBCONTRACTOR. See Article 8.

4.3 NOTICE. See Articles 7 and 10.

4.4 TIME. See Articles 3 and 11.

4.5 COST. The term "Cost" shall include all charges, costs, losses and expenditures of every kind whatsoever for the Work or portion thereof to which reference is made with respect to this term.

4.6 FINISH, SUBSTANTIAL COMPLETION AND FINAL COMPLETION DATES. See Article 11.

4.7 MODIFICATIONS. See also Article 1. A Modification is:

.1 A written amendment to the Contract and General Conditions signed by all parties;

.2 A Change Order properly signed by all parties pursuant to Paragraph 15.1; or

.3 A Field Order for a minor change in the Work issued by the Owner pursuant to Paragraph 15.4.

A Modification may be made only after execution of the Contract and General Conditions.

4.8 CONTRACT. The Contract consists of all the Contract Documents enumerated in Article 1. The Contract represents the entire and integrated agreement between the parties hereto and supersedes all prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification as defined in Paragraph 4.7.

4.9 WORK. The term "Work" includes, without limitation, furnishing all labor, administrative services and supervision necessary to produce the construction required by the Contract Documents and furnishing and installing all materials and equipment incorporated, or to be incorporated, in such construction to complete the Project.

4.10 PROJECT. The Project is the total construction designed by the Owner of which the Work performed under the Contract Documents may be the whole or a part.
4.11 EXECUTION, CORRELATION, INTENT AND INTERPRETATIONS OF THE CONTRACT DOCUMENTS.

4.11.1 The Contract and General Conditions shall be signed by the Owner and the Contractor. By executing the Contract and General Conditions, each party accepts and agrees to be bound by each of the Contract Documents listed in Article 1.

4.11.2 By executing the Contract and General Conditions, the Contractor represents and warrants that he has visited the site, has familiarized himself with the local conditions under which the Work is to be performed, including any and all relevant weather conditions or records or both, and correlated all of his observations with the requirements of the Contract Documents.

4.11.3 The Contract Documents are complementary, and what is required by any one shall be as binding as if required by all. The intention of the Contract Documents is to include, without limitation, all labor, materials, equipment and other items as provided in Subparagraph 7.4.1 necessary for the proper execution and completion of the Work. Words and abbreviations which have well known technical or trade meanings are used herein in accordance with such recognized meanings.

4.11.4 The organization of the Specifications into divisions, sections and articles, and the arrangements 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, or constituting part of the Contract or having any legal or contractual significance.

4.11.5 Written interpretations necessary for the proper execution or progress of the Work, in the form of drawings or otherwise will be issued with reasonable promptness by the Owner in accordance with any schedule agreed upon, or with reasonable promptness in any case. Such interpretations shall be consistent with and reasonably inferable from the Contract Documents.

4.12 COPIES FURNISHED AND OWNERSHIP.

4.12.1 The Contractor will be furnished, free of charge, all copies of Contract Documents reasonably necessary for the execution of the Work as determined by the Owner in his sole discretion.

4.12.2 All Drawings, Specifications and other data, and copies thereof, furnished to the Contractor are and shall remain the property of the Owner. They are not to be used on any other project, and, with the exception of one set for each party to the Contract, are to be returned to the Owner upon request at the completion of the Work.

4.12.3 It shall be the responsibility of the Contractor to ensure that each Subcontractor, Sub-subcontractor and supplier has a current set of those portions of the Construction Documents that may be required for proper execution of their respective portions of the Work.
ARTICLE 5
OWNER’S REPRESENTATIVE

Drawings and Specifications for this Project were prepared by GLHN Architects and Engineers (Owner’s Representative, hereinafter referred to as ‘OR’), who shall act as OR pursuant to the Contract Documents.

5.1 OR: DEFINITION

5.1.1 The OR is the person or organization identified as such in this Contract and General Conditions, and the term OR means the OR or his authorized representative.

5.1.2 Nothing contained in the Contract Documents shall create any contractual relationship between the OR and the Contractor.

5.2 ADMINISTRATION OF THE CONTRACT.

5.2.1 The OR will be the Owner's representative during construction, until final payment and including the warranty period. The OR will have authority to act on behalf of the Owner, unless otherwise modified by written instrument which will be shown to the Contractor. The OR will advise and consult with the Owner, and all of the Owner's instructions to the Contractor shall be issued through the OR, except where the Owner deems direct communication with the Contractor necessary. Any direct communication between Owner and Contractor shall be copied to the OR. The OR and any person designated by Owner as Special Agent shall be Special Agents acting for and on behalf of the Owner for the duration of this Contract.

5.2.2 The OR shall at all times have access to the Work wherever it is in preparation and progress. The Contractor shall provide facilities for such access so the OR may perform their functions under the Contract Documents.

5.2.3 Neither the OR's authority to act under this Contract, nor any decision made by him in good faith either to exercise or not to exercise such authority, shall give rise to any duty of responsibility of the OR to the Contractor, any Subcontractor or material supplier, any of their agents or employees, or any other performing any of the Work.

5.2.4 The duties, responsibilities and limitations of authority of the OR as the Owner's representative during construction as set forth in Articles 1 through 18, inclusive, of this Contract and General Conditions will not be modified or extended without written consent of the Owner and the OR, notice of which will be given to the Contractor.

5.2.5 The OR will not be responsible for the acts or omissions of the Contractor, any Subcontractors or Material Vendors, or any of their agents or employees, or any other persons performing any of the Work.

5.2.6 In case of the termination of the employment of the OR, the Owner shall appoint a successor, whose status under the Contract Documents shall be that of the former OR.
ARTICLE 6
OWNER – CONTRACT ADMINISTRATION

6.1  DEFINITION. The Owner is the person or organization identified as such in the Contract and General Conditions.

6.2  ADMINISTRATION OF THE CONTRACT.

6.2.1  The OR will provide general administration of this Contract, including performance of the functions hereinafter described.

6.2.2  The Owner and the OR shall at all times have access to the Work wherever it is in preparation and progress. The Contractor shall provide facilities for such access so the Owner and the OR may perform their functions under the Contract Documents.

6.2.3  The OR shall make periodic visits to the site to observe the progress and quality of the Work and to determine if the Work is proceeding in accordance with the Contract Documents. These visits shall be of the frequency necessary to adequately observe the progress of the Work. On the basis of his on-site observations, he shall endeavor to guard against defects and deficiencies in the Work of the Contractor. The Owner shall not be responsible for the Contractor's ways and means, methods, techniques and procedures in the construction of the Project or for enforcement of safety requirements on the Project.

6.2.4  Based on such observations and the Contractor's Applications for Payment, the OR will make recommendations as to the amounts owing to the Contractor and will issue Certificates for Payment in such amounts, as provided in Subparagraph 12.4.1.

6.2.5  The OR will be, in the first instance, the interpreter of the requirements of the Contract Documents and the judge of the performance thereunder by the Contractor, except where otherwise provided herein. The OR will promptly render such interpretations as he may deem necessary for the proper execution or progress of the Work.

6.2.6  All claims, disputes and other matters in question relating to the execution or progress of the Work, payment, time extension or interpretation of the Contract Documents shall be submitted to the Owner in the manner provided by Subparagraph 12.4.4, within the time limits prescribed in Subparagraph 15.2.1, for decision by the Owner, as the subject of the matter may require, which will be rendered in writing within a reasonable time.

6.2.7  The Owner's decisions in matters relating to artistic effect will be final if consistent with the intent of the Contract Documents.

6.2.8  If a decision of the Owner states that it is final but subject to appeal, no claim, dispute or other matter covered by such decision may be made later than thirty (30) days after the date on which the party making the demand received the decision.
6.2.9 The OR shall have authority to reject Work which does not conform to the Contract Documents. Whenever, in the OR's reasonable opinion, he considers it necessary or advisable to ensure the proper implementation of the intent of the Contract Documents, he will require the Contractor to stop the Work or any portion thereof, or to require special inspection or testing of the Work as provided in Subparagraph 10.8.2, whether or not such Work be then fabricated, installed or completed.

6.2.10 The OR will review Shop Drawings, Product Data and Samples promptly as provided in Subparagraphs 7.12.1 through 7.12.8, inclusive.

6.2.11 The OR will prepare Change Orders in accordance with Article 15 and will have authority to order minor changes in the Work not involving extra cost as provided in Subparagraph 15.3.

6.2.12 The OR will conduct inspections to determine the date or dates of Substantial Completion and Final Completion and shall issue a Certificate of Substantial Completion and of Final Completion. He will receive written guarantees, record drawings, maintenance manuals and related documents required by the Contract and assembled by the Contractor.

6.2.13 The Owner will not be responsible for the acts or omissions of the Contractor, any Subcontractors or Material Vendors, or any of their agents or employees, or any other persons performing any of the Work.

6.3 INFORMATION AND SERVICES REQUIRED OF THE OWNER.

6.3.1 The Owner shall furnish all surveys describing the physical characteristics, legal limits and utility locations for the site of the Project.

6.3.2 Information or services under the Owner's control shall be furnished by the Owner with promptness to avoid delay in the orderly progress of the Work.

6.3.3 All final decisions concerning Change Orders, Payments, Substantial Completion, Final Completion, Liquidated Damages and Contract Time shall be reserved to the Owner, and this provision of the Contract shall take precedence over any other term hereof.

6.3.4 The foregoing are in addition to other duties and responsibilities of the Owner enumerated herein and especially those in respect to Work by Owner or by separate contractors, payments, completion and insurance in Articles 9, 12 and 14, respectively.

ARTICLE 7
CONTRACTOR

7.1 DEFINITION.

7.1.1 The Contractor is the person or organization identified as such in this Contract and General Conditions and the term "Contractor" means the Contractor or his authorized representative.
The Contractor, and all Subcontractors employed on the Project, shall possess valid Arizona Contractor's Licenses as required by law.

7.1.2 Whenever the words "as may be directed," "suitable," "or equal," "as approved," or other words of similar intent and meaning are used within the Contract Documents implying that judgment or discretion is to be exercised or a decision is to be made, it is understood that it is the judgment, discretion or decision of the OR to which reference is made.

7.1.3 All materials and articles of any kind necessary for this Work are subject to the approval of the Owner as provided in the Contract Documents.

7.1.4 After execution of the Contract, changes of brand named, trade named, trademarked, patented articles, or any other substitutions will be allowed only by written order signed by the Owner, in which case the Owner shall receive all benefit of the difference in cost involved, except where choice of material or method is designated "or equal" or "acceptable alternates" in the Specifications.

7.2 REVIEW OF CONTRACT DOCUMENTS AND EXAMINATION OF SITE.

7.2.1 By executing this Contract, the Contractor warrants that he has examined the site and carefully studied and compared the Contract and General Conditions, Drawings, Specifications, Addenda, and all other Contract Documents before so executing the Contract. The Contractor shall at once report to the Owner any error, inconsistency or omission he may discover. The Contractor shall not be liable to the Owner for any damage resulting from any such errors, inconsistencies or omissions so long as the Owner is notified thereof, unless discovery of such error, inconsistency or omission should have been made by careful examination of the Contract Documents prior to submitting a Bid. The Contractor shall do no Work without appropriate Contract Documents, or where required, approved Shop Drawings, Product Data, Samples or interpretations from the Owner.

7.2.2 The Contractor shall be required to use for data and dimensions, figures marked on the drawings in preference to what the drawings may measure to scale. In the absence of figured dimensions, the Owner shall be notified and the dimensions provided within a reasonable time. Drawings shall not be scaled in the absence of figured dimensions.

7.2.3 The Contractor shall verify all dimensions shown and check all measurements in connection with any present building or buildings, levels of grades, walks, driveways, or other existing conditions, before executing any work. Contractor shall immediately report to the Owner any discrepancies between the Plans and actual field conditions. Failure to report any discrepancy within 24 hours after discovery will constitute a waiver of any claim arising out of such discrepancy. This provision shall have precedence over any other notice provisions contained herein.

7.3 SUPERVISION AND CONSTRUCTION PROCEDURES. The Contractor shall supervise the Work, using his best skill and attention. He shall be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract.
7.4 LABOR AND MATERIALS.

7.4.1 Unless otherwise specifically noted, the Contractor shall provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, heat, utilities, transportation and any other facilities and services necessary for the proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. No materials shall be incorporated into this Work that contains any asbestos.

7.4.2 Any work necessary to be performed after regular working hours, on Sundays or legal holidays, shall be performed without additional expense to the Owner unless approved in advance by Change Order.

7.4.3 The Contractor shall at all times enforce strict discipline and good order among his employees and shall not employ on the Work any unfit person or anyone not skilled in the task assigned to him. When requested by the Owner, the Contractor shall remove from the Project any person who commits trespass or is, in the opinion of the Owner, disorderly, dangerous, insubordinate, incompetent or violates any policies of the Owner. The owner will document the request within 1 work day if requested by the Contractor. The Contractor shall keep the Owner harmless from damages or claims for compensation that may occur in the enforcement of this requirement. The Contractor shall not permit the use of tobacco products (except in designated areas), alcohol or illegal drugs on the project site.

7.5 WARRANTY.

7.5.1 The Contractor warrants to the Owner that all materials and equipment furnished under this Contract will be new unless otherwise specified, and that all Work will be of good quality, free from faults and defects and in conformance with the Contract Documents. All Work not so conforming to these standards may be considered defective. If required by the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

7.5.2 The warranty provided in Paragraphs 7.5 and 18.1 shall be in addition to and not in limitation of any other warranty or remedy available pursuant to law or the Contract Documents.

7.6 TAXES. The Contractor shall pay all sales, consumer, use, transaction privilege and other taxes required by law in connection with the performance of this Contract, whether in force as of the date of this Contract or later imposed. If the Contractor's principal place of business is not in Arizona, Contractor shall post a bond for taxes in compliance with A.R.S. § 42-5007 and furnish evidence of such bond to Owner prior to submitting any application for payment hereunder.

7.7 PERMITS, FEES AND NOTICES.

7.7.1 Unless otherwise provided in the Plans, Specifications or by Addendum, the Contractor shall secure and pay for all permits, fees, inspections and re-inspections necessary for the proper execution and completion of the Work, including, without limitation, the following permits and fees: building, plumbing, mechanical, electrical permits, water meters, water service fees, sewer connection fees, sewer fees or assessments, gas service fees and electric service fees payable to the utility
companies. The Contractor shall procure and pay for all necessary utilities for the Project, including temporary utility hook-ups and utilities used in course of construction.

7.7.2 The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations and orders of any public authority bearing on the performance of the Work. If the Contractor observes that any of the Contract Documents are at variance therewith in any respect, he shall promptly notify the Owner in writing. If the Contractor performs any Work knowing it to be contrary to such laws, ordinances, rules and regulations, and without such notice to the Owner, he shall assume full responsibility therefor and shall bear all costs attributable thereto, including any attorneys’ fees incurred by Owner in connection therewith.

7.8 SUPERINTENDENT. The Contractor shall employ a competent Superintendent and necessary assistants who shall be in attendance at the Project site during the progress of the Work. The Contractor shall assign to the Project a Superintendent prior to the pre-construction meeting and shall furnish to the Owner the Superintendent's resume. The Superintendent shall be satisfactory to the Owner and shall not be changed except with the consent of the Owner, unless the Superintendent proves to be unsatisfactory to the Contractor and ceases to be in his employ. The Superintendent shall represent the Contractor, and all communications given to the Superintendent shall be as binding as if given to the Contractor. Important communications will be confirmed in writing. Other communications will be so confirmed on written request in each case.

7.9 RESPONSIBILITY FOR THOSE PERFORMING THE WORK. The Contractor shall be responsible to the Owner for the acts and omissions of all his employees and all Subcontractors, their agents and employees, and all other persons performing any of the Work or supplying any material or equipment to be incorporated in the Work under a contract of any nature with the Contractor.

7.10 PROGRESS SCHEDULE AND REPORTS.

7.10.1 The Contractor, within fourteen (14) days after being awarded the Contract, shall prepare and submit for the Owner's review his planned Construction Progress Schedule for the Work as provided in the Specifications. The Construction Progress Schedule shall be related to the entire Project and shall indicate the dates for the starting and completion of the various components and phases of construction and shall be revised monthly or as required by the conditions of the Work, upon request of and subject to the review of the Owner. The Contractor shall comply with the requirements of the Specifications in connection with the preparation and revision of the Construction Progress Schedule. The Contractor agrees to promptly respond to all inquiries by the Owner concerning significant deviation of the progress of construction from the Construction Progress Schedule. Failure to timely respond to such request or significant delay from the Construction Progress Schedule may result in progress payments being withheld. Approval of the Construction Progress Schedule by the Owner shall not relieve the Contractor from his obligation to complete the Project within the Contract Time.

The Contractor shall furnish to the Owner four (4) copies of a complete list of all major items of architectural, mechanical, plumbing and electrical equipment and materials within fourteen (14) days of the Start Date. Include projected dates of submittal of all items of material for which submittals are required and delivery dates of all items of material and equipment that are considered by the Owner, in his sole discretion, critical or which may require, in order to obtain, long lead time. Submit a
complete list. A partial list will not be acceptable unless prior permission is obtained from the Owner. The Contractor shall prepare and provide to the Owner a weekly Construction Schedule Status Report which will inform the Owner that, with respect to each category of the Construction Progress Schedule and each item on the material delivery date list, the work or delivery is: (a) on schedule; (b) behind schedule, but will not interfere with the completion of the Project within the Contract Time specified in the Contract; or (c) behind schedule and may prevent the completion of the Project within the Contract Time. In the event that the Construction Schedule Status Report indicates that a delay has occurred or may occur that may prevent the completion of the Project within the Contract Time because the Work in a particular category is behind schedule or a delay in material deliveries is anticipated, the Construction Schedule Status Report shall contain a statement of what corrective measures are being undertaken by the Contractor.

7.10.2 For purposes of determining time extensions resulting from additional work ordered by the Owner, adverse weather or other delays, all float or slack time in the Construction Progress Schedule shall be owned and controlled by the Owner. The Owner shall allow use of such float or slack time by the Contractor as long as such allocation of float or slack time does not adversely affect the completion date of the Project. No additional time shall be allowed for claims for delay, whether or not caused by or the fault of the Owner, if such delay is less than the available float or slack time available for the particular task.

7.11 DRAWINGS AND SPECIFICATIONS AT THE SITE.

7.11.1 The Contractor shall maintain at the site for the Owner one (1) copy of all Drawings, Specifications, Addenda, approved Shop Drawings, Change Orders, other Modifications, and manufacturers' printed specifications and recommendations, in good order and marked carefully, legibly and accurately to record on a daily basis all changes made during construction, all of which shall be available to the Owner at all times. These Drawings shall be delivered to the OR upon completion of the Work. The Drawings indicating the changes shall be maintained throughout the duration of the Project and are the Record Drawings which shall be transferred to electronic media by the Owner.

7.11.2 The Contractor shall also submit to the Owner for his record three (3) copies each (unless otherwise specified) of all manufacturers' maintenance manuals, printed specifications and recommendations, which by reference in the several divisions of the Specifications are a part thereof.

7.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

7.12.1 Shop Drawings and Product Data are drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are required by the Contract Documents and are prepared by the Contractor or any Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor, and which illustrate or describe some portion of the Work.

7.12.2 Samples are physical examples furnished by the Contractor to illustrate materials, equipment or workmanship, and to establish standards by which the Work will be judged.

7.12.3 The Contractor shall review, correct any errors, stamp with his approval and submit, with promptness and in orderly sequence so as to cause no delay in the Work or in the work of any other
contractor, all Shop Drawings, Product Data and Samples required by the Contract Documents or subsequently by the OR as covered by Modifications. Shop Drawings, Product Data and Samples shall be properly identified as specified, or as the OR may require. At the time of submission, the Contractor shall inform the Owner in writing of any deviation in the Shop Drawings, Product Data or Samples from the requirements of the Contract Documents. The OR's responsibility for reviewing Shop Drawings, Product Data, Samples and other submissions of the Contractor are limited to those required by the Contract Documents or Modifications to the Contract Documents.

7.12.4 By approving and submitting Shop Drawings, Product Data and Samples, the Contractor thereby represents that he has determined and verified all field measurements, field construction criteria, materials, catalog numbers and similar data, and that he has checked and coordinated all Shop Drawings, Product Data and Samples with the requirements of the Work and of the Contract Documents.

7.12.5 The OR will review and take other appropriate action with respect to Shop Drawings, Product Data and Samples with reasonable promptness so as to cause no delay, but only for conformance with the Contract Documents.

7.12.6 The Contractor shall make any corrections required by the OR to comply with the Contract Documents and shall resubmit the required number of corrected copies of Shop Drawings, Product Data or new Samples until approved. The Contractor shall direct specific attention in writing or on resubmitted Shop Drawings and Product Data to revisions other than the corrections requested by the Owner on previous submissions.

7.12.7 The OR's review of Shop Drawings, Product Data or Samples shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents unless the Contractor has informed the Owner in writing of such deviation at the time of submission and the OR has given written approval to the specific deviation, nor shall the Owner's approval relieve the Contractor from responsibility for errors or omissions in the Shop Drawings, Product Data or Samples.

7.12.8 No portion of the Work requiring a Shop Drawing, Product Data or Sample submission shall be commenced until the submission has been approved by the Owner. All such portions of the Work shall be in accordance with approved Shop Drawings, Product Data and Samples.

7.13 CUTTING AND PATCHING OF WORK. Any cutting and patching required shall be performed in accordance with instructions contained in the technical specifications of this project.

7.14 CLEANING UP.

7.14.1 The Contractor at all times during the progress of the Work shall keep the buildings and site free from accumulation of waste materials or rubbish caused by his operations. At the completion of the Work, he shall remove all his waste materials and rubbish from and about the Project, as well as all his tools, construction equipment, machinery and surplus materials not specified to be left at the site, and shall clean all glass surfaces and other areas or materials as specified, and leave the Work "broom-clean" or its equivalent, except where more stringent cleaning requirements are provided by the Contract Documents.
7.14.2 If the Contractor fails to satisfactorily clean up, the Owner will do so and the cost thereof shall be charged to the Contractor as provided in Paragraph 10.6.

7.15 COMMUNICATIONS. The Contractor shall forward all written communications to the OR except where otherwise required herein.

7.16 INDEMNIFICATION. To the fullest extent permitted by law, the Contractor shall defend, indemnify and hold harmless the District, its agents, representatives, officers, directors, officials and employees from and against all claims, damages, losses and expenses (including but not limited to attorney fees, court costs, and the cost of appellate proceedings), relating to, arising out of, or alleged to have resulted from the acts, errors, mistakes, omissions, work or services of the Contractor, its employees, agents, or any tier of subcontractors in the performance of this Contract. Contractor’s duty to defend, hold harmless and indemnify the District, its agents, representatives, officers, directors, officials and employees shall arise in connection with any claim, damage, loss or expense that is attributable to bodily injury, sickness, disease, death, or injury to, impairment, or destruction of property including loss of use resulting therefrom, caused by any acts, errors, mistakes, omissions, work or services in the performance of this Contract including any employee of the Contractor or any tier of subcontractor or any other person for whose acts, errors, mistakes, omissions, work or services the Contractor be legally liable.

The amount and type of insurance coverage requirements set forth herein will in no way be construed as limiting the scope of the indemnity in this paragraph.

ARTICLE 8
SUBCONTRACTORS

8.1 DEFINITION.

8.1.1 A Subcontractor is a person or organization who has a direct contract with the Contractor to supply materials or equipment or to perform any of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and masculine in gender and means a Subcontractor or his authorized representative.

8.1.2 A Sub-subcontractor is a person or organization who has a direct or indirect contract with the Subcontractor to perform any of the Work at the site, or to supply any materials or equipment to be used in the Project. The term "Sub-subcontractor" is referred to throughout the Contract Documents as singular in number and masculine in gender, and means a Sub-subcontractor or an authorized representative thereof.

8.1.3 Nothing contained in the Contract Documents shall create any contractual, master-servant or principal-agent relationship between the Owner, and any Subcontractor or Sub-subcontractor.
8.2    AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK.

8.2.1    If, after the actual signing of this Agreement, the Owner refuses to accept any person or organization on the Subcontractor and Material Vendor List for good and substantial reason, the Contractor shall submit an acceptable substitute and the Contract Amount shall be increased or decreased by the difference in cost occasioned by such substitution and an appropriate Change Order shall be issued. However, no increase in the Contract Amount shall be allowed for any such substitution unless the Contractor has acted promptly and responsively in submitting a name with respect thereto.

8.2.2    The Contractor shall not contract with any Subcontractor proposed to perform portions of the Work designated in the Construction Documents, or if none is so designated, with any Subcontractor proposed for the principal portions of the Work who has not been accepted by the Owner. The Contractor will not be required to contract with any Subcontractor against whom he has a reasonable objection.

8.2.3    If the Owner requires a change of any proposed Subcontractor previously accepted by it, the Contract Amount shall be increased or decreased by the difference in cost occasioned by such change and an appropriate Change Order shall be issued.

8.2.4    The Contractor shall not make any substitution for any Subcontractor who has been accepted by the Owner unless the substitution is approved in writing by the Owner.

8.2.5    Notwithstanding any provisions to the contrary in the Contract Documents, if any Subcontractor listed is found not to be qualified to perform public work as a matter of law, upon written notice from the Owner, the Contractor shall submit a qualified Subcontractor for the Owner's approval and shall substitute such qualified and approved Subcontractor at no additional cost to the Owner.

8.3    SUBCONTRACTUAL RELATIONS.

8.3.1    All work performed for the Contractor by a Subcontractor shall be pursuant to an appropriate written agreement between the Contractor and the Subcontractor (and where appropriate between Subcontractors and Sub-subcontractors) which shall contain provisions that:

.1    preserve and protect the rights of the Owner under the Contract with respect to the Work to be performed under the subcontract so that the subcontracting thereof will not prejudice such rights;

.2    require that such work be performed in accordance with the requirements of the Contract Documents;

.3    require submission to the Contractor of applications for payment under each subcontract to which the Contractor is a party, in reasonable time to enable the Contractor to apply for payment in accordance with Article 12;
.4 require that all claims for additional costs, extensions of time, damages for delays or otherwise with respect to subcontracted portions of the Work shall be submitted to the Contractor (via any Subcontractor or Sub-Subcontractor where appropriate) in the manner provided in the Contract Documents for like claims by the Contractor upon the Owner;

.5 waive all rights the contracting parties may have against one another for damages caused by fire or other perils covered by the property insurance described in Article 14, except such rights as they may have to the proceeds of such insurance held by the Owner as trustee under Article 14; and

.6 obligate such Subcontractor specifically to consent to the provisions of this Paragraph 8.3.

8.4 PAYMENTS TO SUBCONTRACTORS.

8.4.1 The Owner may, on request and at his discretion, furnish to any Subcontractor, if practicable, information regarding percentages of completion certified to the Contractor on account of work done by such Subcontractors.

8.4.2 The Owner shall not have any obligation to pay or to see to the payment of any monies to any Subcontractor except as may otherwise be required by law.

ARTICLE 9
SEPARATE CONTRACTS

9.1 OWNER'S RIGHT TO AWARD SEPARATE CONTRACTS. The Owner reserves the right to award other contracts in connection with other portions of the Project under conditions similar to this Contract.

9.2 MUTUAL RESPONSIBILITY OF CONTRACTORS.

9.2.1 The Contractor shall afford other contractors reasonable opportunity for the introduction to the site and storage of their materials and equipment thereon and the execution of their work, and shall properly connect and coordinate his Work with theirs.

9.2.2 If any part of the Contractor's Work depends for proper execution or results upon the work of any other separate contractor, the Contractor shall inspect and promptly report to the Owner any apparent discrepancies or defects in such work that render it unsuitable for such proper execution and results. Failure of the Contractor to so inspect and report shall constitute an acceptance of the other contractor's work as fit and proper to receive his Work, except as to defects which may develop in the other separate contractor's work after the execution of the Contractor's Work.

9.2.3 Should the Contractor cause damage to the work or property of any separate contractor on the Project, the Contractor shall, upon written notice, promptly attempt to settle such other contractor's claim. If such separate contractor sues the Owner on account of any damage alleged to have
been so sustained, the Owner shall promptly notify the Contractor, who shall defend such proceedings at the Contractor's expense, and if any judgment against the Owner arises therefrom, the Contractor shall promptly pay or satisfy it and shall immediately, upon presentation to it of a statement thereof, reimburse the Owner for all attorneys’ fees and court costs which the Owner has incurred.

9.3  CUTTING AND PATCHING UNDER SEPARATE CONTRACTS.

9.3.1  The Contractor shall do all cutting, fitting or patching of his Work that may be required to fit it to receive or be received by the work of other contractors indicated in the Contract Documents. The Contractor shall not endanger any work of any other contractors by cutting, excavating or otherwise altering any work and shall not cut or alter the work of any other contractor except with the written consent of the Owner.

9.3.2  Any costs caused by defective or ill-timed work shall be borne by the party responsible therefor.

9.4  OWNER'S RIGHT TO CLEAN UP. If a dispute arises between the separate contractors as to their responsibility for cleaning up as required by Paragraph 7.14, the Owner may clean up and charge the cost thereof to the several contractors as the Owner shall determine to be just.

ARTICLE 10
MISCELLANEOUS PROVISIONS

10.1  LAW OF THE PLACE. The Contract shall be governed by the law of the State of Arizona, and any other subordinate jurisdiction in which the Project is located.

10.2  SUCCESSORS AND ASSIGNS. The Owner and the Contractor each binds himself, his partners, successors, assigns and legal representatives to the other party hereto and to the partners, successors, assigns and legal representatives of such other party in respect to all covenants, agreements and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract or any part hereof or sublet it as a whole or in part without the written consent of the other, nor shall the Contractor assign or pledge any monies due or to become due to him hereunder without the previous written consent of the Owner.

10.3  WRITTEN NOTICE. Written notice shall be deemed to have been duly served if delivered in person to the individual for whom it was intended or if delivered at or sent by registered or certified mail to the last business address known to him who gives the notice.

10.4  CLAIMS FOR DAMAGES. Should either party to the Contract suffer injury or damage to person or property because of any act or omission of the other party or of any of his employees, agents or others for whose acts he is legally liable, which claim is not covered by Article 15 hereof, a claim shall be made in writing to such other party within a reasonable time after the first observance of such injury or damage.

10.5  PERFORMANCE BOND AND PAYMENT BOND. The Contractor shall furnish and maintain performance and payment bonds as required by Arizona law covering the faithful performance
of the Contract and the payment of all obligations arising thereunder in such form and amount as the Owner may prescribe and with such sureties as may be agreeable to the Owner. The premiums shall be paid by the Contractor. The Contractor shall, prior to commencement of the Work, submit such bonds to the Owner. Individual sureties are not acceptable.

10.6 OWNER'S RIGHT TO COMPLETE THE WORK. If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents, or fails to perform any provision of the Contract, the Owner may, after seven (7) days written notice to the Contractor and/or his surety, if any, and without prejudice to any other remedy he may have, proceed to make such other necessary and reasonable arrangements to carry out the Work in accordance with the Contract Documents, all at the expense of the Contractor, including the Owner's attorneys' fees and other costs.

10.7 ROYALTIES AND PATENTS. The Contractor shall pay all royalties and license fees. He shall defend all suits or claims from infringement of any patent right and shall save the Owner harmless from loss on account thereof, including Owner's attorneys' fees and court costs, except that Owner shall be responsible for all such loss when a particular design, process or product of a particular manufacturer or manufacturers is specified. But, if the Contractor has reason to believe that the design, process or products specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives information to the Owner prior to starting the Work.

10.8 TESTS.

10.8.1 Where the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any of the Work to be inspected, tested or approved, the Contractor shall give the OR timely notice of its readiness and of the date arranged so the OR may observe such inspection, testing or approval. The Owner shall pay the cost of all such tests, except where otherwise provided herein, and except for retest or re-inspection of Work which fails to comply with the Contract Documents.

10.8.2 All equipment and materials used in the construction of the Project, especially those upon which the strength and durability of the structure may depend, shall be subject to adequate inspection and testing in accordance with accepted standards to establish conformity with Specifications, applicable codes and standards and suitability for use intended, all as set forth more particularly in the Specifications.

10.8.3 If after the commencement of the Work the OR determines that any of the Work requires special inspection, testing or approval which Subparagraph 10.8.1 does not include, he will, upon written authorization from the OR, order such special inspection, testing or approval, and the Contractor shall give notice of readiness as in Subparagraph 10.8.1. If such special inspection or testing reveals a failure of the Work to comply:

.1 with the requirements of the Contract Documents, or

.2 with laws, ordinances, rules, regulations or orders of any public authority having jurisdiction over the Work,
the Contractor shall bear all costs thereof, including the cost of the Owner's additional services made necessary by such failure, and the costs of such inspection or testing and other expenses related thereto, including without limitation Owner's legal fees, if any, incurred in connection with advising Owner of such failure of compliance; otherwise, the Owner shall bear such costs.

10.8.4 Required certificates of re-inspections or testing to secure compliance with Clauses 10.8.3.1 or 10.8.3.2 above shall be paid for by the Contractor.

10.8.5 If the Owner wishes to observe the inspections, tests or approvals required by this Paragraph 10.8, he will do so promptly and, where appropriate, at the source of supply.

10.8.6 Neither the observations of the OR or the Owner in their administration of the Construction Contract, nor inspections, tests or approvals by persons other than the Contractor, shall relieve the Contractor from his obligations to perform the Work in accordance with the Contract Documents.

10.9 LEGAL FEES AND COSTS. The prevailing party shall be entitled to recover its attorneys’ fees, any costs of suit, any expert witness fees and the actual cost of any test or inspection incurred in connection with any effort undertaken to enforce any of the terms of this Contract.

ARTICLE 11
TIME AND LIQUIDATED DAMAGES

11.1 CONTRACT TIME, LIQUIDATED DAMAGES AND RELATED PROVISIONS.

11.1.1 It is understood and agreed that the construction of the Work under the Contract Documents shall be commenced on the date stated in the Notice to Proceed issued by the Owner and shall be Substantially Complete by the Contractor no later than the number of consecutive calendar days from that date, which number is the Contract Time as specified in Paragraph 3.2, herein. The Contract Time is the period of time from (1) the date specified in the Notice to Proceed as the date upon which the Contractor is to commence the Work (the "Start Date"), through (2) the date when the agreed time for Substantial Completion of the construction of the Project expires (the "Finish Date"). The date of beginning, rate of progress, and time for completion are essential conditions of the Contract, and the Contractor agrees that said Work shall be prosecuted regularly, diligently and uninterruptedly at such rate of progress as will ensure full completion thereof within the Contract Time specified. It is expressly agreed that the Contract Time is reasonable.

11.1.2 If the Substantial Completion Date as defined in Subparagraph 11.1.3 for the Project or any Phase thereof occurs after the expiration of the Contract Time, the Contractor shall pay the Owner the amount or amounts stated in Article 3 as liquidated damages for each calendar day the Work remains incomplete after expiration of the Contract Time. These amounts are agreed upon because of the impracticability and extreme difficulty of ascertaining the actual damages the Owner would sustain. It is expressly agreed that the amounts of liquidated damages set forth herein are reasonable. Said amounts may be retained from time to time by the Owner from payments due the Contractor.
11.1.3 The date of the Substantial Completion of the Work, or designated portion thereof, is the date established by a Certificate of Substantial Completion prepared by the OR when construction is sufficiently complete, in accordance with the Contract Documents as they may have been modified by any Change Orders agreed to by the parties, so that the Owner may occupy the Project, or a designated portion thereof, if he so elects, for the use for which it is intended. Certification of a designated portion of the Work by the OR as being "Substantially Complete" and occupancy of that portion thereafter by the Owner shall neither release, or otherwise operate to excuse, the Contractor from his duty to complete the remainder of the Work within the Contract Time nor relieve the Contractor from any liability for not completing expeditiously the remainder of Work.

11.1.4 The Final Completion Date is the calendar date when all items of the Work are one hundred percent (100%) finished, with no items of any scope, large or small, outstanding and remaining to be completed, and all known defective work has been corrected. When the Owner certifies in writing, pursuant to the terms of Subparagraph 12.6.2, that the Final Completion Date is reached and it is approved by the Owner, the Contractor may make application for final payment pursuant to Subparagraph 12.6.2.

11.2 PROGRESS AND COMPLETION.

11.2.1 All time limits stated in the Contract Documents are of the essence of the Contract.

11.2.2 The Contractor shall begin the Work on the Start Date as defined in Subparagraph 11.1.1. He shall carry the Work forward expeditiously with adequate forces and shall complete it as required herein.

11.3 DELAYS AND EXTENSIONS OF TIME.

11.3.1 If the Contractor is delayed at any time in the progress of the Work by any cause which the OR determines may justify the delay, including, but not limited to, unforeseeable cause beyond the control and without the fault or negligence of the Contractor, its agents and employees and Subcontractors and Sub-subcontractors and their agents and employees, including, but not restricted to: acts of God, acts of the public enemy, acts of the Owner, acts of another contractor in performance of a contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes and unusually severe weather over the entire Contract Time, then the Contract Time shall be extended by Change Order for such reasonable time as the OR may determine. No extension of the Contract Time pursuant to this paragraph shall relieve the Contractor from any obligation attendant upon him under any of the provisions of this Contract. It is expressly agreed that the Owner's liability for delay from any cause shall be limited to granting a time extension to the Contractor, and there is no other obligation, expressed or implied, on the part of the Owner to the Contractor for delay from any cause other than Owner caused delay. If the Contractor makes a claim for delay, as provided herein, for which he alleges that the Owner is responsible, which is unreasonable under the circumstances and which was not within the contemplation of the parties, the Owner agrees to negotiate with the Contractor the validity of such claim and the amount of damages incurred by the Contractor, if any.

11.3.2 The Contractor's Construction Progress Schedule must reflect the anticipated adverse weather delays on all weather dependent activities.
11.3.3  All claims for extension of time shall be made in writing to the Owner no more than fifteen (15) days after the occurrence of the delay; otherwise, they shall be waived. In the case of a continuing cause of delay, only one claim is necessary, and the Contractor shall promptly notify the Owner in writing of the date of the termination of the continuing cause of delay.

11.3.4  If no schedule or agreement is made stating the dates upon which written interpretations as set forth in Subparagraph 4.12.5 shall be furnished, then no claim for delay shall be allowed on account of failure to furnish such interpretations until fifteen (15) days after demand is made for them, and not then unless such claim is reasonable.

ARTICLE 12
PAYMENTS AND COMPLETION

12.1  CONTRACT AMOUNT. The Contract Amount is as stated in this Contract and General Conditions and is the total amount payable by the Owner to the Contractor for the performance of the Work under the Contract Documents, subject to credits or increases resulting from Change Orders.

12.2  SCHEDULE OF VALUES. Before the first Application for Payment, the Contractor shall submit to the Owner a schedule of values reflecting as nearly as reasonably possible the actual values of the various components of the Work aggregating the total Contract Amount, prepared in such form as Owner may require, and supported by such data to substantiate its correctness as the Owner may require. Each item in the schedule of values shall include its proper share of overhead and profit. This schedule shall be used only as a basis for the Contractor's Application for Payment.

12.3  PROGRESS PAYMENTS IF PRE-AUTHORIZED BY OWNER

12.3.1  On or about the first day of each calendar month during the course of construction, the Contractor shall submit to the Owner an itemized Application for Payment, which shall be AIA Document G702 and G703, supported by such data substantiating the Contractor's right to payment as the Owner may require.

12.3.2  Payments shall be based on the Work actually performed during the preceding calendar month. Payment may be made for materials not incorporated in the Work but delivered and suitably stored at the site under such conditions agreed upon in writing by the Owner.

12.3.3  Material delivered and suitably stored at the site by the Contractor, Subcontractors, Sub-subcontractors, or Material Vendors shall be insured to the full value of the material and shall be suitably stored and protected. Only such material that is in accordance with the Contract Documents shall be installed into the Work. Until the Final Completion and acceptance of the Work by the Owner, it shall be the Contractor's responsibility to protect all materials installed in or delivered to the Project.

12.3.4  The Contractor warrants and guarantees that title for all work, materials and equipment covered by the Contract Documents shall pass to the Owner upon Final Completion and acceptance by the Owner and that such work, materials and equipment shall be free and clear of all liens, claims, security interests or encumbrances, hereinafter referred to in this Article 12 as "claims".
12.4 CERTIFICATION OF PAYMENT.

12.4.1 If the Contractor has made Application for Payment as above, the OR shall approve or modify the Application and forward for payment for such amount as the OR determines to be properly due, or state in writing the OR's reasons for withholding, in whole or in part, the amount applied for as provided in Subparagraph 12.5.1.

12.4.2 The Application for Payment will constitute a representation by the Contractor to the Owner, that:

.1 the Work has progressed to the point indicated;

.2 to the best of his knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole upon Substantial Completion, to the results of any subsequent tests required by the Contract Documents, to minor deviations from the Contract Documents correctable prior to Final Completion, and to any specific qualifications stated in his certification of the Application for Payment); and

.3 the Contractor is entitled to payment in the amount certified.

12.4.3 The Owner shall make a payment to the Contractor on the basis of the value of the Work actually performed during the preceding calendar month in accordance with Subparagraph 12.3.2, less the amount of retention specified in Subparagraph 12.4.5 hereof. Such payments shall be made within thirty (30) days after receipt of Application for Payment. If the Contractor has properly requested the Owner pursuant to Subparagraph 12.3.1 of this Contract and General Conditions to accept substitute security, the Owner shall pay to the Contractor one hundred percent (100%) of the value of the Work actually performed during the preceding calendar month in accordance with this Paragraph 12. If the Contractor did not request an acceptance of substitute security, made an incomplete or incorrect assignment or made a legally insufficient assignment of substitute security, as determined by Owner or Owner's attorney, the Owner shall retain the amount of such approved Application for Payment specified in Subparagraph 12.4.5 hereof as a guarantee of the complete performance of the Contract. Any amounts retained or any securities held by Owner shall be returned to the Contractor within sixty (60) days after the Final Completion Date as specified in Subparagraph 12.6.2 of this Contract and General Conditions, provided the Contractor has by that time duly furnished the Owner any and all documents indicated to be furnished by the close out requirements of the Specifications or required for the proper maintenance and functioning of the Work as a whole. The Contractor shall submit along with the Application for Payment lien waivers from each subcontractor, materials or equipment supplier, the aggregate sum of which shall be the amount of the previous progress payment issued to the Contractor. If lien waivers from all subcontractors, materials or equipment suppliers do not equal the aggregate sum of the previous progress payment, the Contractor shall submit the following statement along with the current progress payment request: "I hereby certify as General Contractor on this project that I have paid all subcontractors, materials or equipment suppliers, for the Work provided in conjunction with the Project for which I have previously received payment."
12.4.4 In his Application for Payment, or in a separate notice, the Contractor shall include and itemize, and furnish such supporting particulars as the Owner shall require, all claims for additional compensation against the Owner arising under the Contract Documents or any covenant thereof, express or implied, or from any cause whatsoever, within the time limits prescribed in Subparagraph 15.2.1. It is expressly covenanted that the purpose of this provision is to guard the Owner against surprise claims, to permit the Owner to investigate claims as the same may arise, and to prevent vexatious litigation of claims. It is expressly covenanted that the Owner shall have no liability on any claim unless such claim was submitted in writing at the time and in the manner required hereby.

12.4.5 The Owner shall retain ten percent (10%) of the amount of each Application for Payment as insurance of proper performance of the Contract. Once the Contract is fifty percent (50%) complete, one-half of the retention then held shall be paid to the Contractor provided the Contractor is making satisfactory progress and there is no specific cause or claim requiring a greater amount to be retained. After the Contract is fifty percent (50%) completed, five percent (5%) of the amount of each subsequent Application for Payment shall be retained provided the Contractor is making satisfactory progress on the Project. If at any time the Owner determines that the Contractor is not making satisfactory progress, then the Owner may retain ten percent (10%) of all subsequent Applications for Payment.

12.4.6 No certificate for a progress payment, nor an acceptance of any security in lieu of the cash retention, nor any progress payment, nor any partial or entire use or occupancy of the Project by the Owner, shall constitute an acceptance of any Work not in accordance with the Contract Documents.

12.5 PAYMENTS WITHHELD.

12.5.1 The OR may decline to certify payment and may withhold his Certificate in whole or in part if, in his opinion, he is unable to make representations to the Owner as provided in Subparagraph 12.4.2. The OR may also decline to certify any Applications for Payment or, because of subsequently discovered evidence or subsequent inspections, he may nullify the whole or any part of any Certificate for Payment previously issued to such extent as may be necessary in his opinion to protect the Owner from loss because of:

- .1 defective work not remedied,
- .2 claims filed or reasonable evidence indicating probable filing of claims,
- .3 reasonable doubt that the Work can be completed for the unpaid balance of the Contract Amount,
- .4 damage to the Owner or another contractor,
- .5 reasonable indication that the Work will not be completed within the Contract Time, or
- .6 unsatisfactory prosecution of the Work by the Contractor.
12.5.2 When the grounds in Subparagraph 12.5.1 are removed, or in the case of 12.5.1.3 above, when the Owner is satisfied that the Contractor will complete the Project at the agreed upon price, payment shall be made for amounts withheld because of them.

12.6 SUBSTANTIAL COMPLETION AND FINAL PAYMENT.

12.6.1 When the Contractor believes that the Work or a designated portion thereof acceptable to the Owner is substantially complete, the Contractor shall prepare for submission to the OR a "punch list" of items to be completed or corrected. Any item on such list shall be completed or corrected before the Final Completion Date without regard to whether such item may be characterized by anyone as a "warranty item" or otherwise. The failure to include any items on such punch list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. When the OR, on the basis of an inspection, determines that the Work or a portion thereof is substantially complete, he will then prepare a Certificate of Substantial Completion, which shall be AIA Document G704, which shall state the responsibilities of the Owner and the Contractor for maintenance, heat, utilities and insurance. The Certificate(s) of Substantial Completion shall be submitted to the Owner for their written acceptance of the responsibilities assigned to them in such Certificate.

12.6.2 Upon receipt of written notice from the Contractor that the Work is ready for final inspection and acceptance, the OR will promptly make such inspection and, when the OR finds (1) the Work acceptable under the Contract Documents; (2) the Contract fully performed; and (3) the Final Completion Date has been reached, as that term is defined in Subparagraph 11.1.4, then, and only then, the Contractor shall promptly issue a final Invoice stating that, to the best of his knowledge, information and belief, and on the basis of observations and inspections, the Work has been fully completed in accordance with the terms and conditions of the Contract Documents, that the entire balance found to be due the Contractor is payable, and that any securities held by the Owner in lieu of a cash retention are returnable. The Contractor's written notice required by this Paragraph shall state the Date of Final Completion.

12.6.3 Neither the final payment nor the remaining retained percentage shall become due until the Contractor submits to the Owner (1) an affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or his property might in any way be responsible, have been paid or otherwise satisfied; (2) consent of surety to final payment; (3) if required by the Owner, other data establishing payment or satisfaction of all such obligations, to the extent and in such form as may be designated by the Owner; and (4) written certification by the Contractor, and such subcontractors, material suppliers and manufacturers as the Owner shall designate, that no materials have been incorporated into the Work which contain any asbestos.

12.6.4 The acceptance of final payment shall constitute a waiver of all claims by the Contractor except previously made in writing and still unsettled.
ARTICLE 13
PROTECTION OF PERSONS AND PROPERTY

13.1 SAFETY PRECAUTIONS AND PROGRAMS. The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work in compliance with all local, state and federal laws and regulations.

13.2 SAFETY OF PERSONS AND PROPERTY.

13.2.1 The Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury or loss, to:

.1 all employees engaged in the Work and all other persons who may be affected thereby;

.2 all the Work and all materials and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody or control of the Contractor or any of his Subcontractors or Sub-subcontractors; and

.3 other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

13.2.2 The Contractor shall comply with all applicable laws, ordinances, rules, regulations and orders of any public authority having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss. He shall erect and maintain, as required by existing conditions and the progress of the Work, all 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 utilities.

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

13.2.4 All damage or loss to any property referred to in Clauses 13.2.1.2 and 13.2.1.3 caused in whole or in part by the Contractor, any Subcontractor, any Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, shall be remedied by the Contractor.

13.2.5 The Contractor shall designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's Superintendent unless otherwise designated in writing by the Contractor to the Owner.

13.2.6 The Contractor shall not load or permit any part of the Work to be loaded so as to endanger its safety.
13.3  EMERGENCIES. In any emergency affecting the safety of persons or property, the Contractor shall act, at his discretion, to prevent threatened damage, injury or loss. Any additional compensation or extension of time claimed by the Contractor on account of emergency work shall be determined as provided by the applicable provisions of the Contract Documents.

ARTICLE 14
CONTRACTOR’S INSURANCE

14.1  GENERAL REQUIREMENTS The Contractor, at Contractor’s own expense, shall purchase and maintain the herein stipulated minimum insurance with companies duly licensed to do business in the State of Arizona with policies and forms satisfactory to the District and possessing a current A.M. Best, Inc. Rating of B++6.

All insurance required herein shall be maintained in full force and effect until all work required to be performed under the terms of the Contract is satisfactorily completed and formally accepted; failure to do so may, at the sole direction of the District, constitute a material breach of the Contract.

The Contractor’s insurance shall be primary insurance, and any insurance or self-insurance maintained by the District shall not contribute to it.

Any failure to comply with the claim reporting provisions of the policies or any breach of an insurance policy warranty shall not affect coverage afforded under the policy to protect the District.

All policies, except Workers’ Compensation, shall contain a waiver of transfer rights of recovery (subrogation) against the District, its agents, representatives, directors, officers, and employees for any claims arising out of the Contractor’s work or service.

The insurance policies may provide coverage which contains deductibles or self-insured retentions. Such deductible and/or self-insured retentions shall not be applicable with respect to the coverage provided to the District under such policies. The Contractor shall be solely responsible for deductible and/or self-insured retention and the District, at its option, may require the Contractor to secure the payment of such deductible or self-insured retentions by a surety bond or an irrevocable and unconditional letter of credit.

The District reserves the right to request and to receive, within 10 working days, certified copies of any or all of the herein required insurance policies and/or endorsements. The District shall not be obligated, however, to review same or to advise Contractor of any deficiencies in such policies and endorsements, and such receipt shall not relieve Contractor from, or be deemed a waiver of the District’s right to insist on, strict fulfillment of Contractor’s obligations under the Contract.

The insurance policies, except Workers’ Compensation, required by the Contract shall name the District, its agents, representatives, officers, directors, officials, and employees as Additional Insureds.
14.2 REQUIRED COVERAGE

14.2.1 General Liability - Contractor shall maintain Commercial General Liability insurance with a limit of not less than $2,000,000 for each occurrence with a $2,000,000 Products and Completed Operations Aggregate and $2,000,000 General Aggregate Limit. The Contractor’s policy shall be endorsed to include a separate designated construction project general aggregate limit applicable to this project with a per project limit of $1,000,000 which coverage will be at least as broad as insurance Service Office, Inc. Policy Form CG 25030397. The policies shall include coverage for bodily injury, broad form property damage, personal injury, products/completed operations and blanket contractual coverage including, but not limited to, the liability assumed under the indemnification provisions of the Contract, which coverage will be at least as broad as Insurance Service Office, Inc. Policy Form CG 000211093 or any replacement thereof. The coverage shall not exclude X, C, U.

Such policies shall contain a severability of interest provision, and shall not contain a sunset provision or commutation clause, or any provision that would serve to limit third party action over claims.

The Commercial General Liability additional insured endorsement shall be at least as broad as the Insurance Service Office, Inc’s, Additional Insured, Form B CG20101185, and shall include coverage for Contractor’s operations and products and completed operations.

14.2.2 Certificates if Insurance - Prior to commencing Services under the Contract, Contractor shall furnish the District with Certificates of Insurance, or formal endorsements as required by the Contract, issued by Contractor’s insurer(s), as evidence that policies providing the required coverages, conditions and limits required by the Contract are in full force and effect.

In the event any insurance policy(ies) required by the contract is(are) written on a “claims made” basis, coverage shall extend for two years past completion and acceptance of the contractor’s work or services and as evidenced by annual Certificates of Insurance.

If a policy does expire during the life of the contract, a renewal certificate must be sent to the District thirty (30) days prior to the expiration date.

All Certificates of Insurance required by the Contract shall be identified with a bid serial number and title.

Insurance evidenced by these certificates shall not expire, be canceled, or materially changed without thirty (30) days prior written notice to the District.

14.2.3 Automobile Liability - Contractor shall maintain and cause any subcontractors to maintain Commercial/Business Automotive Liability insurance with a combined single limit for bodily injury and property damage of not less than $1,000,000 each occurrence with respect to the Contractor’s owned, hired, and non-owned vehicles assigned to or used in performance of the Contractor’s work. Coverage will be at least as broad as coverage code 1, “any auto”, (Insurance Service Office, Inc. Policy Form CA 00011293, or any replacements thereof). Such insurance shall include coverage for loading and off loading hazards. If hazardous substances, materials or wastes are to be transported, MCS 90
endorsement shall be included and $5,000,000 per accident limits for bodily injury and property damage shall apply.

14.2.4 Workers’ Compensation - This Contractor shall carry Workers’ Compensation insurance to cover obligations imposed by federal and state statutes having jurisdiction of Contractor’s employees engaged in the performance of the work; and, Employer’s Liability insurance of not less than $2,000,000 for each accident, $1,000,000 disease for each employee, and $1,000,000 disease policy limit. In case any work is subcontracted, the Contractor will require the Subcontractor to provide Workers’ Compensation and Employer’s Liability to at least the same extent as required of the Contractor.

ARTICLE 15
CHANGES IN THE WORK AND CLAIMS

15.1 CHANGE ORDERS.

15.1.1 The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions. The Contract Amount and/or the Contract Time shall be adjusted accordingly pursuant to the terms of the Contract Documents.

15.1.2 A Change Order is a written amendment to the Contract Documents signed by the Owner, OR and the Contractor, issued after the execution of the Contract, authorizing a change in the Work or an adjustment in the Contract Amount or the Contract Time. The Contract Amount and the Contract Time may be changed only by Change Order.

15.1.3 The debit or credit, as the case may be, to the Owner resulting from a change in the Work shall be determined in one or more of the following ways as mutually agreed:

.1 by a lump sum properly itemized and supported as described below in order to permit evaluation;

.2 by unit prices stated in the Contract Documents or subsequently agreed upon; or

.3 by actual cost and specified percentage fee covering overhead and profit.

The total amount of overhead and profit allowed on any Change Order, whether increase or decrease, shall not exceed 15% of the direct costs of the Change Order Work when the Work is performed by the Contractor, or 5% of the Direct Costs for the Contractor's overhead and profit and 15% for the Subcontractor's overhead and profit when the Work is performed by any level of Subcontractor or Sub-subcontractor. The aforesaid amounts shall include the general conditions, overhead and profit for both the Contractor, Subcontractor(s), and Sub-subcontractor(s), if any. The costs of bond premiums and sales tax shall be added, in that order, after calculation and addition of overhead and profit.

The overhead and profit margin shall cover the costs of any additional supervision and project management, including the Contractor's and any Subcontractor's job superintendent, project
manager, estimator, field office support, home office support, small tools and all other general conditions items.

For each and every proposed change in the Contract Amount, the Contractor shall provide an itemized breakdown of direct costs, hereinafter called the cost breakdown, that: (1) clearly describes each item, location and scope of work; (2) identifies in detail all labor (by trade classification), materials, equipment and services required to complete the work; (3) lists and extends all respective man hours (or unit hours), labor rates, quantities of materials, dimensions used to compute quantities, material units and unit prices, equipment time and rental rates. This cost breakdown shall be organized in a format that clearly identifies the subtotal of direct costs before overhead (if any), profit, bond and tax are added. The cost breakdown format is subject to the approval of the Owner.

Change bids from the Contractor shall include separate cost breakdowns as described above from any and all Subcontractors involved with the change. Subcontractor cost breakdowns are to be in writing on their letterhead and signed by the Subcontractor. Contractor shall provide any additional data needed to substantiate costs of changes, including invoices from suppliers and payroll information upon request of the Owner. The Contractor shall respond to requests for quotations from the Owner within five (5) calendar days.

The Direct Cost is defined as the lowest locally available cost to the Contractor or Subcontractor after all discounts, rebates and concessions are calculated. The Direct Cost is the basis for computing Contractor and Subcontractor overhead and profit margins. The Direct Costs that may be included in the price of a change are limited to the following items directly attributable to the change in the Work:

1. Costs of materials, including cost of delivery;

2. Cost of labor, including social security, old age and employment insurance, and fringe benefits required by agreement and workers’ compensation insurance;

3. Rental value of equipment used to perform the Work.

15.1.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if the quantities originally contemplated are so changed in a proposed Change Order that application of the agreed unit prices to the quantities of Work proposed will create a hardship on the Owner or the Contractor, the applicable unit prices shall be equitably adjusted to prevent such hardship.

15.1.5 Should concealed conditions encountered in the performance of the Work below the surface of the ground be at variance with the conditions indicated by the Contract Documents or should unknown physical conditions below the surface of the ground of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract, be encountered, the Contract Amount shall be adjusted by Change Order upon claim by either party made in compliance with Subparagraph 12.4.4 and within the time limits prescribed in Subparagraph 15.2.1.
15.1.6 If the Contractor claims that additional cost or time is involved because of:

.1 any written interpretation issued pursuant to Subparagraph 4.12.5,

.2 any order by the Owner to stop the Work pursuant to Subparagraph 5.2.11 where the Contractor was not at fault, or

.3 any written order for a minor change in the Work issued pursuant to Paragraph 15.3,

the Contractor shall make such claim as provided in Paragraph 15.2.

15.2 CLAIMS FOR ADDITIONAL COST OR TIME. If the Contractor decides to make a claim for an increase in the Contract Amount or any other claim, except one for an extension of Contract Time, he shall give the Owner written notice thereof within fifteen (15) days after the occurrence of the event giving rise to such claim or include such notice in the Application for Payment for the month in which the event giving rise to the claim occurred, whichever is earlier. Notice of a claim for extension of Contract Time shall be given within fifteen (15) days of the occurrence of the event giving rise to such claim. Any notice other than one made for an extension of the Contract Time shall be given by the Contractor before proceeding to execute the Work which is the subject matter of the claim, except in an emergency endangering life or property, in which case the Contractor shall proceed in accordance with Subparagraph 13.3.1. All claims shall be made as provided in Subparagraph 12.4.4 within the time limits prescribed herein, and no such claim shall be valid unless so made. No change in the Contract Amount or Contract Time resulting from such claim shall be valid unless approved by the Owner and authorized by Change Order.

15.3 MINOR CHANGES IN THE WORK. The OR has authority to order minor changes in the Work not involving an adjustment in the Contract Amount or an extension of the Contract Time and not inconsistent with the intent of the Contract Documents.

15.4 FIELD INFORMATION MEMOS. The OR may issue written Field Information Memos which interpret the Contract Documents in accordance with Subparagraph 4.12.5 or which order minor changes in the Work in accordance with Paragraph 15.3 without change in Contract Amount or Contract Time. The Contractor shall carry out such changes specified in the Field Information Memos promptly.

ARTICLE 16
UNCOVERING AND CORRECTION OF WORK

16.1 UNCOVERING OF WORK.

16.1.1 If any Work should be covered contrary to the request of the OR, it must, if required by the OR, be uncovered for his observation and replaced, all at the Contractor's expense.

16.1.2 If any other Work has been covered which the OR has not specifically requested to observe prior to being covered, the OR may request to see such Work and it shall be uncovered by the Contractor. If such Work is found to be in accordance with the Contract Documents, the cost of
uncovering and replacement after approval by the OR shall, by appropriate Change Order, be charged to
the Owner. If such Work is found not to be in accordance with the Contract Documents, the Contractor
shall pay such costs unless it is found that this condition was caused by a separate contractor employed
as provided in Article 9, and in that event, the Owner shall be responsible for the payment of such costs.

16.2 CORRECTION OF WORK.

16.2.1 The Contractor shall promptly correct all Work rejected by the Owner as defective or as
failing to conform to the Contract Documents whether observed before or after Final Completion and
whether or not fabricated, installed or completed. The Contractor shall bear all costs of correcting such
rejected Work.

16.2.2 If, within two (2) years after acceptance of the Work by the Owner or within such longer
period of time as may be prescribed by law or by the terms of any applicable special guarantee required
by the Contract Documents, including the original conformance with the Contract Documents, any of
the Work is found to be defective or not in accordance with the Contract Documents, the Contractor,
without cost to the Owner, shall correct it promptly after receipt of a written notice from the Owner to
do so. The Owner shall give such notice promptly after discovery of the condition.

16.2.3 All such defective or non-conforming Work under Subparagraphs 16.2.1 and 16.2.2 shall
be removed from the site where necessary, and the Work shall be corrected to comply with the Contract
Documents without cost to the Owner.

16.2.4 The Contractor shall bear the cost of making good all work of separate contractors
destroyed or damaged by such removal or correction.

16.2.5 If the Contractor does not remove such defective or non-conforming Work within a
reasonable time fixed by written notice from the Owner, the Owner may remove it and may store the
materials or equipment at the expense of the Contractor. If the Contractor does not pay the cost of such
removal and storage within ten (10) days after receipt of a statement of charges therefor, the Owner
may, upon ten (10) additional days written notice, sell such Work at auction or at private sale and shall
account for the net proceeds thereof after deducting all the costs that should have been borne by the
Contractor, including compensation for additional architectural services and any attorneys' fees incurred
by Owner in connection therewith. If such proceeds of sale do not cover all costs which the Contractor
should have borne, the difference shall be charged to the Contractor and an appropriate Change Order
shall be issued. If the payments then or thereafter due the Contractor are not sufficient to cover such
amount, the Contractor shall pay the difference to the Owner, and all attorneys' fees and other costs that
the Owner may incur in collecting same.

16.2.6 If the Contractor fails to correct such defective or non-conforming Work, the Owner may
correct it in accordance with Paragraph 10.6.

16.2.7 The obligations of the Contractor under this Paragraph 16.2 shall be in addition to and not
in limitation of any obligations imposed upon him by special guarantees required by the Contract
Documents or otherwise prescribed by law.
16.3 ACCEPTANCE OF DEFECTIVE OR NON-CONFORMING WORK. If the Owner prefers to accept defective or non-conforming Work, he may do so instead of requiring its removal and correction, in which case a Change Order will be issued to reflect an appropriate reduction in the Contract Amount, or, if the amount is determined after final payment, it shall be paid by the Contractor.

ARTICLE 17
TERMINATION OF THE CONTRACT

17.1 TERMINATION BY THE CONTRACTOR. If the Work is stopped for a period of thirty (30) days, and the Owner is immediately notified of such stopping, under an order of any court or other public authority having jurisdiction through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing any of the Work under a contract with the Contractor, and by reason of some act or omission of Owner, then the Contractor may, upon thirty (30) days written notice to the Owner, terminate the Contract and recover from the Owner payment for all Work executed and for any proven loss sustained upon any materials, equipment, tools, construction equipment and machinery, including the percentage profit stated in Paragraph 3.4 herein for Work accomplished through the date the notice of termination is given.

17.2 TERMINATION BY THE OWNER.

17.2.1 If the Contractor files or has filed against it any petition in bankruptcy, or if he makes a general assignment for benefit of his creditors, or if a receiver is appointed on account of his insolvency, or if he refuses or fails, except in cases for which extension of time is provided, to supply enough properly skilled workmen or sufficient and proper materials to complete the Work in accordance with the Progress Schedule and Contract Time, or he fails to make prompt payments to Subcontractors or for materials or labor, or disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, or otherwise is guilty of a material breach of any provision of the Contract Documents, then the Owner may, without prejudice to any other right or remedy and after giving the Contractor and/or his surety seven (7) days written notice, terminate the employment of the Contractor and/or his surety seven (7) days written notice, terminate the employment of the Contractor and/or his surety seven (7) days written notice, terminate the employment of the Contractor and/or his surety seven (7) days written notice, terminate the employment of the Contractor and/or his surety seven (7) days written notice, terminate the employment of the Contractor and take possession of the site and all materials, equipment, tools, construction equipment and machinery thereon owned by the Contractor and may finish the Work by whatever method he may deem expedient. In such case, the Contractor shall not be entitled to receive any further payment until the Work is finished. Termination of the Contract under this Subparagraph 17.2.1 shall not relieve the Contractor of any warranty obligations he would otherwise have on all Work performed hereunder, and such obligations shall survive termination of this Contract.

17.2.2 If the unpaid balance of the Contract Amount exceeds the costs of finishing the Work, including attorneys' fees and all other costs incurred by Owner in completion of the Contractor's obligations, such excess shall be paid to the Contractor. If such costs exceed such unpaid balance, the Contractor shall pay the difference to the Owner.
ARTICLE 18
WARRANTY AND SITE CONDITIONS

18.1 TWO-YEAR WARRANTY.

18.1.1 The Contractor shall warrant all Work under this Contract against defects of material and workmanship for a period of at least two (2) years from the Final Completion Date; provided, however, that those items of the Work specified as having longer warranties shall be warranted for the period specified.

18.1.2 The Contractor shall be responsible for the total cost of repairing and restoring such defective Work to a new condition, at no cost to Owner.

18.1.3 In any case where the subject matter of the defect relates to Work done under a subcontract between the Contractor and any Subcontractor, it is the responsibility of the Contractor, not the Owner, to secure the Subcontractor's performance in compliance with this Paragraph and, in the event of the Subcontractor's failure or refusal within a reasonable time to perform after notice, it shall be the Contractor's responsibility to repair and restore such defective Work to a new condition, at no cost to Owner.

18.1.4 In any case where the defective Work has been brought to the attention of the Contractor by the Owner and the Contractor fails or refuses to correct it, the Owner may elect, without precluding its use of any other remedy it may have available to it, to have the defective Work repaired and restored to a new condition in whatever manner it deems appropriate, regardless of the cost, and the Contractor shall be liable to the Owner for the total cost thereof, including, without limitation, any architectural and legal fees related to effecting the repair.

18.1.5 Material and workmanship made good through compliance with such warranty shall be subject to the same warranty period as the original materials and workmanship. Such warranty period shall begin on the date the replaced material and work is certified as acceptable in writing by the Owner.

18.2 USE OF PREMISES.

18.2.1 The Contractor shall confine his equipment and plant, the storage of materials, and the operations of his workmen to limits indicated by law, ordinances, permits, or directions of the Owner and shall not unreasonably encumber the premises with materials or equipment.

18.3 SEVERABILITY. In the event any provision in this Contract is held invalid by any court of competent jurisdiction, the remaining provisions in this Contract shall be deemed severable and shall remain in full force and effect.

18.4 IMMIGRATION LAW COMPLIANCE.

18.4.1 The Contractor warrants compliance with the Federal Immigration and Nationality Act (FINA) and all other Federal and State immigration laws and regulations related to the immigration status of its employees. Contractor shall obtain statements from its subcontractors of every tier certifying compliance and shall furnish the statements to the Owner upon request. These warranties
shall remain in effect through the term of the Contract, and the Contractor and its subcontractors of every tier shall also maintain Employment Eligibility Verification forms (I-9) as required by the U.S. Department of Labor’s Immigration and Control Act for all employees performing work pursuant to this Contract. I-9 forms are available for download at USCIS.GOV.

18.4.2 The Owner may request, and the Contractor agrees to furnish, verification of compliance from the Contractor or its subcontractors of any tier performing work pursuant to this Contract. Should the Owner reasonably believe or discover that the Contractor or its subcontractors of any tier are not in compliance, the Owner may pursue any and all remedies allowed by law, including, but not limited to: suspension of work, termination of the Contract for default, and suspension and/or debarment of the Contractor or its subcontractors. All costs necessary to verify compliance are the responsibility of the Contractor.

18.5 CANCELLATION. This Agreement is subject to cancellation by the Owner for violation of the provisions of Arizona Revised Statutes Section 38-511.

IN WITNESS WHEREOF, four (4) identical counterparts of this Agreement, each of which shall for all purposes be deemed an original thereof, have been duly executed by the parties hereinabove named, on the day and year first above written.

OWNER: Pima County Community College

By _________________________________Date________________
Its _________________________________

CONTRACTOR:___________________________________

By _________________________________Date________________
Its _________________________________
EXHIBIT A

1. Project Manual/Specifications dated ____________, 201__.

2. Drawing List

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<th>Sheet Date</th>
<th>(Revision Date (if any))</th>
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EXHIBIT B to CONSTRUCTION AGREEMENT
SUPPLEMENTAL CONDITIONS FOR FEDERAL GRANT-FUNDED CONSTRUCTION PROJECTS

The following supplemental conditions apply to any construction project funded, in whole or in part, by a federal grant. Contractor shall comply and shall require its Subcontractors to comply with the requirements of these conditions which are incorporated into the Agreement by reference. Copies of relevant provisions will be provided upon request.

1. Applies to all Construction Agreements, regardless of Contract Amount:
   
   1.1. Equal Employment Opportunity (41 CFR 60-1.4(b)):
       
       1.1.1. Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual identity, or national origin, and,
       
       1.1.2. Effective September 2015, Contractor shall not discriminate against any employee because the employee disclosed or discussed the employee’s compensation.

   1.2. Debarment and Suspension (E.O. 12549 and E.O. 12689):
       
       1.2.1. Contractor or any of his Subcontractors may not be listed on the government-wide exclusions in the System for Award Management (SAM). SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.
       
       1.2.2. Contractor shall provide the required certification regarding its exclusion status and that of its principal employees to Owner prior to the execution of the Agreement.

2. Applies to Contract Amount exceeding $2,000

   2.1. Davis-Bacon Act, as amended (40 U.S.C. 3141-3148) and as supplemented by Department of Labor regulations (29 CFR Part 3):
       
       2.1.1. Contractor and its Subcontractors shall pay all laborers and mechanics involved in the Work at a rate not less than the prevailing wage as determined by the Department of Labor. In addition, Contractors shall be required to pay wages not less than once per week.
       
       2.1.2. Owner has placed a copy of the current prevailing wage determination issued by the Department of Labor in the solicitation and the award of the contract/issued purchase order shall be conditioned upon the acceptance by Contractor of the applicable wage determination.
       
       2.1.3. College shall report all suspected or reported violations to the Federal awarding agency.

       
       2.2.1. The Act provided that each Contract or sub-recipient shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he is otherwise entitled.
2.2.2. The College shall report all suspected or reported violations to the Federal awarding agency.

3. **Apply to Contract Amount exceeding $100,000:**

   
   3.1.1. Contractor shall be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work weeks is permissible provided that the worker is compensated at a rate of not less than one and a half time the basic rate of pay for all hours work in excess of 40 hours in the work week.
   
   3.1.2. Additionally, no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous.

3.2. **Byrd Anti-Lobbying Amendment** (31 USC 1352):

   3.2.1. Contractor (and any Subcontractor, of any tier, bidding on a project with a cost of $100,000) shall file the certification with Owner prior to the execution of the Agreement certifying that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee or member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. 1352.

   3.2.2. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. The disclosures are forward from tier to tier, up to the recipient.

4. **Apply to Contract Amount exceeding $150,000:**

   4.1. **Clean Air Act** (42 U.S.C. 7401-7671q.), as amended, and **Federal Water Pollution Control Act** (33 U.S.C. 1251-1387), as amended.

   4.1.1. Owner will report Contractor’s violations with these requirements to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).
PROJECT MANUAL

for

Upgrades and Renovation of the
Pima County Community College District
West Campus – K Building
Dental Clinic Phase 3
Tucson, Arizona

April 6, 2016

Pima County Community College District
Facilities Operations & Construction
Maintenance and Security
6680 South Country Club Road
Tucson, AZ 85709-1810
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DIVISION 1 GENERAL REQUIREMENTS

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## ATTACHMENTS

- **GLHN Dental Clinic Drawings**  
  April 6, 2016
- **Attachment A**  
  K Building Floor Plans and Use Schedule
- **Attachment B**  
  K Building Class Schedule Summer 2016
- **Attachment C**  
  Asbestos Report for WC Dental Jan 2014

END OF DIVISION 1 – TABLE OF CONTENTS
DIVISION 1 – GENERAL REQUIREMENTS

SECTION
01 11 00 SUMMARY OF THE WORK

01 11 00.01 GENERAL:

A. The scope of this contract consists of all supervision, labor, materials, equipment, appliances unless noted to be furnished by Others, transportation, tools, equipment rentals, fees, taxes and incidentals necessary to perform all operations required to install, alter, construct and complete, all in accordance with this Project Manual and the applicable drawings and documents, and work reasonably inferable from the Project Manual and drawings, and subject to the terms and conditions of the contract.

1. The work includes:
   a. Upgrade and Renovations to the Pima County Community College District, West Campus, K Building, Dental Clinic Phase 3 per drawings and Project Manual prepared by GLHN Architects and Engineers.
   b. One purchase order is proposed to be issued to the General Contractor. Because a portion of the funding for this project is from a Title V Department of Education Federal grant, the construction work on site has been phased, and is continuing to be completed over the next two construction phases during the College’s summer break periods. There may be at times, construction tasks which are before or extend past the summer break periods, or occurs during off hours, or on holidays and weekends.
   c. The General Contractor shall provide value engineering services including constructability reviews, and material reviews. These services should result in increased project quality and lower lifetime costs associated with the project.
   d. The General Contractor shall assist Pima Community College and the Architect with developing the construction sequencing and the project’s construction schedule. Critical time of construction may have to be phased and needs to be tailored to minimally impact the educational schedules.
   e. At the end of each phase the work shall be inspected for Substantial Completion by the College and College’s Owner Representative.
   f. This purchase order includes federal funding and is covered by the Davis-Bacon Act requirements. All laborers and mechanics employed by the General Contractor and Subcontractors for the construction or renovation of this project must be paid wages at least once a week and no less than the prevailing wage rate as determined by the Department of Labor. Weekly certified payroll reports must be submitted to the PCC Facilities Project Manager.
   g. This project is funded with Title V grant monies, and the General Contractor shall follow the requirements of the grant. The General Contractor’s pricing shall be based on Davis Bacon Wages pertinent to the project’s location. Prior to submitting the proposal or bid, the Contractor shall verify that Davis Bacon Wages have not been updated, and adjust his proposal if necessary. The most current wage determination can be found at:

http://www.wdol.gov/dba.aspx

Scroll down and select:
- Arizona as the State
- Pima as the County
- Building for the construction type

h. The Contractor and his subcontractors shall participate in a meeting prior to construction beginning on site which will cover the Davis-Bacon administrative requirements.

i. The College will furnish to the General Contractor the Summer class schedules for the West Campus K Building when they becomes available.
j. Warranties shall be for a minimum 2 year period commencing on Substantial Completion of the current construction phase or longer as noted within the Project Manual.

2. Work by the College:
   a. Unless noted otherwise, the College will provide inspections, and tests as required and noted by the drawings and Project Manual.
   b. All applicable governmental agency permits (for example: Fire Alarm/Construction Plan permits with the Arizona State Fire Marshal, EPA) shall be obtained and paid for by Pima Community College (PCC) unless noted otherwise in Division 1 - Section.01 41 00 “Regulatory Requirements”, and Section 01 25 00 “Product Substitution Procedures”, and as noted within the other sections of the Project Manual.
   c. Per plans and Project Manual the College shall furnish and install the following systems except as noted scope to be provided by the General Contractor:
      i. Energy management control system upgrades shall be furnished and installed by Others hired by the College. However, the infrastructure pathway shall be provided by the General Contractor.
      ii. Master clock system upgrades shall be furnished and installed by Others hired by the College. However, the infrastructure pathways shall be provided by the General Contractor.
      iii. IT network and video cabling shall be furnished and installed by Others. However, the infrastructure pathways and cable tray shall be provided by the General Contractor.
      iv. Card readers shall be furnished and installed by Others hired by the College. However, the infrastructure cabling pathway and cover plates shall be provided by the General Contractor.
      v. Sound system. Scope of work not in contract.
   d. Per the Drawings and the Project Manual, the General Contractor shall coordinate the installation of equipment noted as furnished by College or Others and as noted below:
      i. Dental Clinic equipment moveable equipment shall be furnished by the College or Others unless noted otherwise. The General Contractor shall coordinate the installation of the equipment within the Dental Clinic with the dental equipment suppliers
      ii. Dental Clinic operatory cabinetry, and the Dental Clinic operatory chairs shall be furnished and installed by Others hired by the College. The General Contractor shall coordinate the installation with the dental operatory cabinet suppliers and vendors. However, the General Contractor shall make all final utility connections, and attachment of the cabinetry pieces to the concrete floor slab below the raised floor system.
      iii. Cut sheets for all equipment shall be provided to the Contractor for his use. Contractor shall participate in meetings with the Dental Equipment vendors to coordinate the work.
   e. The following materials are furnished by the College, and to be picked up by the General Contractor at the College’s Maintenance & Security Warehouse located at 6680 S. Country Club Road, and installed by the General Contractor:
      i. Tate raised access flooring system
      ii. Light fixtures
      iii. Acoustical ceiling tiles. General Contractor to furnish and install the acoustical ceiling suspension system.
TABLE 01 11 00 – Contract Time

<table>
<thead>
<tr>
<th>TASK</th>
<th>DATES</th>
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<tbody>
<tr>
<td>Submittal Process</td>
<td>Commences on Notice to Proceed</td>
</tr>
<tr>
<td>Construction on site scheduled to begin</td>
<td>Tuesday, May 31, 2016</td>
</tr>
<tr>
<td>Installation of Dental Operatory Cabinetry in Dental Clinic Phase 3 area</td>
<td>June 20 - July 8, 2016</td>
</tr>
<tr>
<td>Substantial Completion for College’s Occupancy within areas affected by the work</td>
<td>August 12, 2016</td>
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<tr>
<td>PCC Classes Begin for Fall Semester</td>
<td>August 24, 2016</td>
</tr>
<tr>
<td>Final Completion</td>
<td>September 30, 2016</td>
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</table>

A. Contract Time:

1. If the Contractor is delayed at any time in the progress of the Work by an act or neglect of the College or Architect, or of an employee of either, which the Architect determines justifies relief, then the Contract time shall be extended by Change Order for such reasonable time as the Architect or College may determine.

2. An extension of time shall be the Contractor’s sole remedy for delay. The Contractor expressly agrees not to make, and hereby waives any claim for damages against the College on account of any delay, obstruction, or hindrance for any cause whatsoever, and agrees that the Contractor’s sole right and remedy in the case of delay shall be an extension of the time fixed for completion of the contract.

3. The Contract Time shall not be adjusted unless a change affects the critical path of the Work.

B. Warranty: If, within two years after the date of Substantial Completion of the particular phase of the work, 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 College. See also Section 01 78 36 “Warranties”.


01 11 00.03 DEFINITIONS:

A. The term "Architect" or "College’s Owner Representative" as used herein means the firm of GLHN Architects and Engineers, Inc. and its employees.

B. The term "Contractor" means the person or organization awarded the contract to complete work specified herein, and shall be a General Contractor registered and licensed by the State of Arizona, who has successfully completed a minimum of three comparable remodeling projects and can provide references for those projects.

C. The term "College" as used herein means Pima County Community College (PCC) District of the State of Arizona. The Director of Facilities Operations and Construction or the PCC Facility’s Project Manager assigned to this Project shall act on behalf of the College. Communication to Pima Community College is not received unless directed to the attention of the PCC Director of Facilities Operations and Construction, or the PCC Facilities Project Manager assigned to this project.

01 11 00.04 INTENT OF DOCUMENTS:

A. Drawings and the Project Manual specifications are cooperative and supplementary. Portions of the work which can be best illustrated by drawings may not be included in Project Manual specifications, and portions best described by the Project Manual may not be depicted on the drawings. The intent of the drawings and the Project Manual specifications is to include labor, materials and services necessary for proper completion of this project.

B. Completeness and correctness of the drawings and the Project Manual shall be verified before execution by the Contractor who shall notify the Architect of any errors, inconsistencies or omissions within ten (10) days from the Notice to Proceed. The Contractor shall be liable to the College or the Architect for any damages resulting from any errors, inconsistencies or omissions and knowingly failed to report it to the Architect. If the Contractor performs any construction activity knowing it involves a recognized error, inconsistency or omission in the drawings and Project Manual without such notice to the Architect, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of attributable costs for correction.

C. Where the drawings and the Project Manual appear to conflict, the Project Manual shall govern. Detail drawings have priority over other drawings and large scale plans have priority over small scale plans. Discrepancy in figures, drawings or the Project Manual shall be promptly submitted to the Architect, who shall promptly make a determination in writing.

01 11 00.05 DETAIL DRAWING INTERPRETATION:

A. Before doing any work or ordering any materials, the Contractor shall verify measurements of existing and new work and be responsible for their correctness. Differences which may be found shall be submitted to the Architect for consideration before proceeding with the work. No extra compensation will be allowed because of differences between actual dimensions and those indicated on working drawings. The Contractor will be responsible for verifying the locations and elevations indicated by the drawings.

01 11 00.06 PROTECTION OF ADJACENT PROPERTY:

A. Contractor is responsible for preservation of public and private property on the surface or underground, along and adjacent to the work, and shall conduct his operations so as to ensure the prevention of injury or damage thereto.

B. Whenever direct or indirect damage or injury is done to public or private property by or on
account of acts, omissions, neglect or misconduct in the execution of the work, or in consequence of non-execution thereof on the part of the Contractor, such property shall be restored by Contractor at his expense, to a condition equal to that existing before such damage or injury was done, by repairing, rebuilding or otherwise restoring same, or the Contractor shall make good such damage or injury in an acceptable manner to the College.

END OF SECTION 01 11 00

SECTION 01 14 00 WORK RESTRICTIONS

01 14 00.01 WORK RESTRICTIONS:

A. Work involving excessive noise or which will disrupt classroom instruction shall be scheduled during non-normal business hours. The Contractor shall anticipate disruptive work activities required by the project which will occur outside of normal business hours. Work outside of normal business hours shall be included in the project bid. No change orders will be issued for work outside of normal business hours required by the project documents.

1. Normal Business hours: Monday through Saturday 8:00 am to 10:00 pm
2. Pima Community College Holiday Schedule can be found at the following internet website: http://www.pima.edu/calendars/index.html

B. Work involving shutdown of utilities, and building systems (for example: water service, electric service, heating/cooling, life safety shall be scheduled during non-school hours) A minimum of 48 hour notice to the PCC Project Director, PCC Facilities Project Manager, Campus Operations Manager and the College’s Owner Representative is required. Major scheduled utility shutdowns will require a minimum of 3 weeks notification so that PCC Facilities Department can notify the campus administrators.

C. Contractor may schedule work to be completed between the hours of 10pm and 8 am however, a 48 hour notice shall be given to PCC Facilities Project Manager.

END OF SECTION 01 14 00
01 22 00 UNIT PRICES

A. Unit price is a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

B. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

C. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

01 22 00.02 SCHEDULE OF UNIT PRICES:

A. Unit Price No. 01:

1. Description: **Floor Levelling** according to Section 096519 Resilient Tile Flooring and Section 096516 Resilient Sheet Flooring.
2. Unit of measurement: 100 square feet.
3. Provide a unit price for "floating-out" abnormal irregularities in the existing concrete slab with Ardex or similar material at a maximum thickness of ¾ inch. Final pricing will be determined by multiplying the actual square feet of levelled area multiplied by 1/100 of this unit price.
4. Note that common, incidental floor levelling to a maximum thickness of 1/8 inch shall be included in the base bid as normal substrate preparation.

END OF SECTION 01 22 00
SECTION 01 24 00  VALUE ANALYSIS

01 24 13  VALUE ENGINEERING PROPOSALS (VEP):

A. The Contractor is encouraged to develop, prepare, and submit value engineering proposals (VEP's).

B. The Contractor shall include the following information in each VEP:
   1. A description of the difference between the existing Contract requirement and that proposed VEP which includes:
      a. The requirements of Section 01 25 00, Product Substitution Procedures
      b. The comparative advantages and disadvantages of each
      c. A justification when an item's function or characteristics are being altered.
   2. A separate, detailed cost estimate for (a) the affected portions of the original contract requirement and (b) the VEP. The cost reduction associated with the VEP shall take into account the Contractor's overhead and profit, and a statement of the time by which a contract modification accepting the VEP must be issued in order to maximize cost reduction, and the effect, if any, on the Contract Time.
   3. Submission, review, and acceptance or non-acceptance of VEP's shall be in accordance with standard change order proposal requirements. The cost savings shall reduce the Contract Sum by the amount(s) indicated on the VEP(s). After the purchase order has been issued, change orders shall be issued for accepted VEP's.

END OF SECTION 01 24 00

SECTION 01 25 00  PRODUCT SUBSTITUTION PROCEDURES

01 25 00.01  SUBSTITUTION REQUEST PRIOR TO PROPOSAL SUBMISSION – PRIOR APPROVAL:

A. Refer to the Instructions to Bidders for prior approval requirements.

01 25 00.02  SUBSTITUTION REQUEST AFTER PURCHASE ORDER HAS BEEN ISSUED:

A. After the purchase order has been issued to the General Contractor, a substitution request will be considered only if the specified product or system has gone out of production, or has been deemed illegal or dangerous subsequent to bidding.

B. The General Contractor shall submit a substitution request after the bid has been awarded using a separate request for each substitution. Include, at a minimum, in each request:
   1. Complete data substantiating compliance of proposed substitution with the drawings and Project Manual, include:
      a. Product identification, manufacturer's name and address.
      b. Product specifications and data per 01 33 00.
      c. Samples per 01 33 00 if applicable.
   2. Itemized comparison of the proposed substitution with the specified products, listing all variations, including size and weight.
   3. Data relating to changes in the construction schedule.
   4. Any effect on the in-place construction or other materials and systems to be installed.
   5. Cost data comparing the proposed substitution with the specified product.
      a. Engineering fees and additional agency permit costs required by the substitution submittal will be paid for by the General Contractor.
7. Advantages to the College of accepting the substitution.

01 25 00.04 SUBSTITUTIONS NOT CONSIDERED:

A. Substitutions will **not** be considered when:
   1. They are indicated or implied on submittals without formal request.
   2. Acceptance may require revision of Contract documents, unless Contractor agrees to compensate the College for the Architect's additional design and engineering services, and additional costs related to the substitution.
   3. The requested substitution is directly from a Subcontractor, a manufacturer, a vendor, or supplier’s representative. All substitution requests have to be submitted for consideration only by the General Contractor.

01 25 00.05 SUBSTITUTE PRODUCT:

A. Substitute products shall not be ordered or installed without written acceptance by the Architect and the College.

01 25 00.06 SUBSTITUTION DATA:

A. Based on the submitted data, the Architect will determine if the proposed substitution meets the requirements of the Contract Documents.

END OF SECTION 01 25 00

SECTION

01 26 00 CONTRACT MODIFICATION PROCEDURES

01 26 33 MINOR CHANGES IN THE WORK:

A. The Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, “Architect's Supplemental Instructions” (ASI) or similar form as approved by the PCC Facilities Project Manager. An ASI which involves change in Contract Time, or Contract Sum needs to be approved by the College prior to issuing to the Contractor.

01 26 53 CHANGE ORDER REQUESTS (COR):

A. College-Initiated Change Order Request (COR): Architect will issue a detailed description of the 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 revisions to the Project Manual.
   1. Change Order Requests issued by the Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change without authorization and approval from the College and the Architect.
   2. Within 10 days after receipt of Change Order Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change. Contractor to submit the following items:
      a. Include an itemized list of quantities of materials, supplies, and equipment (including cost of transportation, whether incorporated or consumed) required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities. The pricing shall be determined using 2015 RS Means Cost Data for the Tucson, AZ area or as substantiated from local Tucson, Arizona material supply vendors.
b. At the PCC Project Manager’s discretion, he/she may request additional supporting documentation such as actual receipts indicating material costs, and actual payroll time cards or copies of the payroll checks.

c. Include applicable costs of premiums for all bonds and insurance, permit fees, taxes, delivery charges, equipment rental (exclusive of hand tools), and amounts of trade discounts required or eliminated.

d. Include costs of labor and supervision directly attributable to the change, including social security, unemployment insurance, fringe benefits required by agreement or custom, and workers’ compensation insurance required or eliminated. Davis Bacon Wage rates apply for this project.

e. 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.

f. Comply with requirements in Division 1 Section “Product Substitution Procedures” if the proposed change requires substitution of one product or system for product or system specified.

g. For deductive change order proposals, Contractor may add appropriate preparation costs.

h. Include within the COR the performance and payment bonds, and taxes.

B. Contractor-Initiated Change Order Request (COR): Contractor may propose changes by submitting a request for a change to Architect, properly itemized and supported by sufficient substantiating data for permit evaluation, plus a fee; such costs shall be itemized by crafts as defined within the Schedule of Values and limited to the following items directly attributable to the change in the Work:

1. Comply with requirements in Division 1 Section 01 25 00, “Product Substitution Procedures” if the proposed change requires substitution of one product or system specified.

2. At the PCC Project Manager’s discretion, he/she may request additional supporting documentation such as actual receipts indicating material costs, and actual payroll time cards or copies of the payroll checks.

   a. 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.

   b. Include an itemized list of quantities of materials, supplies, and equipment (including cost of transportation, whether incorporated or consumed) required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

   c. Include applicable costs of premiums for all bonds and insurance, permit fees, taxes, delivery charges, equipment rental (exclusive of hand tools), and amounts of trade discounts required or eliminated.

   d. Include itemized costs of labor and supervision directly attributable to the change, including social security, unemployment insurance, fringe benefits required by agreement or custom, and workers’ compensation insurance required or eliminated.

   e. 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.

   f. For deductive change order requests, Contractor may add appropriate preparation costs.

   g. Include within the COR the costs for performance and payment bonds, and taxes.

01 26 57 CHANGE ORDERS – (CO):

A. On the College’s approval of a Change Order Request (COR), the College will issue a Purchase Order modification to increase or decrease the purchase order sum. The purchase order modification is also known by the term “Change Order”. The purchase order modification may combine more than one change order request at the discretion of the PCC Facilities Project Manager.
APPLICATION AND CERTIFICATION FOR PAYMENT:

A. Application and Certification for Payment using AIA Form G702 or similar form as approved by the PCC Facilities Project Manager must be submitted, in triplicate, to the attention of the Architect for certification and processing then to the PCC Facilities Project Manager. An Application and Certification for Payment will normally be processed and a check ready within 14 days after receipt of the certified pay application by the College. Applications for payment which are not properly submitted will be delayed. Application and Certification for Payment mailed to Pima College Accounts Payable Department are NOT properly submitted. The Contractor shall submit a draft Application and Certification for Payment, and Schedule of Values for review and approval by the Architect and the PCC Facilities Project Manager at the last construction meeting of each month.

PROGRESS PAYMENT APPLICATION PROCEDURES:

A. Contractor shall provide the items listed below with each Application and Certification for Payment. Provide three notarized originals to the Architect for him/her to certify. Applications for payment which do not include these items will not be certified:

1. Updated project schedule per Section 01 32 00, showing the actual progress for each task during the pay application period.

2. A copy of the Schedule of Values completed for the period of time covered by the application, including the percent of each task complete as shown on the updated project schedule. Use AIA document G703 certification for payment continuation sheet or similar document as approved by the PCC Facilities Project Manager. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of the subsequent Application and Certificate for Payments and progress reports. Correlate line items in the Schedule of Values with the construction schedule and Subcontractor list.

3. Invoices for materials stored on-site. Payment will not be made for materials stored off-site.

4. Lien Waivers: After the first application for payment, the General Contractor shall submit with each application for payment a partial lien release for the work and partial lien releases from each Subcontractor and/or for each separate line item on the schedule of values, for the work equal to the amount approved on the last application for payment, less retainage.

5. Copies of Superintendent’s daily log upon request by the College or Architect.

6. Prior to final payment also refer to Section 01 77 00.

PROGRESS PAYMENT:

A. Payments on account of this Contract will typically be made monthly as the Work progresses. The Contractor shall submit to the College through the Architect, in the manner and form prescribed by the College, an Application and Certification for Payment, and, if required by the Architect and/or PCC Facilities Project Manager, the General Contractor shall provide receipts or other vouchers showing his payments for materials suitably stored at the construction site and labor, including payments to the Subcontractors.

INVOICE DETAIL:

A. Invoices shall include the following: Contractor’s invoice number; invoice date; official project title; current purchase order number and reference to any change orders for which payment is being requested; number of invoice pages; and dates covered by the invoice. Payment of invoices that do not indicate the correct current purchase order may be delayed. Use AIA G702 and G703 or similar forms as approved by the PCC Facilities Project Manager. In addition the Contractor shall submit certified payroll forms required by
RETENTION:

A. Retention: All invoices shall provide a line item indicating retention of 10% of the dollar amount due at the time. Upon 50% completion the retention may be reduce to 5% upon the College’s discretion. Final payment of retention will not occur until all punch list items are completed in a manner acceptable to the College and per Section 01 77 00. Retention will be released at the College’s discretion at the completion of each construction phase.

PROMPT PAY:

A. The General Contractor shall promptly pay each Subcontractor, upon receipt of payment from the College, out of the amount paid to the Contractor on account of such Subcontractor’s portion of the Work, the amount to which said Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of such Subcontractor’s portion of the Work. The General Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to sub-Subcontractors in a similar manner.

PROJECT MEETINGS

A. A pre-construction conference will be called by the College’s Owner Representative for the purpose of discussing execution of the work. The General Contractor and any Subcontractors whose presence is necessary or requested must attend.

COORDINATION MEETINGS:

A. Job site Coordination Meetings may be called by College or Architect as deemed necessary to coordinate, expedite, or schedule the work of this Contract.

PROGRESS MEETINGS:

A. When demolition and construction begins on site, weekly Progress Meetings will be held at the job site with the PCC Facilities Project Manager, the Architect, and the Contractor’s Project Manager and Site Superintendent. The weekly progress meeting agenda shall include however not be limited to the following:

1. Review and approval of the meeting minutes taken at the previous progress meeting.
2. Review of schedules and the job progress in relation to the current project schedule.
3. Review of the "as-built" drawings for work accomplished since the last meeting.
4. Notification by the General Contractor of potential delays due to action or inaction by the College and/or the Architect.
5. Review of Architect’s Supplemental Instructions (ASI), Construction Change Order Requests (COR), Request for Information (RFI), shop drawing status etc.
6. Critical Work Sequencing: Discuss coordination requirements, working hours and critical path.
7. Review status of the Shop Drawing Submittal Log.
8. The General Contractor will notify the Architect and/or College of any action required on their part prior to the next meeting.
9. The General Contractor is responsible for meeting minutes and distribution to the attendees on a weekly basis.
SECTION
01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION

01 32 16 CONSTRUCTION PROGRESS SCHEDULE:

A. The construction progress schedule shall be coordinated with the College’s work and activities in the construction area and surrounding areas which may be affected by the General Contractor’s work. The schedule shall be reviewed at the weekly construction progress meeting. Refer also to Section 01 11 00.

B. Prepare the construction progress schedule as follows:
   1. The schedule shall be a Gantt (bar chart) with a horizontal time scale and activities listed vertically using the Critical Path Method (CPM). Note on the schedule any assumptions made, including but not limited to, Request for Information (RFI) turnaround times.
   2. At a minimum, no task on the schedule shall have duration greater than 15 (calendar) days. All activities shall include tasks for shop drawing review or other submittals, approvals, procurement, fabrication, delivery, installation, start-up and testing as required. The schedule shall clearly indicate the start and completion date of each activity, and the predecessor activity.
   3. The initial construction schedule shall be developed and based on the Contract Time as indicated in Section 01 11 00 – Summary of the Work.

C. The construction progress schedule shall anticipate the following number of normal adverse weather days as indicated in the following Table 013216. No extension of the Contract time will be granted unless the actual adverse weather days exceed the cumulated normal adverse weather days for the duration of the Contract Time and the actual adverse weather days had an effect on the scheduled construction. The number of adverse weather days was determined by using the following number of average days with greater than one quarter (1/4) inch of rain in Tucson, Arizona: No additional days will be allowed for adverse weather, as building is roofed and dried in, exception-loss of power for longer than a 3-hours period during normal working hours of 6am to 10pm.

D. If the Architect determines that the start or completion of any activity on the schedule deviates from the schedule by more than seven days, the General Contractor shall revise and reissue the schedule within seven days of the determination that an activity has deviated by more than seven days.

E. An updated CPM schedule will be required to request as adjustment in the Contract Time.

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TABLE 013216 – ABOVE
NORMAL ADVERSE WEATHER DAYS

END OF SECTION 01 32 16
SECTION
01 33 00 SUBMITTAL PROCEDURES

01 33 00.01 START-UP SUBMITTALS:

A. Start-up Submittals: Within 10 days after the Notice to Proceed, submit:
   1. Schedule of Values per Division 1, Section 01 29 00.
   2. Submittal review schedule per Division 1, Section 01 33 00.
   3. Construction Schedule for the work per Division 1, Section 01 32 00.
   4. A letter stating which individual within the Contractor's organization is authorized to
      sign change orders on behalf of the Contractor.
   5. No construction work shall be started and no progress payments made until the
      above are submitted and accepted.
   6. Submittals shall be submitted to the Architect in a timely manner to not cause delay
      and so that the General Contractor can complete the work in the specified contract
      time.
   7. The Contractor shall submit Material Data Safety Sheets to the PCC Facilities
      Project Manager per section 01 33 00. Prior to start of Work, the Contractor must
      provide an inventory list of chemicals that will be used on this project per section 01
      33 00.

01 33 00.02 OTHER COMMUNICATIONS:

A. Project Communications: Routine written communications between the Contractor and the
   Architect shall be in letter, field memo or PDF format. Such communication shall not
   substitute for any other written requirement or submittal.

B. Request for Information (RFI): A request from the Contractor seeking an interpretation or
   a clarification of some requirement of the contract documents. The RFI shall be logged
   and numbered sequentially. The contractor shall clearly and concisely set forth the issue
   for which they seek clarification or interpretation and why a response is needed. The
   request shall include specific reference to drawings, description of plan location, room
   number, detail number, specification section, etc. The Contractor shall, in the written
   request, set forth their interpretation or understanding of the contract's requirements along
   with the reasons why they have reached such an understanding. Responses to the RFI will
   not change any requirements of the contract documents unless so noted in the Request for
   Information response.

C. Architect's Supplemental Instruction (ASI) for Drawing/Plan Clarifications: An answer from
   the Architect, in response to an inquiry from the Contractor, intended to make some
   requirement(s) of the drawings or plans clearly understood. Drawing clarifications/plan
   clarifications may be sketches, drawings or in narrative form. If the ASI involves changes
   which would affect the Contract Sum or Contract Time, the College shall approve the ASI
   prior to being issued to the General Contractor.

D. Communications with the College: Pima Community College’s Facilities Project Manager
   is the General Contractor's official contact person with the College. Communication to
   Pima Community College is not received unless directed to the attention of the PCC
   Director of Facilities Operations and Construction, or the PCC Facilities Project Manager
   assigned to this project. The Facilities Project Manager is the only person from the College
   authorized to communicate changes to the work.

E. The Architect is acting as a College Owner's Representative is authorized to interpret and
   enforce the requirements of the Contract documents.
01 33 00.03 MATERIAL SAFETY DATA SHEETS (MSDS):

A. The General Contractor shall provide the College with MSDS (do not provide a copy to the Architect because the Architect will not review) for all material which may affect the College’s students or staff 10 days prior to delivery of material to the job site.

B. Prior to start of Work, the General Contractor must provide an inventory list of chemicals that will be used on this project. A copy of this list shall be provided by the Contractor to the PCC Facility Project Manager. The Contractor is responsible for maintaining Material Safety Data Sheets (MSDS) at the job site. Copies must be readily accessible and available for review by both College employees and regulatory authorities.

C. The General Contractor shall maintain a binder at the job site with MSDS for all materials used in the work.

01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

A. Review Times: submittal review schedule shall include 10 working days for review of submittals and shop drawings by the Architect. Revise submittal review schedule and resubmit when progress deviates from previous schedule by 7 days. The shop drawing and submittal review tasks must be included with the Construction Progress Schedule. (See Section 01 32 00)

B. Submit Shop Drawings in electronic pdf format. Provide drawing scale large enough to clearly show all elements of the work. Show how adjacent work relates. Reference the shop drawing to the sheet, detail and/or schedule, and Project Manual specification section. The number of shop drawing copies will be determined at the preconstruction meeting. For most shop drawing submittals, the College will prefer electronic pdf copies.

C. Submit manufacturer's standard product data in electronic pdf format. Include reference standards and warranty information. Provide references to sheet, detail, schedule, and/or specification section. Show dimensions and clearances specific to the work. For most product data submittals, the College will prefer electronic pdf copies.

D. Submit up to four (4) samples of which the College will retain two sets. The number of samples needed for the project will be discussed and determined at the Preconstruction Meeting.

E. Submittals without indication of Contractor's review and approval of conformance with the drawings and Project Manual will be returned without Architect's review, and will have to be resubmitted by the General Contractor.

F. Electronic submittals are allowed if all parties, College, General Contractor, and Architect, agree to their use.

G. At the project’s completion the Architect shall provide an electronic copy of all the approved submittals, shop drawings, and product data. Approved samples used at the jobsite shall be given to the College.

END OF SECTION 01 33 23
SECTION
01 41 00 REGULATORY REQUIREMENTS

01 41 00.01 STANDARDS, CODES, AND LAWS:

A. Project shall be completed in accordance with Federal, State, and local codes, laws, regulations, and rules that govern such operations, including fire codes. Applicable codes are listed on the drawings.

B. Material and products are specified for their appropriateness in the completed work. The Contractor is responsible for providing training and education to the Contractor's employees and obtaining and distributing information regarding the potential dangers and appropriate safety measures for material and products during the work as required by the Occupational Safety and Health Administration, Hazard Communication Standard and the State of Arizona.

C. Contractor and his Subcontractors shall follow PCC Policies and Standard Policy Guidelines related to safety. Copies will be distributed at the pre-construction meeting.

01 41 00.02 PERMITS, LICENSES, AND REGULATORY FEES:

A. Required governmental agency permits (for example: Fire Alarm and Construction Plan permits with the Arizona State Fire Marshal, EPA) shall be obtained and paid for by the College - Pima Community College (PCC), except for the following circumstances:
   1. If the permit and or fee is an additional requirement resulting from a Contractor's substitution request per Section 01 25 00 “Product Substitution Procedures”
   2. If the permit and or fee is an additional requirement resulting from modifications or changes related to a Contractor initiated Proposal Request.
   3. As required by Specification Section 01 51 00 “Temporary Utilities”.

B. The following permits and fees will be paid for by the College when required by the Local, State and Federal regulations and the pertinent Authority Having Jurisdiction except as indicated in Section 01 41 00.02 A above:
   1. Building Permits
   2. State of Arizona Fire Marshal Permit Application fees
   3. Plumbing, Electrical, Mechanical Permits
   4. Permanent Water Meters Installed by Utility Water Company
   5. Utility Water Company Service and Plan Review fees
   6. Sewer Tap Connection fees
   7. Sewer Fees or Assessments
   8. Utility Gas Company Service fees
   9. Electric Utility Company Service and Design fees
   10. Systems Furniture Vendor Design fee
   11. Permits required by the local, State and Federal Environmental Protection Agencies
   12. Hazardous materials abatement
   13. All required governmental agency licenses
   14. Deferred shop drawing permit review submittals

01 41 00.03 REGULATORY TESTING AND SPECIAL INSPECTIONS:

A. The College will hire a company or companies to perform special inspections, and tests as required by the Contract drawings and Project Manual unless noted to be provided by the General Contractor.
   1. The College will provide a third party inspector for modifications to the dental-related utilities such as compressed air and vacuum. The Contractor is still responsible for certifying modifications to these systems, as stated in Specification Sections 226113 and 226213.
B. The General Contractor shall provide the Test and Balance Report, and all HVAC commissioning.

C. The General Contractor shall hire a utility location company to x-ray the second floor, roof, and first floor within the area of work prior to the General Contractor core drilling.

D. The General Contractor shall hire a third party to certify the medical systems as required by the specifications within the Project Manual.

END OF SECTION 01 41 00

SECTION 01 51 00 TEMPORARY UTILITIES

A. Prior to start of ANY trenching or excavation, Contractor shall employ a utility location specialist to locate all utilities; including irrigation lines, in areas not under the jurisdiction of Arizona Bluestake, and shall include expense of such work in the bid or proposal. Prior to site work beginning (if applicable) the General Contractor shall call Arizona Bluestake at 811 and shall schedule the utility location services. The Contractor shall review As-Built drawings and other information supplied by the College, as well as information provided by utility location specialist if applicable, prior to submitting the initial Construction Schedule. Any down time for utilities that may be required due to the location of utility lines found, shall be shown on the initial Construction Schedule. See Section 01 32 00.

1. (This Article does not really apply to this renovation project.)

B. College will provide temporary (if applicable to the scope of work) water and electricity from the existing points of connection for the General Contractor's use during construction until Substantial Completion. Temporary modifications and extensions to the water and electrical connections shall be the responsibility and paid for by the General Contractor. The temporary utility connections shall be made and maintained in a safe and secure condition. The General Contractor shall be responsible for any temporary meters, temporary backflow preventers, and maintaining temporary climate control as required by the Contract Documents, and obtaining and paying for temporary use permits.

1. (This Article does not really apply to this renovation project.)

C. The General Contractor is responsible to hire a vendor to x-ray the concrete floor slabs and roof, prior to the General Contractor creating any floor and/or roof penetrations.

SECTION 01 52 00 CONSTRUCTION FACILITIES

01 52 13 FIELD OFFICES AND SHEDS:

A. For this project, a temporary field office trailer or storage trailer will be furnished and paid for by the Contractor as needed at no additional expense to the College. The PCC Facilities Project Manager will make arrangements to have weekly on site progress meetings within an available campus meeting room, classroom, or within the construction work area.

B. The Contractor shall provide at his expense temporary storage container/s, as needed, to secure tools and materials during the construction period. The storage container/s shall be located per the College's direction, and as required by law, ordinances, and permits.

C. Contractor's Project Manager and Superintendent shall have, as a minimum, a cellular telephone and e-mail and shall provide the telephone number and e-mail address to the College's Facilities Project Manager and the Architect.

D. The Contractor will have to make arrangements off-site or use his own resources to make
copies, send faxes, make phone calls or other office related functions because the College resources will not be available for use by the Contractor or his Subcontractors.

01 52 19 SANITARY FACILITIES:

A. The Contractor shall not use College restrooms for any construction purpose. Accommodations may be made to use existing toilet facilities for non-construction purposes. Provide portable toilets for use by construction personnel. Location of portable toilets shall be approved by PCC Project Manager before placement. Toilets shall be cleaned a minimum of 2-times per week.

END OF SECTION 01 52 19

SECTION 01 55 00 VEHICULAR ACCESS AND PARKING

01 55 00.01 CONSTRUCTION VEHICLE PARKING:

A. Parking arrangement for Contractor's crew to be made during the Pre-Construction conference. Contractor will be responsible for restricting his employees', subcontractors' and suppliers' vehicles to the designated area.

END OF SECTION 01 55 00

SECTION 01 56 00 TEMPORARY BARRIERS AND ENCLOSURES

01 56 16 TEMPORARY DUST BARRIERS:

A. Controlling construction-related dust and preventing the spread of flying particles is the Contractor's responsibility. HVAC return air paths must be sealed to prevent dust and odors from spreading to occupied parts of the building. The HVAC ducts shall be cleaned by the General Contractor if there is construction dust within the ductwork.

B. The General Contractor shall provide temporary dust partitions consisting of 3-5/8” metal studs at 16” on center with 5/8” gypsum wall board each side with sound batts to structure above. Heavy plastic dust partitions can be used if acceptable to the College and Architect. Seal around all penetrations to prevent and mitigate the passage of dust, odors and noise to the adjoining spaces.

C. The General Contractor shall provide walk-off mats to mitigate the dust from being transferred to outside the construction areas.

01 56 23 TEMPORARY BARRICADES, FENCING AND WARNING SIGNS:

A. Contractor shall furnish, erect, and maintain barricades, barriers, construction fencing and warning signs, etc., required for protection of persons and property in compliance with applicable statutes.

01 56 36 TEMPORARY SECURITY ENCLOSURES:

A. Contractor is responsible for: providing appropriate safety and warning signs; securing materials stored on site to prevent theft; and securing the work in-place to prevent vandalism. The College will not be responsible for theft or vandalism of equipment and materials left on the site.
B. The Contractor will be issued a set of keys for access to existing College facilities if required. The Contractor will be responsible for loss or theft of keys issued and will be liable for the cost of re-keying all or a portion of the College's existing facilities. The General Contractor is responsible for securing the areas where the General Contractor and his Subcontractors have access.

END OF SECTION 01 56 36

SECTION 01 60 00 PRODUCT REQUIREMENTS

01 60 00.01 PRODUCT OPTIONS:

A. Products are generally specified by reference standard and/or manufacturer's name and model number or trade name. When specified only by referenced standard, the Contractor may select any product meeting this standard by any manufacturer. When several products or manufacturers are specified as being acceptable, the Contractor has the option of using any product and manufacturer combination listed.

B. When a specific manufacturer, installer (where pre-qualification is required), trade name or material is specified, or indicated, it is to establish a standard of quality and shall not be construed as limiting competition. Any brand names or names of manufacturers listed in the contract documents are provided as guidelines for the purpose of establishing the minimum acceptable specifications.

C. Items of the same kind are to be by the same manufacturer.

D. For product substitution procedures after the Contract award refer to Section 01 25 00.

END OF SECTION 01 60 00

SECTION 01 65 00 PRODUCT DELIVERY REQUIREMENTS

01 65 00.01 DELIVERY & STORAGE:

A. Deliveries may be made directly to job site, however, it shall be the sole responsibility of the Contractor to receive, handle, and store such items in a safe and secure manner.

B. Materials required for this project shall be stored on-site at locations and in a manner mutually acceptable to College and Contractor. Store materials per the manufacturer's written instructions.

C. Deliveries shall be made during normal working hours only and shall be accepted by General Contractor. PCC WILL NOT ACCEPT DELIVERIES ON BEHALF OF CONTRACTOR. The Contractor shall verify and accept all delivery orders prior to being turned over to the College.

01 65 00.02 MAINTENANCE OF IN-PLACE MATERIALS AND CONSTRUCTION:

A. Provide maintenance per manufacturer's written instructions and recommendations, and industry recommendations until Substantial Completion.

B. Maintenance required elsewhere in the contract documents shall continue after Substantial Completion as specified.

01 65 00.03 INSTALLATION INSTRUCTIONS:
A. Materials and equipment incorporated into the work shall be installed or applied per the manufacturer’s written instructions, the Project Manual, and Manufacturer’s recommendations; unless specifically modified by written instruction from the manufacturer. Submit any modifications to Architect as product data per Section 01 33 00 “Submittal Procedures”

END OF SECTION 01 65 00

SECTION 01 73 00 EXECUTION

01 73 29 CUTTING AND PATCHING:

01 73 29.01 RELATED DOCUMENTS:

A. Related Sections include the following:
   1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
   2. Division 1 Section "Selective Demolition" for demolition of selected portions of the building.
   3. Project Manual specifications and the drawings for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

01 73 29.02 SUMMARY:

A. This Section includes procedural requirements for cutting and patching.

01 73 29.03 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. The patch materials will match the adjoining materials finish, and color.

01 73 29.04 QUALITY ASSURANCE:

A. Structural Elements: Do not cut and patch structural elements unless noted within the construction documents.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity perform as intended or those results in increased maintenance or decreased operational life or safety. Operating elements include the following:
   1. Primary operational systems and equipment.
   2. Fire-suppression systems – if applicable.
   3. Mechanical systems piping and ducts.
   4. Control systems.
   5. Communication systems.
   6. Electrical wiring systems.

C. 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.

D. Do not alter the fire rating of any existing or new partition or assembly by cutting or patching. Penetrations made to floor assemblies, walls, roofs and ceiling assemblies, in existing or new construction, are required to be in-filled to meet the existing or new assembly requirements. All fire walls, fire assemblies, and fire partitions must be fire caulked per code and per the manufacturer’s requirements.

E. All penetrations in existing sound rated floor, doors, walls, ceiling and roof assemblies shall be resealed to match the existing sound barrier assembly.

01 73 29.05 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.

01 73 29.06 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.

01 73 29.07 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.

E. For work affecting the existing Fire Alarm: Fire Alarm testing and shutdowns will be conducted only after approval by PCC Environmental Health and Safety Department. 48 hour notice must be provided to the College prior to the work. Please contact the College – PCC Facility Project Manager to coordinate.

F. The General Contractor and his Subcontractors shall not use the existing elevators during construction to assist in removal or delivery of materials and equipment without approval from the PCC West Campus Operations Manager.
G. The Contractor shall notify the College prior to the start of all Hot Work. This work involves cutting torches, welding, grinding, open flame, or produces slag, sparks, or excessive heat. The PCC Environmental Safety Department shall authorize this Hot Work in accordance with the PCC Hot Work Management Program. Whenever possible, the Contractor shall utilize construction methods that do not require cutting torches or open flames.

01 73 29.08 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 and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. 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 from 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.
      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 re-hang 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 weather-tight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
01 77 00.01 INITIATE SUBSTANTIAL COMPLETION:

A. Initiate Substantial Completion procedures a minimum of 7 days prior to the date for substantial completion.

01 77 00.02 PRIOR TO SUBSTANTIAL COMPLETION:

A. Prior to substantial completion complete the following:
   1. Contractor prepared Punch list of all incomplete items and corrections to be made.
   2. Punch list: When the Contractor considers that the Work is Substantially Complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected. By submitting a request for substantial completion inspection the Contractor thereby certifies that the Work, or the designated portion, is functionally ready for Occupancy by the College and that the remaining incomplete or defective work required by the Contract Documents shall be completed within 7 days. The Contractor shall proceed promptly to complete and correct items on the list. Failure to include an item on the list does not alter the responsibility of the Contractor to complete all work in accordance with the Contract Documents.
   3. Schedule Punch list inspection with the College’s Representative in order to exhibit the completeness of the work. College’s Representative will not participate in an inspection unless a full Punch list is submitted 5 days prior to inspection.
   4. Remove all temporary facilities and controls.
   5. Complete final cleanup requirements, including touchup painting.

01 77 00.03 PUNCH LIST:

A. If the Architect’s inspection discloses an item, whether or not included on the Contractor's punch list, which is not in accordance with the requirements of the Contract Documents, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct the item upon notification by the Architect to determine Substantial Completion. When the Work or designated portion is substantially complete, the Architect will prepare a Certificate of Substantial Completion which shall establish responsibilities of the College and Contractor for maintenance, damage to the Work, insurance, and the Final Punch list and shall fix the time within which the Contractor shall finish all items on the Final Punch list accompanying the Certificate. Satisfactory completion of all items on the Final Punch list shall be final completion of the work. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion unless otherwise provided in the Certificate of Substantial Completion. The Project shall not be deemed substantially complete until the Certificate is issued.

B. Neither Final Payment by Phase nor any remaining retainage or substituted securities shall become due until the Contractor submits to the College:
   1. An affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for that Phase have been paid or otherwise satisfied,
   2. Consent of surety to final payment for that Phase or release of substituted securities and 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.

C. Acceptance of Final Payment for the Phase by the Contractor, 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 Invoice.

D. The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the contract documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The contractor shall bear costs of correcting such rejected work, including additional testing and inspections and compensation for the Architect’s services and expenses made necessary thereby.

E. If the Contractor fails to correct nonconforming Work within a reasonable Time, the College may correct it. If the Contractor does not proceed with correction of such nonconforming Work within a reasonable time fixed by written notice from the Architect, the College may remove it and store the salvageable materials at the Contractor’s expense.

F. The General Contractor shall schedule 10 working days into schedule for completion of punch list.

01 77 00.04 RECORD DRAWINGS AS-BUILTS:

A. Maintain a clean, undamaged set of Contract Documents and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Tape or paste addenda, architect’s supplemental instructions, proposal requests and other information onto the appropriate sheet to provide a complete record of the work.

B. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work. The Architect will either approve the as-built submittal or note corrections to be made prior to approval.

C. Mark new information that is important to the College, but was not shown on Contract Drawings or Shop Drawings.

D. Note related Change Order numbers where applicable.

E. Organize record Shop Drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set. Upon completion of the work for all Phases, submit complete sets to the Architect. The Architect will either approve the as-built submittal or note corrections to be made prior to approval.

F. Upon completion of the work, the Contractor shall scan the approved as-built documents, shop drawings and other data and provide the College and Architect with PDF copies. The Contractor shall deliver to the Architect these record drawings “as-builts”. Unless contracted otherwise between the Architect/College, these record drawing “as-builts” shall be transferred to electronic media by the Architect, and delivered to the College.

01 77 00.05 OPERATIONS AND MAINTENANCE MANUALS:

A. Provide four (4) copies of the closeout submittals in three ring notebooks with section tabs, organized in CSI format for each Phase:
   1. Updated Subcontractor list with names and phone numbers.
   2. From each Subcontractor and material and equipment supplier, provide the following:
      a. Guarantees and Warranties.
      i. Provide minimum Two Year Warranty
b. Operation and Maintenance data, including:
   i. Emergency instructions
   ii. Spare parts list
   iii. Wiring diagrams
   iv. Recommended “turn around” cycles
   v. Inspection procedures
   vi. Shop Drawings and Product Data
   vii. Special inspection documentation

c. Testing Reports.

01 77 00.06 PRIOR TO FINAL PAYMENT BY PHASE:

A. Prior to Final Payment for each phase complete the following and items noted below:
   1. Schedule a time with the Architect and College to inspect the work following the
      completion of the final punch list by the Contractor.
   2. Provide a letter documenting that the project has been completed in accordance
      with Contract Documents and Warranting materials and work.
   3. Provide Operations and Maintenance Manuals per 01 77 00.
   4. Record Documents
   5. Final Cleaning
   6. Submit Warranties and Bonds
   7. Davis Bacon payroll submissions

01 77 00.07 CLEANING:

A. Final Cleaning:
   1. Thoroughly clean the interior and exterior of the project areas, removing misplaced
      mastic, paint, and other finishes. Remove dust, dirt, and stains from new and
      existing materials.

B. Sweep all exterior paving areas, remove debris and stains. Remove debris from
   landscaping areas. Rake and/or remove debris from all other areas affected by the work.

END OF SECTION 01 77 00

SECTION 01 78 36 WARRANTIES

01 78 36.01 WARRANTY PERIOD:

A. Unless noted otherwise as extended, standard general warranty period shall be two (2)
   years from the date of Substantial Completion of each phase. Refer to Project Manual
   specifications for additional warranty requirements.

01 78 36.02 EXCLUSIONS:

A. The Contractor warrants to the College and Architect that materials and equipment furnished
   under the Contract will be of good quality and new unless otherwise required or permitted by
   the Contract Documents, that the work will be free from defects not inherent in the quality
   required or permitted, and that the Work will conform with the requirements of the Contract
   Documents. Work not conforming to these requirements, including substitutions not properly
   approved and authorized, may be considered defective. The Contractor's warranty excludes
   remedy for damage or defect caused by abuse, modifications not executed by the
   Contractor, improper or insufficient maintenance, improper operation, or normal wear and
   tear under normal usage.
01 78 36.03 CONTRACTOR GUARANTEE:

A. Neither the final payment nor any provision in the Contract Documents shall constitute an acceptance of the Work not done in accordance with the Contract Documents or relieve the Contractor or its sureties of liability with respect to any warranties or responsibility for faulty materials and workmanship. The Contractor guarantees that the Work will conform to the Contract Documents.

01 78 36.04 FAILURE TO REMEDY DEFECTS:

A. If the Contractor fails to remedy any defects or damage, the College may correct the Work or repair the damages, and the cost and expense incurred in such event shall be paid by or be recoverable from the Contractor or Surety, or offset against any amounts owing the Contractor.

01 78 36.05 TIME OF WARRANTY SUBMISSION:

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.

01 78 36.06 WARRANTY SUBMISSION:

A. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
B. Bind warranties and bonds in 3-ring, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8 ½ x 11.
C. Provide dividers with plastic-covered tabs for each separate warranty. Mark tab to identify 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 the installer.
D. Identify each binder on the front and spine with the typed or printed title “WARRANTIES,” Project name, and name of Contractor.

01 78 36.07 ADDITIONAL COPIES:

A. Provide additional copies of each warranty to include in operation and maintenance manuals.

END OF SECTION 01 78 36

SECTION 01 89 30 SELECTIVE DEMOLITION

01 89 30.01 SUMMARY:

A. This Section includes the following:
   1. Demolition and removal of selected portions of building or structure.
   2. Salvage of existing items to be reused or recycled.

01 89 30.02 DEFINITIONS:

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
B. Remove and Salvage: Contractor to salvage the following items and turn them over to the College for first right of refusal and as noted on the Contract Documents and Project
Manual:

1. Life safety devices
2. Public address speakers
3. Toilet accessories
4. Light fixtures and exit signs
5. Energy Management Control system parts
6. Door hardware
7. Exterior metal panels, doors, and windows

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

01 89 30.03 QUALITY ASSURANCE:

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI A10.6 and NFPA 241.

01 89 30.04 PROJECT CONDITIONS:

A. College will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so College's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by College as far as practical.


D. Hazardous Materials: It is not expected that extensive hazardous materials will be encountered in the Work. An Asbestos Plan is in place at PCC; areas known to contain asbestos are clearly marked with approved signage. Asbestos may be present in mastics, insulation, floor and roofing materials.
   1. If materials suspected of containing hazardous materials are encountered, do not disturb, and immediately notify Architect and College. The PCC Facility Project Manager will notify PCC’s Environmental Health and Safety (EH&S) Department so that the materials are sampled, and PCC EH&S will arrange to have all required hazardous materials removed under a separate contract.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
   1. Maintain fire-protection facilities in service during selective demolition operations.

01 89 30.05 EXAMINATION:

A. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
B. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

01 89 30.06  UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS:

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
   1. If required, arrange to shut off indicated utilities with utility companies.
   2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass the area of selective demolition and that maintain continuity of services/systems to other parts of building.

01 89 30.07  PREPARATION:

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

01 89 30.08  SELECTIVE DEMOLITION EXECUTION:

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
   2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   3. Do not use cutting torches.
   4. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space.
   5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
   6. Remove demolished items and materials promptly from Project area.

B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect and College, items may be removed to a suitable, protected, insured, storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

C. Existing Items to Be Salvaged and Given to College. The Contractor shall meet with the Facilities Project Manager prior to demolition to confirm the items to be salvaged. The
College shall have the first right of refusal for all items indicated to be demolished. Salvaged items rejected by the College shall be disposed of by the General Contractor. The following is a list of items to be salvaged:

1. Any fire alarm devices removed during demolition will be given to the PCC Environmental Health and Safety Department or the PCC District Facilities Project Manager assigned to this Project.
2. White boards
3. Ceiling mounted projection system
4. Wireless Access Points
5. Fire extinguishers and cabinets
6. Door hardware
7. Clocks
8. Equipment
9. Lab hoods where noted to be removed
10. Paper towel dispensers
11. Plumbing fixtures
12. Energy management control system components

D. The Contractor and Subcontractors are expected not to activate the College’s fire alarm system due to dust generating activities such as drywall sanding, using vacuums without filters, sweeping etc. If the fire alarm system or fire alarm devices such as smoke or heat detectors need to be temporarily disabled or covered, the Contractor shall notify the PCC Facilities Project Manager (with 48 hour minimum notice prior to beginning work) who then will notify the PCC Environmental Health and Safety Department to coordinate this portion with PCC.

E. The Contractor shall notify the College prior to the start of all Hot Work. This work involves cutting torches, welding, grinding, open flame, or produces slag, sparks, or excessive heat. The PCC Environmental Safety Department shall authorize this Hot Work in accordance with the PCC Hot Work Management Program. Whenever possible, the Contractor shall utilize construction methods that do not require cutting torches or open flames.

01 89 30.09 DISPOSAL OF DEMOLISHED MATERIALS:

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain College’s property, remove demolished materials from Project site and legally dispose of them.

B. Disposal: Transport demolished materials off College’s property and legally dispose of them off site.

01 89 30.10 CLEANING:

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

B. The Work area shall be cleaned up on a daily basis.
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SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Demolition and removal of selected portions of building.
   2. Salvage of existing items to be reused or recycled.

B. Related Requirements:
   1. Section 011100 "Summary of Work" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
   2. Section 017300 "Execution" for cutting and patching procedures.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

1. Before selective demolition, Owner will remove the following items:
   a. Operating equipment.

C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
   a. The only suspected potential hazardous materials in this project are roofing materials. Please notify the Owner prior to any new or modified roof penetrations so an asbestos survey can be accomplished in the subject areas before the roofing is disturbed.

2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

D. Storage or sale of removed items or materials on-site is not permitted.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:

1. Roof system.

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Comply with requirements for existing services/systems interruptions specified in Section 011100 “Summary of Work.”
2. Owner Facilities Manager will arrange to shut off indicated services/systems when requested by Contractor.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.

a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.

b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.

c. Equipment to Be Removed: Disconnect and cap services and remove equipment.

d. Equipment to Be Removed and Reinstalled: Disconnect and cap services, remove, clean, and store equipment; and reinstall, reconnect, and make equipment operational by other hired by Owners.

e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Section 015100 "Temporary Utilities."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015100 "Utilities."

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain[ fire watch and] portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.
B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.

C. Removal and Salvaged Items and reinstallation by Owner as noted on drawings.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.

B. Concrete Slab-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

C. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Dispose of demolished items and materials promptly.

B. Burning: Not allowed at any time.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119
SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Exterior non-load-bearing wall framing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of cold-formed steel framing product and accessory.

1.3 QUALITY ASSURANCE

A. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   1. AllSteel & Gypsum Products, Inc.
   2. California Expanded Metal Products Company.
   3. ClarkWestern Building Systems, Inc.
   4. Consolidated Fabricators Corp.; Building Products Division.
   5. Craco Mfg., Inc.
   6. Custom Stud Inc.
   7. Design Shapes in Steel.
   8. Dietrich Metal Framing; a Worthington Industries company.
   10. MarinoWARE.
   11. MBA Building Supplies, Inc.
   12. Nuconsteel; a Nucor Company.
   13. Olmar Supply, Inc.
   15. SCAF CO Corporation.
   17. State Building Products, Inc.
   20. Steel Structural Systems.
2.2 COLD-FORMED STEEL FRAMING, GENERAL

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
   2. Coating: G60 (Z180).

B. Steel Sheet for Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
   1. Grade: 50 (340), Class 1.
   2. Coating: G60 (Z180).

2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer’s standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as shown on drawings.

B. Steel Track: Manufacturer’s standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as shown on drawings.

C. Vertical Deflection Clips: Manufacturer’s standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer’s single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as shown on drawings.

2.4 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer’s standard thickness and configuration.

2.5 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
B. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength
design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to
the design load, as determined by testing per ASTM E488 conducted by a qualified testing
agency.

C. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated
from corrosion-resistant materials, with allowable load capacities calculated according to ICC-
ESAC70, greater than or equal to the design load, as determined by testing per ASTM E1190
conducted by a qualified testing agency.

D. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel
drill screws.
   1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2.6 MISCELLANEOUS MATERIALS
   A. Galvanizing Repair Paint: ASTM A780.
   B. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, standard widths to match width of
      bottom track or rim track members.

PART 3 - EXECUTION

3.1 PREPARATION
   A. Install load bearing shims or grout between the underside of load-bearing wall bottom track and
      the top of foundation wall or slab at locations with a gap larger than 1/4 inch (6 mm) to ensure a
      uniform bearing surface on supporting concrete or masonry construction.
   B. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of
      foundation wall or slab at stud or joist locations.

3.2 INSTALLATION, GENERAL
   A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field
      assembled.
   B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions
      unless more stringent requirements are indicated.
   C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with
      connections securely fastened.
   D. Install framing members in one-piece lengths.
E. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

F. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet:

3.3 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 inches (406 mm).

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not less than 6'-0" on center. Fasten at each stud intersection.

1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.

3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.4 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.
D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.5 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer’s written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000
SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section Includes:
   1. Miscellaneous steel framing and supports.

1.3 ACTION SUBMITTALS
A. Shop Drawings: Show fabrication and installation details for metal fabrications.
   1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1.4 INFORMATIONAL SUBMITTALS
A. Welding certificates.

1.5 QUALITY ASSURANCE
A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 COORDINATION
A. Coordinate installation with dental equipment installer hired by Pima Community College. Contact information to be provided by Owner.

PART 2 - PRODUCTS

2.1 METALS, GENERAL
A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
2.2 FERROUS METALS
A. Steel Tubing: ASTM A 500, cold-formed steel tubing.
B. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.

2.3 FASTENERS
A. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
B. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

2.4 MISCÉLLANEOUS MATERIALS
A. Shop Primers: Provide primers that comply with Section 099123 Interior Painting.

2.5 FABRICATION, GENERAL
A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
D. Form exposed work with accurate angles and surfaces and straight edges.
E. Weld corners and seams continuously to comply with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.
F. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

G. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.6 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Not allowed in building:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

3.2 ADJUSTING

A. Adjust equipment supports as needed to allow for installation of equipment by others.

END OF SECTION 055000
SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rooftop equipment bases and support curbs.
2. Wood blocking and nailers.
3. Plywood backing panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product, indicate component materials and dimensions and include construction and application details.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

2.2 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.

B. For items of dimension lumber size, provide Standard, Stud, or No. 3 grade lumber of any species.

C. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 3 grade; SPIB.
2. Eastern softwoods, No. 3 Common grade; NELMA.
3. Northern species, No. 3 Common grade; NLGA.
4. Western woods, Standard or No. 3 Common grade; WCLIB or WWPA.

2.3 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, Exterior, C-C Plugged, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
C. Screws for Fastening to Metal Framing: ASTM C 1002, length as recommended by screw manufacturer for material being fastened.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit.
B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.
D. Do not splice structural members between supports unless otherwise indicated.
E. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:


END OF SECTION 061053
SECTION 064116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

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. Plastic-laminate-faced architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.

B. NOTE: All custom millwork and manufactured casework and countertops shown in the Construction Documents shall be furnished and installed by the Contractor except for the center consoles, “12 o’clocks,” and the corner cabinets in the dental operatories. Those 3 items, in addition to the dental chairs themselves will be provided and installed by a separate contractor, but the General Contractor is still responsible for utility connections to those items as well as under-raised-floor structural supports and in-wall backing for them.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products; high-pressure decorative laminate cabinet hardware and accessories.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Samples for Initial Selection:

1. Plastic laminates.
2. PVC edge material.

D. Samples for Verification:

1. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish.
2. Wood-grain plastic laminates, 12 by 24 inches, for each type, pattern and surface finish.
3. Thermoset decorative panels, 8 by 10 inches, for each color, pattern, and surface finish, with edge banding on one edge.
1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.

B. Installer Qualifications: Fabricator of products.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 17 and 50 percent during the remainder of the construction period.

B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.

C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.
B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Section 087100 "Door Hardware (Descriptive Specification)" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide labels from AWI certification program indicating that woodwork, including installation, complies with requirements of grades specified.

B. Grade: Custom.

C. Type of Construction: Frameless.

D. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.

E. Reveal Dimension: 1/2 inch.

F. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Abet Laminati, Inc.
   b. Formica Corporation.
   c. Lamin-Art, Inc.
   d. Panolam Industries International, Inc.
   e. Wilsonart International; Div. of Premark International, Inc.

G. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGL.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade VGS.
4. Edges: Grade VGS PVC T-mold matching laminate in color, pattern, and finish, color as noted on drawings.

H. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
2. Drawer Sides and Backs: Solid-hardwood lumber.
3. Drawer Bottoms: Hardwood plywood.
I. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

J. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
   1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

K. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

2.2 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. Wood Moisture Content: 4 to 9 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
   1. Medium-Density Fiberboard: ANSI A208.2-2002, conforming to ANSI MR50 (having a 24 hour soak thickness swell of less than or equal to 5.5%), made with binder containing no urea formaldehyde.
   2. Softwood Plywood: DOC PS1, medium-density overlay.
   3. Thermoset Decorative Panels: 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.
   4. The cabinet material for any custom millwork in the Sterilization Room, K283 (Phase 4), the Dental Lab, K209, and the Porcelain Room, K209A shall be Quality Panels; Xcelamine 3/4" thick moisture resistant board with a 24 hour soak thickness swell of less than 0.08% or approved equal.

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087100 "Door Hardware (Descriptive Specification)."

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening, self-closing, by BLUM Manufacturing only -- No substitutions accepted.

C. Wire Pulls: Back mounted, solid brushed aluminum, 4 inches.
D. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071.
   1. Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip.

E. Drawer Slides: BHMA A156.9.
   1. Grade 1 and Grade 2: Side mounted; full-extension type; zinc-plated steel or epoxy-coated steel with polymer rollers.
   2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
   3. For drawers not more than 3 inches (75 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1.
   4. For drawers more than 3 inches (75 mm) high but not more than 6 inches (150 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1HD-100.
   5. For drawers more than 6 inches (150 mm) high or more than 24 inches (600 mm) wide, provide Grade 1HD-200.
   6. For computer keyboard shelves, provide Grade 1HD-100.

F. Door Locks: BHMA A156.11, E07122.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Olympus Lock, Inc.; 100DR Deadbolt Cabinet Door Lock or comparable product.
   2. Key all cabinet doors alike – 915, with catch, and spacer for pair of doors.

G. Drawer Locks: BHMA A156.11, E07042.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Olympus Lock, Inc.; 200DW Deadbolt Cabinet Drawer Lock or comparable product.
   2. Key all cabinet drawers alike – 915.

H. Door and Drawer Silencers: BHMA A156.16, L03031.

I. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
   1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.

J. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content. Installed behind gypsum wall board. Cabinet fabricator to provide shop drawing of required blocking locations.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
C. Adhesives: Do not use adhesives that contain urea formaldehyde. Adhesives shall be waterproof.


2.5 FABRICATION

A. Fabricate cabinets to dimensions, profiles, and details indicated.

B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.

C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork.

1. Use filler matching finish of items being installed.
F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood, blocking.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 064116
SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Glass-fiber blanket.

B. Related Sections:
   1. Section 075216 "Styrene-Butadiene-Styrene (SBS) Modified Bituminous Membrane Roofing" for insulation specified as part of roofing construction.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS
A. Product test reports.
B. Research reports.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET
A. Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. CertainTeed Corporation.
   b. Guardian Building Products, Inc.
   c. Johns Manville; a Berkshire Hathaway company.
   d. Knauf Insulation.
   e. Owens Corning.
2.2 ACCESSORIES

A. Insulation for Miscellaneous Voids:
   1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.

B. Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.

C. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.2 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
   1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
   2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
   4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.

END OF SECTION 072100
SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Penetrations in fire-resistance-rated walls.
   2. Penetrations in horizontal assemblies.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

   1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.3 INFORMATIONAL SUBMITTALS

A. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

B. Product test reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

   1. Penetration firestopping tests are performed by UL FM Global.
   2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems bearing marking of qualified testing and inspection agency.

C. Preinstallation Conference: Conduct conference at Project site.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hilti, Inc.
2. 3M Fire Protection Products.

2.2 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
2. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

D. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

E. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
B. Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

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.

3.2 IDENTIFICATION

A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

   1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
   2. Contractor's name, address, and phone number.
   3. Designation of applicable testing and inspecting agency.
   4. Date of installation.
   5. Manufacturer's name.
   6. Installer's name.

3.3 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.

3.4 PENETRATION FIRESTOPPING SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
B. Where FM Global-approved systems are indicated, they refer to design numbers listed in FM Global’s “Building Materials Approval Guide” under “Wall and Floor Penetration Fire Stops.”

C. Firestopping with No Penetrating Items:

1. UL-Classified Systems:
   a. C-AJ (Concrete floor or wall).
   b. C-BJ (Concrete floor or wall).
   c. F-A (Concrete floor).
   d. F-B (Concrete floor).
   e. F-E (Concrete floor and bar joist).
   f. WJ (Concrete wall)
   g. WL (Gypsum wall).

D. Firestopping for Metallic Pipes, Conduit, or Tubing:

1. UL-Classified Systems:
   a. C-AJ (Concrete floor or wall).
   b. C-BJ (Concrete floor or wall).
   c. F-A (Concrete floor).
   d. F-B (Concrete floor).
   e. F-E (Concrete floor and bar joist).
   f. WJ (Concrete wall)
   g. WL (Gypsum wall).

E. Firestopping for Nonmetallic Pipe, Conduit, or Tubing:

1. UL-Classified Systems:
   a. C-AJ (Concrete floor or wall).
   b. C-BJ (Concrete floor or wall).
   c. F-A (Concrete floor).
   d. F-B (Concrete floor).
   e. F-E (Concrete floor and bar joist).
   f. WJ (Concrete wall)
   g. WL (Gypsum wall).

F. Firestopping for Electrical Cables:

1. UL-Classified Systems:
   a. C-AJ (Concrete floor or wall).
   b. C-BJ (Concrete floor or wall).
   c. F-A (Concrete floor).
   d. F-B (Concrete floor).
   e. F-E (Concrete floor and bar joist).
   f. WJ (Concrete wall)
   g. WL (Gypsum wall).
G. Firestopping for Cable Trays with Electric Cables:

1. UL-Classified Systems:
   a. C-A (Concrete floor or wall).
   b. C-B (Concrete floor or wall).
   c. F-A (Concrete floor).
   d. F-B (Concrete floor).
   e. F-E (Concrete floor and bar joist).
   f. WJ (Concrete wall)
   g. WL (Gypsum wall).

H. Firestopping for Insulated Pipes:

1. UL-Classified Systems:
   a. C-A (Concrete floor or wall).
   b. C-B (Concrete floor or wall).
   c. F-A (Concrete floor).
   d. F-B (Concrete floor).
   e. F-E (Concrete floor and bar joist).
   f. WJ (Concrete wall)
   g. WL (Gypsum wall).

I. Firestopping for Miscellaneous Electrical Penetrants:

1. UL-Classified Systems:
   a. C-A (Concrete floor or wall).
   b. C-B (Concrete floor or wall).
   c. F-A (Concrete floor).
   d. F-B (Concrete floor).
   e. F-E (Concrete floor and bar joist).
   f. WJ (Concrete wall)
   g. WL (Gypsum wall).

J. Firestopping for Miscellaneous Mechanical Penetrants:

1. UL-Classified Systems:
   a. C-A (Concrete floor or wall).
   b. C-B (Concrete floor or wall).
   c. F-A (Concrete floor).
   d. F-B (Concrete floor).
   e. F-E (Concrete floor and bar joist).
   f. WJ (Concrete wall)
   g. WL (Gypsum wall).

K. Firestopping for Groupings of Penetrants:

1. UL-Classified Systems:
   a. C-A (Concrete floor or wall).
b. C-Bj (Concrete floor or wall).
c. F-A (Concrete floor).
d. F-B (Concrete floor).
e. F-E (Concrete floor and bar joist).
f. Wj (Concrete wall)
g. WL (Gypsum wall).

END OF SECTION 078413
SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Silicone joint sealants.
   2. Nonstaining silicone joint sealants.
   3. Urethane joint sealants.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.
B. Samples: For each kind and color of joint sealant required.
C. Joint-Sealant Schedule: Include the following information:
   1. Joint-sealant application, joint location, and designation.
   2. Joint-sealant manufacturer and product name.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.
B. Preconstruction laboratory test reports.
C. Preconstruction field-adhesion-test reports.
D. Field-adhesion-test reports.
E. Sample warranties.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.
1.6 PRECONSTRUCTION TESTING


1.7 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following:

1. Architectural sealants shall have a VOC content of 250 g/L or less.
2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 775 g/L or less.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dow Corning Corporation.
b. GE Construction Sealants; Momentive Performance Materials Inc.
c. Polymeric Systems, Inc.
d. Schnee-Morehead, Inc., an ITW company.
e. Sherwin-Williams Company (The).
B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Dow Coming Corporation.
   b. GE Construction Sealants; Momentive Performance Materials Inc.
   d. Pecora Corporation.
   e. Tremco Incorporated.

2.3 URETHANE JOINT SEALANTS

A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. BASF Corporation; Construction Systems.
   b. Bostik, Inc.
   c. ER Systems; an ITW Company.
   d. Pecora Corporation.
   e. Polymeric Systems, Inc.
   f. Schnee-Morehead, Inc.; an ITW company.
   g. Sherwin-Williams Company (The).
   h. Sika Corporation; Joint Sealants.
   i. Tremco Incorporated.

B. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. BASF Corporation; Construction Systems.
   b. Pecora Corporation.
   c. Polymeric Systems, Inc.
   d. Sherwin-Williams Company (The).

C. Urethane, M, P, 50, T, NT: Multicomponent, pourable, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 50, Uses T and NT.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. LymTal International Inc.
2.4 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Dow Coming Corporation.
   b. GE Construction Sealants; Momentive Performance Materials Inc.
   d. Soudal USA.
   e. Tremco Incorporated.

2.5 JOINT-SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C 1330, Type C closed-cell material with a surface skin or Type B (bicellular material with a surface skin); of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. BASF Corporation; Construction Systems.
   b. Construction Foam Products; a division of Nomaco, Inc.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.6 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.
PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
   1. Remove laitance and form-release agents from concrete.
   2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses in each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
   1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.3 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
   1. Extent of Testing: Test completed and cured sealant joints as follows:
      a. Perform one test for each type of sealant/substrate.

B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
   1. Joint Locations:
      a. Isolation and contraction joints in cast-in-place concrete slabs.
      b. Other joints as indicated on Drawings.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

   1. Joint Locations:
      b. Joints between plant-precast architectural concrete units.
      c. Other joints as indicated on Drawings.
   2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
   1. Joint Locations:
      b. Control and expansion joints in tile flooring.
      c. Other joints as indicated on Drawings.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

   1. Joint Locations:
      a. Control and expansion joints on exposed interior surfaces of exterior walls.
      b. Tile control and expansion joints.
      c. Vertical joints on exposed surfaces of concrete walls and partitions.
      d. Other joints as indicated on Drawings.
   2. Joint Sealant: Urethane, S, NS, 25, NT.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.

1. Joint Locations:
   a. Control joints on exposed interior surfaces of exterior walls.
   b. Perimeter joints between interior wall surfaces and frames of interior doors windows and elevator entrances.
   c. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:
   a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
   b. Tile control and expansion joints where indicated.
   c. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200
SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY
A. Section includes:
   1. Glass for windows, doors, and storefront framings.
   2. Glazing sealants and accessories.

1.2 COORDINATION
A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS
A. Preconstruction adhesion and compatibility test report.

1.5 QUALITY ASSURANCE
A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

1.6 WARRANTY
A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
   1. Warranty Period: 10 years from date of Substantial Completion.
B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness for Exterior Lites: Not less than ¼ inch (6.0 mm).
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites of thickness indicated.
2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

D. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

2.2 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other coated glass).

2.3 INSULATING GLASS

A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products by Viracon, Inc. or comparable products by one of the following:

1. Guardian Industries Corp.
2. PPG Industries, Inc.

B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E2190, and complying with other requirements specified.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
2. Spacer: Aluminum with powdered metal paint finish, black.
3. Desiccant: Molecular sieve or silica gel, or blend of both.

C. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Insulating-Glass Types" Article.

2.4 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1. Neoprene complying with ASTM C 864.
2. EPDM complying with ASTM C 864.
4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene, EPDM, silicone, or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.5 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer’s full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. BASF Building Systems; Omniseal 50.
   b. Dow Corning Corporation; 756 SMS, 791, 795, and 995.
   e. Pecora Corporation; 864, 895, and 898.
   g. Sika Corporation, Construction Products Division; SikaSil-C 995.
   h. Tremco Incorporated; Spectrem 2 and Spectrem 3.


C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Dow Corning Corporation; 799.
   b. GE Advanced Materials - Silicons; UltraGlaze SSG 4000 and UltraGlaze SSG 4000AC.
   c. May National Associates, Inc.; Bondaflex Sil 200 GPN and Bondaflex Sil 201 FC.
   e. Schnee-Morehead, Inc., an ITW company; SM 5731 Poly-Glaze Plus.
   f. Tremco Incorporated; Proglaze SSG and Tremsl 600.

2. Applications: Interior glazing.

2.6 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.8 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Heat Soaking of Tempered Glass: All exterior tempered glass must be heat soak tested to convert nickel sulfide inclusions from the alpha phase to the beta phase.

C. Glass Distortion: Fabricate glass by horizontal roller heating process only, with roll wave distortion horizontal parallel to the bottom edge of the glass as installed. The deviation from flatness at any peak (peak to valley deviation) shall not exceed 0.003 inches in the center of the lite and shall not exceed 0.008 inches within 10.5 inches of the leading or trailing edge.

PART 3 - EXECUTION

3.1 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

3.2 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at comers of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Apply heel bead of elastomeric sealant.

F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at comers and work toward centers of openings.

G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.3 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at comers.
C. **Installation with Drive-in Wedge Gaskets:** Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. **Installation with Pressure-Glazing Stops:** Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.4 **SEALANT GLAZING (WET)**

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.5 **CLEANING AND PROTECTION**

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

3.6 **MONOLITHIC GLASS SCHEDULE**

A. **Glass Type GL-01:** All Interior glazing.

  1. **Basis-of-Design Product:** Viracon; Monolithic Glass.
  2. **Minimum Thickness:** 1/4 inch.
  3. **Safety glazing required.**
3.7 INSULATING GLASS SCHEDULE

A. Glass Type GL-01: All exterior glazing.

2. Overall Unit Thickness: 1 inch.
3. Minimum Thickness of Each Glass Lite: 1/4”.
4. Outdoor Lite: Fully tempered float glass, blue tint.
5. Interspace Content: Air.
6. Indoor Lite: Fully tempered float glass.
7. Low-E Coating: Pyrolytic or sputtered on second surface.
8. Winter Nighttime U-Factor: 0.29 maximum.
9. Summer Daytime U-Factor: 0.26 maximum.
11. Solar Heat Gain Coefficient: 0.29 maximum.
12. Safety glazing required.

END OF SECTION 088000
SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.

B. Studs and Runners: ASTM C 645. Use steel studs and runners.

1. Steel Studs and Runners:
   a. Minimum Base-Metal Thickness 0.033 inch.
   b. Depth: As indicated on Drawings.

C. Slip-Type Head Joints: Where indicated, provide the following:

1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
   a. Products: Subject to compliance with requirements available products that may be incorporated into the Work include, but are not limited to, the following:
      1) Dietrich Metal Framing.
      2) MBA Building Supplies
      3) Steel Network Inc.
4) Superior Metal Trim; Superior Flex Track System (SFT).
5) Telling Industries.

D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
   1. Minimum Base-Metal Thickness: 0.033 inch.

E. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal thickness, with minimum
   1/2-inch-wide flanges.
   1. Depth: 1-1/2 inches.
   2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.

2.2 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.
   1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power,
      and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide one of the following:
   1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
   2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener
      penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames,
   cast-in anchors, and structural framing, for compliance with requirements and other conditions
   affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.
   1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to
      framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim,
   grab bars, toilet accessories, furnishings, or similar construction. Blocking to be minimum of 3/4" ply
   plywood. Metal blocking is not acceptable.

C. Install bracing at terminations in assemblies.
D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

   a. Install two studs at each jamb unless otherwise indicated.
   b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
   c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure. Install minimum 48” o.c.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

E. Direct Furring:

1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION 092216
SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Exterior gypsum board.
3. Texture finishes.

1.1 REFERENCE STANDARDS

A. The criteria of the following organizations shall be followed as reference standards:

2. The United States Gypsum Company (the non-proprietary aspects of the Gypsum Construction handbook).

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples:

1. Textured Finishes: 24 inch by 24 inch for each textured finish indicated and on same backing indicated for Work.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
2.3 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Gypsum.
2. CertainTeed Corporation.
3. Continental Building Products, LLC.
4. Georgia-Pacific Building Products.
6. PABCO Gypsum.
7. Temple-Inland Building Products by Georgia-Pacific.
8. United States Gypsum Company.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

C. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch, Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 EXTERIOR GYPSUM BOARD

A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. CertainTeed Corporation.
   b. Georgia-Pacific Building Products.
   c. Lafarge North America Inc.
   e. Temple-Inland Building Products by Georgia-Pacific.
   f. United States Gypsum Company.

2. Core: 5/8 inch, Type X.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:
   1. Interior Gypsum Board: Paper.
   2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or successive coats.

2.7 AUXILIARY MATERIALS

A. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

C. Acoustical Joint Sealant: ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings as demonstrated by testing according to ASTM E 90.

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Accumetric LLC.
      b. Grabber Construction Products.
      c. Hilti, Inc.
      d. Pecora Corporation.
      e. Specified Technologies, Inc.
      f. United States Gypsum Company.

D. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

2.8 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.

B. New or repaired walls and ceilings in existing spaces: Match existing texture.

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

A. Comply with ASTM C 840.
B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent ceiling panels not less than one framing member.

D. Install wall panels across framing to minimize the number of abutting end joints. Stagger abutting end joints of adjacent wall panels one half panel length.

E. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

F. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

G. Install control and expansion joints in locations designated on Drawings. Form control and expansion joints with space between edges of adjoining gypsum panels.

H. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
   1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.
   3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

I. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

J. Install wall panels continuous above door and window openings, and extend at least one full stud width beyond the opening edge.

K. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

L. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
3.2 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
   1. Type X: Vertical and horizontal surfaces unless otherwise indicated >.
   2. Moisture- and Mold-Resistant Type SLX: As indicated on Drawings.

B. Single-Layer Application:
   1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
   2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
      a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
   3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
   4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:
   1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
   2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
   3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
   4. Fastening Methods: Fasten base layers and face layers separately to supports with screws or as required by fire-resistance rated assembly.

3.3 APPLYING EXTERIOR GYPSUM PANELS

A. Apply panels perpendicular to supports, with end joints staggered and located over supports.
   1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
   2. Fasten with corrosion-resistant screws.
3.4 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints at locations indicated on Drawings.

C. Interior Trim: Install in the following locations:
   1. Cornerbead: Use at outside corners unless otherwise indicated.
   2. L-Bead: Use where gypsum board abuts another material and the abutted joint will be exposed.

3.5 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
   1. Level 1: Concealed areas.
   2. Level 4: At panel surfaces that will be exposed to view.
      a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

3.6 PROTECTION

A. Protect adjacent surfaces from joint compound, adhesives, and texture finishes. Promptly remove from floors and other non-gypsum board surfaces. Repair surfaces stained, marred, or otherwise damaged during application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, or mold damaged.

END OF SECTION 092900
SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for ceilings.
   1. Acoustical panels will be provided by Owner, installed by Contractor.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Samples: For each exposed product and for each color and texture specified, 6 inches in size.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver suspension-system components and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 Moderate Low designation.
B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: Comply with ASTM E 1264 for Class A.
   2. Smoke-Developed Index: 50 or less.

2.2 ACOUSTICAL PANELS: Panels to be provided by Pima Community College.
   A. Material being provided: Armstrong World Industries, Inc. - Ultima, 4’x2’, lay-in square edge white, 1913.
   B. Color: White.
   C. LR: Not less than 0.90.
   D. NRC: Not less than 0.70.
   E. CAC: 35.
   F. AC: Not less than 180.
   G. Edge/Joint Detail: Square.
   H. Thickness: 3/4 inch.
   I. Modular Size: 24 by 24 inches.
   J. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment.

2.3 METAL SUSPENSION SYSTEMS, GENERAL - Material to be provided by the Contractor.
   A. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.
   B. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
      1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
         a. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 for Class SC 1 service condition.
      2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190, conducted by a qualified testing and inspecting agency.
C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, “Direct Hung”) will be less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.

D. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

E. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in place.

2.4 METAL SUSPENSION SYSTEM

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Armstrong World Industries, Inc.
2. CertainTeed Corp.
3. Chicago Metallic Corporation.
4. USG Interiors, Inc.; Subsidiary of USG Corporation.

B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted according to ASTM A 653/A 653M, not less than G30 coating designation; with prefinished 15/16-inch-wide metal caps on flanges.

2. End Condition of Cross Runners: Butt-edge type.
3. Face Design: Flat, flush.

2.5 METAL EDGE MOLDINGS AND TRIM

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Armstrong World Industries, Inc.
2. CertainTeed Corp.
3. Chicago Metallic Corporation.
4. Fry Reglet Corporation.
5. USG Interiors, Inc.; Subsidiary of USG Corporation.

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
2. Face Finish: Factory painted white.
2.6 **ACOUSTICAL SEALANT**

A. **Products:** Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1. **Acoustical Sealant for Exposed and Concealed Joints:**
   a. **Pecora Corporation;** AC-20 FTR Acoustical and Insulation Sealant.
   b. **USG Corporation;** SHEETROCK Acoustical Sealant.

2. **Acoustical Sealant for Concealed Joints:**
   a. **Henkel Corporation;** OSI Pro-Series SC-175 Acoustical Sound Sealant.
   b. **Pecora Corporation;** AIS-919.
   c. **Tremco, Inc.;** Tremco Acoustical Sealant.

B. **Acoustical Sealant:** Manufacturer's standard sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.


**PART 3 - EXECUTION**

3.1 **EXAMINATION**

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 **PREPARATION**

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders. Comply with layout shown on reflected ceiling plans and notify Architect of discrepancies between site conditions and reflected ceiling plans before proceeding with work. Proceeding before resolution by Architect may require re-installation at contractor's expense.

B. Request delivery of panels to be provided by Pima Community College minimum of 5 business days before needed and accept delivery of material from College.
3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
   2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
   4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

D. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
   1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113
SECTION 096513 - RESILIENT BASE AND ACCESSORIES

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. Resilient base.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Samples: For each exposed product and for each profile, not less than 12 inches long.
C. Color shall be black.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.5 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 60 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.
B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
C. Install resilient products after other finishing operations, including painting, have been completed.
PART 2 - PRODUCTS

2.1 THERMOSET-RUBBER BASE OR THERMOPLASTIC-RUBBER BASE

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Armstrong
2. Flexco
3. Roppe Corporation, USA.

B. Product Standard: ASTM F1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).

1. Style:
   a. Style A, Flat
   b. Style B, Cove.

2. Location: Per drawings.

C. Thickness: 0.125 inch.

D. Height: 4 inches.

E. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard length.

F. Outside Corners: Preformed.

G. Inside Corners: Job formed.

H. Colors: Black.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
   1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
   1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are the same temperature as the space where they are to be installed.
   1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.
F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer’s recommended adhesive filler material.

G. Preformed Comers: Install preformed comers before installing straight pieces.

H. Job-Formed Comers:
   1. Inside Comers: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
      a. Miter comers to minimize open joints.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer’s written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:
   1. Remove adhesive and other blemishes from exposed surfaces.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION 096513
SECTION 096519 - RESILIENT TILE FLOORING

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. Vinyl composition floor tile.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
   1. Show details of special patterns.
C. Samples: Full-size units of each color and pattern of floor tile required.
D. Samples for Initial Selection: For each type of floor tile indicated.

1.4 INFORMATIONAL SUBMITTALS
A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS
A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 QUALITY ASSURANCE
A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
   1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.
1.7 DELIVERY, STORAGE, AND HANDLING
A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.8 FIELD CONDITIONS
A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 60 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.
B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
C. Close spaces to traffic during floor tile installation.
D. Close spaces to traffic for 48 hours after floor tile installation.
E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 VINYL COMPOSITION FLOOR TILE (VCT)
A. Products: Subject to compliance with requirements, provide the following:
   1. Armstrong World Industries, Inc; Excelon Series, no substitution.
B. Wearing Surface: Smooth.
C. Thickness: 0.125 inch.
D. Size: 12 by 12 inches.
E. Colors and Patterns: ChromaSpin #56815 Soft Ochre, ¼ turn for installation.
2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

1. Refer to Section 012200 “Unit Prices” for providing a unit price for excessive floor levelling, if required.

B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

1. Adhesives shall comply with the following limits for VOC content:
   a. Vinyl Composition Tile Adhesives: 50 g/L or less.

2. Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.

3. 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.
4. **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.

C. **Access Flooring Panels:** Remove protective film of oil or other coating using method recommended by access flooring manufacturer.

D. **Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.**

E. Do not install floor tiles until they are the same temperature as the space where they are to be installed.

   1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

F. **Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.**

### 3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

   1. Lay tiles square with room axis.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

   1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

I. Seamless Installation:
   1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and heat weld with welding bead to permanently fuse sections into a seamless flooring. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.
   2. Chemically Bonded Seams: Bond seams with chemical-bonding compound to permanently fuse sections into a seamless flooring. Prepare seams and apply compound to produce tightly fitted seams without gaps, overlays, or excess bonding compound on flooring surfaces.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

B. Perform the following operations immediately after completing floor tile installation:
   1. Remove adhesive and other blemishes from exposed surfaces.
   2. Sweep and vacuum surfaces thoroughly.
   3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
   1. Apply three coat(s).

E. Joint Sealant: Apply sealant to resilient terrazzo floor tile perimeter and around columns, at door frames, and at other joints and penetrations.

F. Sealers and Finish Coats: Remove soil, visible adhesive, and surface blemishes from resilient terrazzo floor tile surfaces before applying liquid cleaners, sealers, and finish products.
   1. Sealer: Apply two base coats of liquid sealer.
   2. Finish: Apply three coats of liquid floor finish.

G. Cover floor tile until Substantial Completion.

END OF SECTION 096519
SECTION 096543 - LINOLEUM FLOORING

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes linoleum sheet flooring, factory-adhered to raised access flooring panels.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product.

1.3 CLOSEOUT SUBMITTALS
   A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. Fire-Test-Response Characteristics: For linoleum flooring, as determined by testing identical
      products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
      1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
   B. FloorScore Compliance: Flooring shall comply with requirements of FloorScore certification.
   C. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of
      the California Department of Public Health’s “Standard Method for the Testing and Evaluation of
      Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers.”

2.2 LINOLEUM SHEET FLOORING
   A. Manufacturers: Subject to compliance with requirements, provide products by the following:
      1. Forbo Industries, Inc.; Marmoleum, Real #2707 Barley.

2.3 INSTALLATION MATERIALS
   A. Adhesives: Water-resistant type recommended by flooring and adhesive manufacturers to suit
      products and substrate conditions indicated.
PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to linoleum flooring manufacturer's written instructions to ensure adhesion of flooring.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing flooring.

B. Adhere flooring to substrates using a full spread of adhesive applied to substrate to produce a completed installation without telegraphing of adhesive spreader marks, and other surface imperfections.

END OF SECTION 096543
SECTION 096900 - ACCESS FLOORING

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Access-flooring panels.
   2. Understructure.

1.2 COORDINATION
A. Coordinate location of mechanical, electrical, and technology work in underfloor cavity to prevent interference with access-flooring pedestals.
B. Mark pedestal locations on subfloor using a grid to enable mechanical and electrical work to proceed without interfering with access-flooring pedestals.

1.3 PREINSTALLATION MEETINGS
A. Preinstallation Conference: Conduct conference at Project site.
   1. Review connection with mechanical, electrical, and technology systems.
   2. Review requirements related to sealing the plenums.
   3. Review procedures for keeping underfloor space clean.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Shop Drawings: Include layout of access-flooring system and relationship to adjoining Work based on field-verified dimensions.
   1. Details and sections with descriptive notes indicating materials, finishes, fasteners, typical and special edge conditions, accessories, and understructures.

1.5 INFORMATIONAL SUBMITTALS
A. Qualification Data: For Installer.

1.6 QUALITY ASSURANCE
A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain access-flooring system components from single source from single manufacturer as described below.

2.2 FLOOR PANELS

A. Floor Panels, General: fully encased cementitious filled welded steel panels supported on all four edges by structural steel members which are designed to bolt onto adjustable height pedestal assemblies forming a modular grid pattern.

1. Size: Nominal 24 by 24 inches.
2. Attachment to Understructure: Bolted.

B. Access floor panels have been pre-purchased by the College and are available at their warehouse at 6680 S. Country Club Road. For reference, panels are Tate Access Floors, Inc.; ConCore® CC1250 Panel-24.

2.3 UNDERSTRUCTURE

A. Pedestals have been pre-purchased by the College and are available at their warehouse at 6680 S. Country Club Road. For reference, pedestals are Tate Access Floors, Inc.; Type 1A.

B. Stringers have been pre-purchased by the College and are available at their warehouse at 6680 S. Country Club Road. For reference, stringers are Tate Access Floors, Inc.; 4-foot Bolted Stringer.

1. Stringer grid shall be 4’ stringers in a basketweave configuration ensuring maximum lateral stability in all directions. (Also available in 2’ x 4’ and 2’ x 2’ grid patterns)

2.4 FABRICATION

A. Fabrication Tolerances:

1. Size: Plus or minus 0.020 inch of required size.
2. Squareness: Plus or minus 0.015 inch between diagonal measurements across top of panel.
3. Flatness: Plus or minus 0.035 inch, measured on a diagonal on top of panel.

B. Cutouts: Fabricate cutouts in floor panels for cable penetrations and service outlets. Provide reinforcement or additional support, if needed, to make panels with cutouts comply with structural performance requirements.

1. Number, Size, Shape, and Location: As indicated.
2. Grommets: Where indicated, fit cutouts with manufacturer's standard brush grommets; or, if size of cutouts exceeds maximum grommet size available, trim edge of cutouts with manufacturer's standard plastic molding with tapered top flange. Refer to Divisions 26 and 27.

3. Provide foam-rubber pads for sealing annular space formed in cutouts by cables.

4. Provide air-tight seals at penetrations through access flooring above pressurized air plenums.

C. Finishes

1. Factory-finish the surface of floor panels with floor covering material as indicated. Refer to Section 096543 “Linoleum Flooring.”

2.5 ACCESSORIES

A. Adhesives: Manufacturer's standard adhesive for bonding pedestal bases to subfloor.

1. Adhesive shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Panel Lifting Device: Panel manufacturer's standard portable lifting device for each type of panel required.

C. Perimeter Support: Where indicated, provide manufacturer's standard method for supporting panel edge.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer and manufacturer's representative present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, foreign deposits, and debris that might interfere with attachment of pedestals.

2. Verify that concrete floor sealer and finish have been applied and cured.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Lay out floor panel installation to keep the number of cut panels at floor perimeter to a minimum. Avoid using panels cut to less than 6 inches.

B. Locate each pedestal, complete any necessary subfloor preparation, and vacuum subfloor to remove dust, dirt, and construction debris before beginning installation.
3.3 INSTALLATION

A. Install access-flooring system and accessories under supervision of access-flooring manufacturer's authorized representative to produce a rigid, firm installation that complies with performance requirements and is free of instability, rocking, rattles, and squeaks.

B. Adhesive Attachment of Pedestals: Set pedestals in adhesive, according to access-flooring manufacturer's written instructions, to provide full bearing of pedestal base on subfloor.

C. Adjust pedestals to permit top of installed panels to be set flat, level, and to proper height.

D. Stringer Systems: Secure stringers to pedestal heads according to access-flooring manufacturer's written instructions.

E. Install flooring panels securely in place, properly seated with panel edges flush. Do not force panels into place.

F. Scribe perimeter panels to provide a close fit with adjoining construction with no voids greater than 1/8 inch where panels abut vertical surfaces.

G. Cut and trim access flooring and perform other dirt-or-debris-producing activities at a remote location or as required to prevent contamination of subfloor under already-installed access flooring.

H. Grounded Flooring Access Panel Systems: Ground flooring system as recommended by manufacturer and as needed to comply with performance requirements for electrical resistance of floor coverings.

1. Panel-to-Understructure Resistance: Not more than 10 ohms as measured without floor coverings.

I. Clean dust, dirt, and construction debris caused by floor installation, and vacuum subfloor area as installation of floor panels proceeds.

J. Install access flooring without change in elevation between adjacent panels and within the following tolerances:

1. Plus or minus 1/8 inch in any 10-foot distance.
2. Plus or minus 1/4 inch from a level plane over entire access-flooring area.

3.4 PROTECTION

A. Prohibit traffic on access flooring for 24 hours and removal of floor panels for 72 hours after installation to allow pedestal adhesive to set.

B. After completing installation, vacuum access flooring and cover with continuous sheets of reinforced paper or plastic. Maintain protective covering until time of Substantial Completion.

C. Replace access-flooring panels that are broken or otherwise damaged or that do not comply with specified requirements.

END OF SECTION 096900
SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following exterior substrates:

1. Metal siding
2. Hollow metal doors and frames

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Behr Process Corporation
2. Benjamin Moore & Co.
3. Dunn-Edward Corporation
4. Frazee Paint
5. ICI Paints
6. PPG Architectural Finishes, Inc.
7. Sherwin-Williams Company

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

C. Colors: Match existing (blue).
2.3 WATER-BASED PAINTS

A. Light Industrial Coating, Exterior, Water Based (Gloss Level 3):


PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions.

B. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

3.3 APPLICATION

A. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

A. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.
3.5 EXTERIOR PAINTING SCHEDULE

A. Metal Substrates:

1. Water-Based Light Industrial Coating System:

   a. Prime Coat: Light industrial coating, exterior, water based (Gloss Level 3).
   b. Topcoat: Light industrial coating, exterior, water based (Gloss Level 3).

END OF SECTION 099113
SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on interior substrates. The following interior substrates:

1. Gypsum board.

1.2 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, include preparation requirements and application instructions.

B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on gypsum board minimum 8.5"x11" with appropriate texture.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 2 gallons of each color and sheen. Contractor shall paint a 12” diameter circle on painted wall from each gallon in presence of PCC Job Coordinator to verify paint color and sheen match.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

   a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
   b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

   a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Benjamin Moore & Co.
3. Dunn-Edwards Corporation.
4. Frazee Paint.
5. ICI Paints.
6. PPG Architectural Finishes, Inc.
7. Sherwin-Williams Company.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. Colors: Match Architect's samples as indicated in the finish schedule.

2.3 PRIMERS/SEALERS

A. Primer Sealer, Interior, Institutional Low Odor/VOC: MPI #149.

1. Primer as specified by paint manufacturer for finish and texture. Primer shall be tinted so Job Coordinator with PCC can verify wall have been primed.

B. Primer, Latex, for Interior Wood: MPI #39.

2.4 STANDARD PAINT SPECIFICATIONS

A. Interior Acrylic Enamel, Low Sheen. The composition of the material shall conform to the following:

1. Pigment: to be no less than 35% and titanium dioxide to be no less than 18% of pigment by weight.
2. Vehicle: to be no less than 63% and vinyl resin to be no less than 20% of vehicle by weight. Gloss level to be no less than 5% or more than 9% using Garder Gloss Meter after air dry for seven (7) days.
3. Note: total pigment and vehicle to equal 100% of direct composition method.
4. Thickness: 1.5 dry mils.

B. Interior Acrylic Enamel, Semi-Gloss. The composition of the material shall conform to the following:
   1. Pigment: to be no less than 20% and titanium dioxide to be no less than 20% of pigment by weight.
   2. Vehicle: to be no less than 78% and vinyl resin to be no less than 24% of vehicle by weight.
   3. Gloss level to be no less than 49% or more than 61% using Garder Gloss Meter after air dry for seven (7) days.
   4. Note: total pigment and vehicle to equal 100% of direct composition method.
   5. Thickness: 1.5 dry mils.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Gypsum Board: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

E. Proceed with coating application only after unsatisfactory conditions have been corrected.
   1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer’s written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat. Job Coordinator for PCC shall approve each coat before Contractor can paint over with next paint coating layer. Failure to obtain approval will result in Contractor having to repaint surface.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance. Minimum of 2 coats of top coat is required with 24 hour dry time between coats.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

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.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Gypsum Board Substrates:

1. Institutional Low-Odor/VOC Latex System:
   a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
   c. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2), MPI #144.

END OF SECTION 099123
SECTION 099646 - INTUMESCENT PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and application of fire-retardant intumescent paint at underside of concrete roof deck, where edges of existing polyurethane foam insulation have been exposed in the past and where exposed by this project.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

B. MPI Standards: Comply with indicated requirements for the following:

1. Products: MPI standards indicated and listed in "MPI Approved Products List."

PART 2 - PRODUCTS

2.1 INTERIOR, PIGMENTED, INTUMESCENT PAINT SYSTEM

A. Fire-Retardant Intumescent Paint: Solvent-based, modified-alkyd-type, fire-retardant paint for interior wood and other combustible surfaces; MPI #63.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Flame Control Coatings, LLC; No. 10-10A; flat finish.
   b. Albi Manufacturing; a division of StanChem, Inc.; Albi-Cote 107A; flat finish.
B. Fire-Retardant Intumescent Paint: Water-based, latex-type, fire-retardant paint for interior wood and other combustible surfaces; MPI #64.

1. **Products**: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   b. Flame Control Coatings, LLC; No. 20-20; flat finish.
   d. Muralo Company (The); 1500; flat finish.
   e. NoFire Technologies Inc.; A-18; flat finish.
   f. PPG Industries Inc.; Speed Hide 42-7; flat finish.
   g. Albi Manufacturing, a division of StanChem, Inc.; Albi-Cote FRL; flat finish.
   h. Fire Research Laboratories/Ocean Fire Retardants Inc.; FireCoat 320; flat finish.
   i. Flame Control Coatings, LLC; No. 320A.

PART 3 - EXECUTION

3.1 **APPLICATION**

A. **Preparation**: Comply with manufacturer's written instructions and recommendations in the "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.

B. **Apply intumescent paints according to manufacturer's written instructions and to comply with requirements for fire-retardant coating classification.**

C. **At completion of construction activities, touch up and restore damaged or defaced coated surfaces.**

END OF SECTION 099646
SECTION 102600 - WALL AND DOOR PROTECTION

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. Corner guards.

B. Related Sections:
   1. Section 064023 "Interior Architectural Woodwork" for custom-fabricated bumper rails.
   2. Section 087100 "Door Hardware" for metal armor, kick, mop, and push plates.

1.3 ACTION SUBMITTALS

A. Product Data: Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.

B. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
   1. Corner Guards: 12 inches (300 mm) long. Include examples of joinery, comers, end caps, and field splices.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

   1. Corner Guards: Full-size units equal to 2 percent of each type, color, and texture of units installed, but no fewer than two, 4-foot- (1.2-m-) long units.

1.5 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish all wall protection system components from a single source.

B. Manufacturer: A firm regularly engaged in the manufacture of wall protection system components similar to those specified.
1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturers packages properly labeled for identification and for location in the Project. Comply with manufacturers instructions for storage and handling. Damaged and otherwise unsuitable material, when so determined, shall be immediately removed from the Project site.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install wall surface protection systems until the installation area is enclosed and weatherproof, and until the ambient temperature within the building is maintained at not less than 70 degrees F (21 degrees C) for not less than 72 hours prior to installation.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall protection units that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless-Steel Sheet: ASTM A 240/A 240M.

B. Adhesive: As recommended corner guard manufacturer and with a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.2 CORNER GUARDS

A. Surface-Mounted, Metal Corner Guards: Fabricated from one-piece, formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Babcock-Davis Model CG-SS304, or comparable product by one of the following:
   b. Hiawatha; CGSS.
   c. InPro Corporation.
d. JL Industries; CGSS.
e. Meek Mirrors LLC; M9010.

2. Material: Stainless steel, Type 304.
   a. Thickness: Minimum 16 gauge (0.0598 inch) (1.52 mm).
   b. Finish: Directional satin, No. 4.

3. Wing Size: Nominal 1-1/2 by 1-1/2 inches (38 by 38 mm).
4. Corner Radius: 1/8 inch (3 mm).

2.3 METAL FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
   1. Remove tool and die marks and stretch lines, or blend into finish.
   2. Grind and polish surfaces to produce uniform finish, free of cross scratches.
   3. Run grain of directional finishes with long dimension of each piece.
   4. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

B. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Complete finishing operations, including painting, before installing corner guards.

B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. General: Install corner guards level, plumb, and true to line without distortions. Do not use materials with scratches, stains, or other defects that might be visible in the finished Work.
3.4 CLEANING

A. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 102600
SECTION 104413 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fire-protection cabinets for the following:
      a. Portable fire extinguishers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.

PART 2 - PRODUCTS

2.1 FIRE-PROTECTION CABINET, DENTAL CLINIC

A. Cabinet Type: Suitable for fire extinguisher.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Guardian Fire Model 1840 or comparable product by one of the following:
      a. Larsens Manufacturing Company.
      b. Strike First Corporation of America.

B. Cabinet Construction: Nonrated.

C. Cabinet Material: Cold-rolled steel sheet.
   1. Shelf: Same metal and finish as cabinet.

D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
   1. Rolled-Edge Trim: 2-1/2-inch backbend depth.

E. Cabinet Trim Material: Steel sheet.

F. Door Material: Steel sheet.
G. Door Style: Fully glazed panel with frame.

H. Door Glazing: Tempered float glass (clear).

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
   1. Provide recessed door pull and friction latch.
   2. Provide continuous steel hinge permitting door to open 180 degrees.

J. Materials:
   1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
      a. Finish: Baked enamel or powder coat.
      b. Color: Red.
   2. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.2 Fire-Protection Cabinet, Dental Lab

A. Cabinet Type: Suitable for fire extinguisher.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Larsens Manufacturing Company; Occult Series Model O-2409 with solid #4 stainless steel door with black Type A die-cut lettering, or comparable product by one of the following:
      a. Nystrom, Inc.
      b. Potter Roemer LLC.

B. Cabinet Construction: Nonrated.

C. Cabinet Material: Stainless-steel sheet.
   1. Shelf: Same metal and finish as cabinet.

D. Recessed Cabinet:
   1. Trimless with Hidden Flange: Flange of same metal and finish as box overlaps surrounding wall finish and is concealed from view by an overlapping door.

E. Cabinet Trim Material: Same material and finish as door.

F. Door Material: Stainless-steel sheet.

G. Door Style: Flush opaque panel, frameless, with no exposed hinges.

H. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
I. **Accessories:**

1. **Identification:** Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
   
a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
   
      1) Location: Applied to cabinet door.
      2) Application Process: Manufacturer's standard.
      3) Lettering Color: Black.
      4) Orientation: Vertical (not "marquee").

J. **Materials:**

1. **Stainless Steel:** ASTM A 666, Type 304.
   
a. Finish: No. 4 non-directional satin finish.

2.3 **FABRICATION**

A. **Fire-Protection Cabinets:** Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

   1. Weld joints and grind smooth.
   2. Provide factory-drilled mounting holes.

B. **Cabinet Doors:** Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.

2.4 **GENERAL FINISH REQUIREMENTS**


B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. **Appearance of Finished Work:** Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

**PART 3 - EXECUTION**

3.1 **EXAMINATION**

A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for recessed and semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated below:

1. Fire-Protection Cabinets: 54 inches above finished floor to top of cabinet.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413
SECTION 123553.16 - PLASTIC-LAMINATE-CLAD LABORATORY CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Plastic-laminate laboratory casework.
   2. Filler and closure panels.
   3. Exposed shelves.

B. Related Requirements:
   1. Section 123661 “Simulated Stone Countertops” for solid surface countertops on plastic-laminate-clad laboratory casework.

C. NOTE: All custom millwork and manufactured casework and countertops shown in the Construction Documents shall be furnished and installed by the Contractor except for the center consoles, “12 o’clocks,” and the corner cabinets in the dental operatories. Those 3 items, in addition to the dental chairs themselves will be provided and installed by a separate contractor, but the General Contractor is still responsible for utility connections to those items as well as under-raised-floor structural supports and in-wall backing for them.

1.2 DEFINITIONS

A. MDF: Medium-density fiberboard.

B. Hardwood Plywood: A panel product composed of layers, or plies, of veneer, or of veneers in combination with lumber core, hardboard core, MDF core, or particleboard core, joined with adhesive and faced both front and back with hardwood veneers.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For laboratory casework. Include plans, elevations, and attachment details.

C. Samples: For plastic laminate and other materials requiring color selection.
1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of casework that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Delamination of components or other failures of glue bond.
   b. Warping of components.
   c. Failure of operating hardware.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide products by Case Systems Inc. or comparable product by one of the following:

1. ALC-Collegedale.
2. Cif Laboratory Solutions.
3. L9 Corporation of America; a Sagus International company.
4. Sheldon Laboratory Systems.
5. South Texas Woodmill, Inc.
7. Terrill Manufacturing Co., Inc.
10. Dental Arte (Metal Laboratory Casework).

B. Source Limitations: Obtain plastic-laminate-clad laboratory casework from single source from single manufacturer unless otherwise indicated.

C. Product Designations: Drawings indicate sizes and configurations of laboratory casework by referencing designated manufacturer's catalog numbers. Other manufacturers' laboratory casework of similar sizes and similar door and drawer configurations and complying with Specifications may be considered.

2.2 CASEWORK, GENERAL

A. Casework Product Standard: Comply with SEFA 8 PL, "Laboratory Grade Plastic Laminate Casework."
2.3 PLASTIC-LAMINATE CABINETS

A. Design:

1. Flush overlay.

B. Exposed Materials:

1. Plastic-Laminate Grade: HGS.
   a. Colors and Patterns: As selected by Architect from manufacturer's full range.

C. Semiexposed Materials:

1. Plastic Laminate: Grade CLS unless otherwise indicated. Provide plastic laminate for semiexposed surfaces unless otherwise indicated.
   a. Colors: As selected by Architect from manufacturer's full range.

2.4 PLASTIC-LAMINATE CABINET MATERIALS

A. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. ABET Inc.
   b. Arboite; a division of ITW Canada.
   c. Formica Corporation.
   d. Lamin-Art, Inc.
   e. Panoram Industries International.
   f. Wilsonart International; Div. of Premark International, Inc.

B. Edgebanding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish, 3 mm thick at doors and drawer fronts, 1 mm thick elsewhere.

1. Colors: As selected by Architect from manufacturer's full range.

C. Core Materials for Plastic Laminate:


D. Adhesive for Bonding Plastic Laminate: Manufacturer's standard waterproof, urea-formaldehyde-free adhesive.
2.5 FABRICATION

A. Filler and Closure Panels: Provide where indicated and as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as adjacent exposed cabinet surfaces unless otherwise indicated.

2.6 HARDWARE

A. General: Provide laboratory casework manufacturer's standard, commercial-quality, heavy-duty hardware complying with requirements indicated for each type.

B. Butt Hinges: Stainless-steel, five-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and rounded tips.

C. Hinged Door and Drawer Pulls: Solid-aluminum or stainless-steel back-mounted pulls.

D. Door Catches: Dual, self-aligning, permanent magnet catches. Provide two catches on doors more than 48 inches (1200 mm) high.

A. Door Locks: BHMA A156.11, E07122.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Olympus Lock, Inc.; 100DR Deadbolt Cabinet Door Lock or comparable product.
2. Key all cabinet doors alike – 915, with catch, and spacer for pair of doors.

B. Drawer Locks: BHMA A156.11, E07042.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Olympus Lock, Inc.; 200DW Deadbolt Cabinet Drawer Lock or comparable product.
2. Key all cabinet drawers alike – 915.

C. Adjustable Shelf Supports: Powder-coated steel shelf rests complying with BHMA A156.9, Type B04013.

2.7 EXPOSED SHELVES

A. Stainless-Steel Shelves: Made from stainless-steel sheet, not less than 0.050-inch nominal thickness, with No. 4 satin finish. Weld shop-made joints. Fold down front edge 3/4 inch. Provide manufacturer's standard support brackets, spacing as indicated. After fabricating, grind welds smooth and polish as needed to produce uniform, directionally textured finish with no cross scratches or evidence of welds. Passivate and rinse surfaces; remove embedded foreign matter and leave surfaces clean.
PART 3 - EXECUTION

3.1 INSTALLATION OF CABINETS

A. Comply with installation requirements in SEFA 2.3. Install level, plumb, and true; shim as required, using concealed shims. Where laboratory casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

B. Base Cabinets: Fasten cabinets to reinforcements in partitions, with fasteners spaced not more than 16 inches o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform.

1. Where base cabinets are installed away from walls, fasten to floor at toe space at not more than 24 inches o.c. and at sides of cabinets with not less than two fasteners per side.

C. Wall Cabinets: Fasten to hanging strips, partition framing, blocking, or reinforcements in partitions. Fasten each cabinet through back, near top, at not less than 16 inches o.c.

D. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.

E. Adjust laboratory casework and hardware so doors and drawers align and operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

3.2 CLEANING AND PROTECTING

A. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

B. Protect countertop surfaces during construction with 6-mil plastic or other suitable water-resistant covering. Tape to underside of countertop at a minimum of 48 inches o.c.

END OF SECTION 123553.16
SECTION 123623.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes plastic-laminate-clad countertops.

B. NOTE: All custom millwork and manufactured casework and countertops shown in the Construction Documents shall be furnished and installed by the Contractor except for the center consoles, "12 o'clocks," and the corner cabinets in the dental operatories. Those 3 items, in addition to the dental chairs themselves will be provided and installed by a separate contractor, but the General Contractor is still responsible for utility connections to those items as well as under-raised-floor structural supports and in-wall backing for them.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product high-pressure decorative laminate.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Samples:

1. Plastic laminates, for each color, pattern, and surface finish.

1.3 INFORMATIONAL SUBMITTALS

A. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates or WI Certified Compliance Program certificates.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Certified participant in AWI's Quality Certification Program or Licensee of WI's Certified Compliance Program.

B. Installer Qualifications: Fabricator of products.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE COUNTERTOPS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades indicated for construction, installation, and other requirements.

1. Provide labels from AWI or WI certification program indicating that countertops, including installation, comply with requirements of grades specified.

B. Grade: Custom.

C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGL.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Formica Corporation.
   b. Pionite.
   c. Wilsonart International; Div. of Premark International, Inc.
   d. Nevamar.

D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces that match existing and comply with the following requirements:

1. As selected by Architect from manufacturer's full range.

E. Edge Treatment: Square edge.

F. Core Material at Sinks: Water resistant MDF (ANSI MR-50).

G. Core Thickness: 3/4 inch.

1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.

H. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.

1. Wood Moisture Content: 4 to 9 percent.
2.3 ACCESSORIES

A. Grommets for Cable Passage through Countertops: 3-inch OD, brown, molded-plastic grommets and matching plastic caps with slot for wire passage.

   1. Product: Subject to compliance with requirements, provide “OG series” by Doug Mockett & Company, Inc.

2.4 MISCELLANEOUS MATERIALS

A. Adhesives: Do not use adhesives that contain urea formaldehyde.

B. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Health Services’ “Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers.”

C. VOC Limits for Installation Adhesives and Sealants: Use products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

   1. Wood Glues: 30 g/L
   2. Multipurpose Construction Adhesives: 70 g/L
   3. Structural Wood Member Adhesive: 140 g/L
   4. Architectural Sealants: 250 g/L

2.5 FABRICATION

A. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:

   1. Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.

B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

C. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burs.

   1. Seal edges of openings in countertops with a coat of varnish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.
3.2 INSTALLATION

A. Grade: Install countertops to comply with same grade as item to be installed.

B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
   1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.
   2. Seal edges of cutouts by saturating with varnish.

C. Field Jointing: Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required.
   1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

D. Install countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

E. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

F. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
   1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
   2. Secure backsplashes to walls with adhesive.
   3. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

END OF SECTION 123623.13
SECTION 123661 - SIMULATED STONE COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Solid-surface-material countertops and backsplashes.

B. NOTE: All custom millwork and manufactured casework and countertops shown in the Construction Documents shall be furnished and installed by the Contractor except for the center consoles, “12 o’clocks,” and the corner cabinets in the dental operatories. Those 3 items, in addition to the dental chairs themselves will be provided and installed by a separate contractor, but the General Contractor is still responsible for utility connections to those items as well as under-raised-floor structural supports and in-wall backing for them.

1.2 ACTION SUBMITTALS
A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

C. Samples: For each type of material exposed to view.

PART 2 - PRODUCTS

2.1 SOLID-SURFACE-MATERIAL COUNTERTOPS
A. Configuration: Provide countertops with the following front and backsplash style:
   1. Front: Straight, slightly eased at top.
   2. Backsplash: Straight, slightly eased at corner.

B. Countertops: 3/4-inch-thick, solid surface material with front edge built up with same material.

C. Backsplashes: Solid surface material to match countertop, thickness indicated.

2.2 COUNTERTOP MATERIALS
A. Composite Wood and Agrifiber Products: Provide products that comply with the testing and product requirements of the California Department of Health Services’ “Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers,” including 2004 Addenda.

C. Adhesives: Adhesives shall comply with the testing and product requirements of the California Department of Health Services’ "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Solid Surface Material: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Avonite Surfaces.
   c. Formica Corporation.
   d. LG Chemical, Ltd.
   e. Meganite Inc.
   f. Samsung Chemical USA, Inc.
   g. Swan Corporation (The).
   h. Transolid, Inc.
   i. Wilsonart International.

2. Type: Provide Standard Type.

3. Colors and Patterns: As selected by Architect from manufacturer's full range.
   b. Dental Clinic Sterilization Area, Biohazard Waste Basis of Design: Formica Traditions: Copper Matrix #334.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

END OF SECTION 123661
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves.
2. Sleeve-seal systems.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.


E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.2 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Thunderline Linkseal.
2. Mason Industries
B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel.
3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.3 GROUT


B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Cut sleeves to length for mounting flush with both surfaces.
   a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."
E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.3 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:
   a. Piping Smaller Than NPS 6 Cast-iron wall sleeves with sleeve-seal system
      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system
   b. Piping NPS 6 (and Larger):
      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system

2. Concrete Slabs-on-Grade:
   a. Piping Smaller Than NPS 6:
      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
   b. Piping NPS 6 and Larger: Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs above Grade:
   b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves.

4. Interior Partitions:
   a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves
   b. Piping NPS 6 and Larger: Galvanized-steel-sleeve.

END OF SECTION 220517
SECTION 220518 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Escutcheons.
   2. Floor plates.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated and rough-brass finish and setscrew fastener.

2.2 FLOOR PLATES

A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

   1. Escutcheons for New Piping:
      a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
      b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.
      c. Insulated Piping: One-piece, stamped-steel type.
      d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
g. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type.
h. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with rough-brass finish.
i. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type.
j. Bare Piping in Equipment Rooms: One-piece, cast-brass type with rough-brass finish.
k. Bare Piping in Equipment Rooms: One-piece, stamped-steel type.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
   1. New Piping: One-piece, floor-plate type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 220518
SECTION 220523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Brass ball valves.
   2. Bronze swing check valves.

B. Related Sections:
   1. Section 220553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.
   2. Section 221116 "Domestic Water Piping" for valves applicable only to this piping.
   3. Section 221319 "Sanitary Waste Piping Specialties" for valves applicable only to this piping.
   4. Section 226113 "Compressed-Air Piping for Laboratory and Healthcare Facilities" for valves applicable only to this piping.
   5. Section 226213 "Vacuum Piping for Laboratory and Healthcare Facilities" for valves applicable only to this piping.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of valve indicated.

1.3 QUALITY ASSURANCE

A. ASME Compliance: ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.

B. NSF Compliance: NSF 61 for valve materials for potable-water service.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.
D. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Gate Valves: With rising stem.
2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

E. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Solder Joint: With sockets according to ASME B16.18.
3. Threaded: With threads according to ASME B1.20.1.

2.2 BRASS BALL VALVES

A. Two-Piece, Full-Port, Brass Ball Valves with Brass Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Apollo Valve.
   c. Milwaukee Valve Company.

2. Description:
   c. Body Material: Bronze.
   d. Ends: Threaded.
   e. Seats: PTFE or TFE.
   f. Stem: Bronze.
   g. Ball: Chrome-plated brass.
   h. Port: Full.

2.3 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Nonmetallic Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Milwaukee Valve Company.
   c. Keckley

2. Description:
   a. Standard: MSS SP-80, Type 4.
d. Ends: Threaded.
e. Disc: PTFE or TFE.

2.4 BRONZE GATE VALVES

A. Class 125, NRS Bronze Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   
a. Crane Co.; Crane Valve Group; Crane Valves.
b. Milwaukee Valve Company.
c. Keckley
   
2. Description:
   
a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig
d. Ends: Threaded.
e. Stem: Bronze.
f. Disc: Solid wedge; bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install swing check valves for proper direction of flow and in horizontal position with hinge pin level.

3.2 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.
3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:
   1. Shutoff Service: Ball, or gate valves.
   2. Throttling Service: Ball valves.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:
   1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
   2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
   3. For Copper Tubing, NPS 5 and Larger: Flanged ends.

3.4 LOW-PRESSURE, COMPRESSED-AIR VALVE SCHEDULE (150 PSIG OR LESS)

A. Pipe NPS 2 and Smaller:
   1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
   2. Ball Valves: Two piece, full port, bronze with bronze trim.
   3. Bronze Swing Check Valves: Class 125, nonmetallic disc.
   4. Bronze Gate Valves: Class 125, NRS

B. Pipe NPS 2-1/2 and Larger:
   1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
   2. Ball Valves: Two piece, full port, bronze with bronze trim.
   3. Bronze Swing Check Valves: Class 125, nonmetallic disc.
   4. Bronze Gate Valves: Class 125, NRS

3.5 HIGH-PRESSURE, COMPRESSED-AIR VALVE SCHEDULE 150 PSIG

A. Pipe NPS 2 and Smaller:
   1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
   2. Ball Valves: Two piece, full port, bronze with bronze trim.
   3. Bronze Swing Check Valves: Class 150, nonmetallic disc.
   4. Bronze Gate Valves: Class 150, NRS

B. Pipe NPS 2-1/2 and Larger:
   1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
   2. Ball Valves: Two piece, full port, bronze with bronze trim.
   3. Bronze Swing Check Valves: Class 150, nonmetallic disc.
   4. Bronze Gate Valves: Class 150, NRS
3.6 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:
   1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
   2. Ball Valves: Two piece, full port, bronze with bronze trim.
   3. Bronze Swing Check Valves: Class 125, nonmetallic disc.
   4. Bronze Gate Valves: Class 125, NRS

B. Pipe NPS 2-1/2 and Larger:
   1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
   2. Ball Valves: Two piece, full port, bronze with bronze trim.
   3. Bronze Swing Check Valves: Class 125, nonmetallic disc.
   4. Bronze Gate Valves: Class 125, NRS.

END OF SECTION 220523
SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.
5. Pipe positioning systems.
6. Equipment supports.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7

1. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.
1.5 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:
   1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
   2. Galvanized Metallic Coatings: Pre-galvanized or hot dipped.
   3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
   4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.

B. Stainless-Steel Pipe Hangers and Supports:
   1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
   2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.

C. Copper Pipe Hangers:
   1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 THERMAL-HANGER SHIELD INSERTS

A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig with ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.

B. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig [ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength. 
C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.5 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces, for plumbing fixtures in commercial applications.

2.6 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.7 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

D. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

E. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.

F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.


H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

I. Install lateral bracing with pipe hangers and supports to prevent swaying.

J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

K. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

M. Insulated Piping:

1. Attach clamps and spacers to piping.
   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.

c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
b. NPS 4: 12 inches long and 0.06 inch thick.
c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.

6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches

3.5 PAINTING

A. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 Galvanized Surfaces. Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
E. Use carbon-steel pipe hangers and supports and metal trapeze pipe hangers and attachments for general service applications.
F. Use stainless-steel pipe hangers and stainless-steel attachments for hostile environment applications.
G. Use copper-plated pipe hangers and stainless-steel attachments for copper piping and tubing.
H. Use padded hangers for piping that is subject to scratching.
I. Use thermal-hanger shield inserts for insulated piping and tubing.
J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of non-insulated or insulated, stationary pipes NPS 1/2 to NPS 30
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to 
   NPS 24, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes 
   NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
4. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of non-insulated, stationary 
   pipes NPS 1/2 to NPS 8.
5. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
6. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe 
   base stanchion support and cast-iron floor flange or carbon-steel plate.
7. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe 
   base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to 
   retain pipe.
8. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if 
   longitudinal movement caused by expansion and contraction might occur.
9. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal 
   movement caused by expansion and contraction might occur but vertical adjustment is 
   not necessary.

K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system 
   Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to 
   NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to 
   NPS 24 if longer ends are required for riser clamps.

L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system 
   Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.

M. Building Attachments: Unless otherwise indicated and except as specified in piping system 
   Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe 
   hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist 
   construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, 
   channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are 
   considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by 
   using clip and rod. Use one of the following for indicated loads:
   a. Light (MSS Type 31): 750 lb
   b. Medium (MSS Type 32): 1500 lb.
   c. Heavy (MSS Type 33): 3000 lb.
8. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
9. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
2. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
3. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.

P. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

Q. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

R. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529
SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Equipment labels.
   2. Warning signs and labels.
   3. Pipe labels.

1.2 ACTION SUBMITTAL

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:
   1. Material and Thickness: Stainless steel, 0.025-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
   2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
   3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
   5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:
   1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
   2. Letter Color: Black.
   4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
   5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
   6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
   8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.


C. Background Color: Red.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.

2. Lettering Size: At least 1-1/2 inches high.
PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Division 09.

B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.

C. Pipe Label Color Schedule:

1. Vacuum Piping:
   a. Background Color: Black and White checkered.
   b. Letter Color: Black.

2. Compressed-Air Piping:
   a. Background Color: Yellow and White checkered
   b. Letter Color: Black.

3. Domestic Water Piping:
   a. Background Color: Blue
   b. Letter Color: Black.
4. Sanitary Waste Piping:
   a. Background Color: Green.
   b. Letter Color: Black.

END OF SECTION 220553
SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes insulating the following plumbing piping services:
   1. Domestic hot-water piping.
   2. Domestic re-circulating hot-water piping.
   3. Sanitary waste piping exposed to freezing conditions.
   4. Storm-water piping exposed to freezing conditions.
   5. Roof drains and rainwater leaders.

B. Related Sections:
   1. Section 220716 "Plumbing Equipment Insulation."
   2. Division 22 Section "Identification for Plumbing Piping and Equipment"

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
   2. Detail attachment and covering of heat tracing inside insulation.
   3. Detail insulation application at pipe expansion joints for each type of insulation.
   4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
   5. Detail removable insulation at piping specialties, equipment connections, and access panels.
   6. Detail application of field-applied jackets.
   7. Detail application at linkages of control devices.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.
1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

B. Comply with the following applicable standards and other requirements specified for miscellaneous components:


PART 2 - PRODUCTS

2.1 INSULATION MATERIALS


B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide the following:

a. Pittsburgh Coming Corporation; Foamglas.

2. Special-Shaped Insulation: ASTM C 552, Type III.
3. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
5. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
G. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Aeroflex USA, Inc.; Aerocel.
   b. Armacell LLC; AP Armaflex.
   c. K-Flex USA; Insul-Lock, Insul-Tube, and K-FLEX LS.

H. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, provide one of the following:
   b. Knauf Insulation: 1000-Degree Pipe Insulation.
   c. Owens Corning: Fiberglas Pipe Insulation.

2. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 INSULATING CEMENTS


1. Products: Subject to compliance with requirements, provide one of the following:
   a. Ramco Insulation, Inc.; Ramcote 1200 and Quik-Cote.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Aeroflex USA, Inc.; Aeroseal.
   b. Armacell LLC; Armaflex 520 Adhesive.
   c. K-Flex USA; R-373 Contact Adhesive.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide one of the following:
   b. Eagle Bridges - Marathon Industries; 225.

2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."


1. Products: Subject to compliance with requirements, provide one of the following:
   b. Eagle Bridges - Marathon Industries; 225.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Dow Corning Corporation; 739, Dow Silicone.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-BARRIER Mastic: Water based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:
   b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:
   b. Eagle Bridges - Marathon Industries; 550.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.

2.5 SEALANTS

A. Joint Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 100 to plus 300 deg F.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
6. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
B. **Metal Jacket Flashing Sealants:**

1. **Products:** Subject to compliance with requirements, provide one of the following:
   
   
b. Eagle Bridges - Marathon Industries; 405.
   
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. **Service Temperature Range:** Minus 40 to plus 250 deg F.
5. **Color:** Aluminum.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. **ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:**

1. **Products:** Subject to compliance with requirements, provide the following:
   

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. **Service Temperature Range:** Minus 40 to plus 250 deg F.
5. **Color:** White.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.6 **FACTORY-APPLIED JACKETS**

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. **ASJ-SSL:** ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
2.7 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for pipe.

1. Products: Subject to compliance with requirements, provide one of the following:
   b. Vimasco Corporation; Elastafab 894.

2.8 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Johns Manville; Zeston.
   c. Proto Corporation; LoSmoke.

2. Adhesive: As recommended by jacket material manufacturer.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
   a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.9 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. ABl, Ideal Tape Division; 428 AWF ASJ.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
   c. Compac Corporation; 104 and 105.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. ABI, Ideal Tape Division; 491 AWF FSK.
   b. Compac Corporation; 110 and 111.
   c. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW SQ.

2. Width: 3 inches.
3. Thickness: 6.5 mils.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. ABI, Ideal Tape Division; 370 White PVC tape.
   b. Compac Corporation; 130.
   c. Venture Tape; 1506 CW NS.

2. Width: 2 inches.
3. Thickness: 6 mils.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. ABI, Ideal Tape Division; 488 AWF.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
   c. Compac Corporation; 120.

2. Width: 2 inches.
3. Thickness: 3.7 mils.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

2.10 SECUREMENTS

A. Aluminum Bands: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing seal or closed seal.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. ITW Insulation Systems; Gerrard Strapping and Seals.
b. RPR Products, Inc.; Insul-Mate Strapping and Seals.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch wide, stainless steel or Monel.

C. Wire: 0.062-inch soft-annealed, stainless steel.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2.11 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. Truebro; a brand of IPS Corporation.

2. Description: Manufactured plastic wraps for covering plumbing fixture hot-water and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
   1. Install insulation continuously through hangers and around anchor attachments.
   2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
   3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
   4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:
   1. Draw jacket tight and smooth.
   2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
   3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.  
      a. For below-ambient services, apply vapor-barrier mastic over staples.
   4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
   5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:
1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.

3.3 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.4 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer’s recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.6 INSTALLATION OF MINERAL-FIBER PREFORMED PIPE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:
   1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
   2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
   3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
   4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:
   1. Install preformed pipe insulation to outer diameter of pipe flange.
   2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
   3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
   4. Install jacket material with manufacturer’s recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:
   1. Install preformed sections of same material as straight segments of pipe insulation when available.
   2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:
   1. Install preformed sections of same material as straight segments of pipe insulation when available.
   2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
   3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
   4. Install insulation to flanges as specified for flange insulation application.
3.7 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK jackets are indicated, install as follows:
   1. Draw jacket material smooth and tight.
   2. Install lap or joint strips with same material as jacket.
   3. Secure jacket to insulation with manufacturer's recommended adhesive.
   4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch-wide joint strips at end joints.
   5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

B. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.
   1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

C. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.8 FINISHES

A. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

B. Do not field paint aluminum or stainless-steel jackets.

3.9 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:
   1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.
3.10 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
   1. Drainage piping located in crawl spaces.
   2. Underground piping.
   3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.11 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Hot and Recirculated Hot Water: Insulation shall be one of the following:
   1. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

B. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities: Insulation shall be one of the following:
   1. Flexible Elastomeric: 3/4 inch thick.
   2. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

3.12 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:
   1. None.

D. Piping, Exposed:
   1. PVC: 20 mils thick.

END OF SECTION 220719
SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes under-building-slab and aboveground domestic water pipes, tubes, and fittings inside buildings.

B. Related Requirements:

1. Section 221113 "Facility Water Distribution Piping" for water-service piping outside the building from source to the point where water-service piping enters the building.

1.2 ACTION SUBMITTALS

A. Product Data: For transition fittings and dielectric fittings.

B. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content.

2. Laboratory Test Reports for Credit IEQ 4: For solvent cements and adhesive primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.3 INFORMATIONAL SUBMITTALS

A. System purging and disinfecting activities report.

B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Potable-water piping and components shall comply with NSF 14 and NSF 61. Plastic piping components shall be marked with "NSF-pw."
2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
B. Soft Copper Tube: ASTM B 88, Type K water tube, annealed temper.
C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.
E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
F. Copper Unions:
   1. MSS SP-123.
   4. Solder-joint or threaded ends.

2.3 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:
   1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
   2. Full-face or ring type unless otherwise indicated.
B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
C. Solder Filler Metals: ASTM B 32, lead-free alloys.
D. Flux: ASTM B 813, water flushable.
E. Brazing Filler Metals: AWS-A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.4 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
B. Dielectric Unions:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Capitol Manufacturing Company; member of the Phoenix Forge Group.
      b. Watts; a division of Watts Water Technologies, Inc.
      c. Wilkins; a Zurn company.
2. **Standard:** ASSE 1079.
3. **Pressure Rating:** 150 psig.
4. **End Connections:** Solder-joint copper alloy and threaded ferrous.

### C. Dielectric Flanges:

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
   
   a. Capitol Manufacturing Company; member of the Phoenix Forge Group.
   b. Watts; a division of Watts Water Technologies, Inc.
   c. Wilkins; a Zurn company.

2. **Standard:** ASSE 1079.
3. **Factory-fabricated, bolted, companion-flange assembly.**
4. **Pressure Rating:** 150 psig.
5. **End Connections:** Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

### D. Dielectric-Flange Insulating Kits:

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
   
   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Pipeline Seal and Insulator, Inc.

2. **Nonconductive materials for field assembly of companion flanges.**
3. **Pressure Rating:** 150 psig.
4. **Gasket:** Neoprene or phenolic.
5. **Bolt Sleeves:** Phenolic or polyethylene.
6. **Washers:** Phenolic with steel backing washers.

### E. Dielectric Nipples:

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
   
   a. Grinnell Mechanical Products; Tyco Fire Products LP.
   b. Precision Plumbing Products, Inc.
   c. Victaulic Company.

2. **Standard:** IAPMO PS 66.
3. **Electroplated steel nipple complying with ASTM F 1545.**
4. **Pressure Rating and Temperature:** 300 psig.
5. **End Connections:** Male threaded or grooved.
6. **Lining:** Inert and noncorrosive, propylene.
PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.

D. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."

E. Install shutoff valve immediately upstream of each dielectric fitting.

F. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements for pressure-reducing valves in Section 221119 "Domestic Water Piping Specialties."

G. Install domestic water piping level without pitch and plumb.

H. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

I. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

J. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

K. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

L. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

M. Install piping to permit valve servicing.

N. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

O. Install piping free of sags and bends.

P. Install fittings for changes in direction and branch connections.

Q. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
R. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping."

S. Install thermostats in hot-water circulation piping. Comply with requirements for thermostats in Section 221123 "Domestic Water Pumps."

T. Install thermometers on inlet and outlet piping from each water heater. Comply with requirements for thermometers in Section 220519 "Meters and Gages for Plumbing Piping."

U. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

V. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

W. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.2 Joint Construction

A. Ream ends of pipes and tubes and remove burns. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, 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 burns and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B828 or CDA's "Copper Tube Handbook."

F. Pressure-Sealed Joints for Copper Tubing: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.

G. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

H. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.
3.3 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings or unions.

3.4 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flange kits.

D. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:
   a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
   b. Longer than 100 Feet: MSS Type 43, adjustable roller hangers.
   c. Longer than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

   1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
   2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
   3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
   4. NPS 2-1/2: 108 inches with 1/2-inch rod.
   5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.

F. Install supports for vertical copper tubing every 10 feet.
3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
3. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
4. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.7 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."

B. Label pressure piping with system operating pressure.

3.8 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:
   a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
   b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
      1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
      2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
   c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
   d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
2. Piping Tests:
   a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
   b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
   c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
   d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
   e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
   f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.9 ADJUSTING

A. Perform the following adjustments before operation:
   1. Close drain valves, hydrants, and hose bibbs.
   2. Open shutoff valves to fully open position.
   3. Open throttling valves to proper setting.
   4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
      a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
      b. Adjust calibrated balancing valves to flows indicated.
   5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
   7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
   8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.10 CLEANING

A. Clean and disinfect potable domestic water piping as follows:
   1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
   a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
   b. Fill and isolate system according to either of the following:
      1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
      2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
   c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
   d. Repeat procedures if biological examination shows contamination.
   e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.11 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Aboveground domestic water piping, NPS 2 and smaller, shall be the following:
   1. Hard copper tube, ASTM B 88, Type L; cast or wrought copper, solder-joint fittings; and soldered joints.

E. Aboveground domestic water piping, NPS 2-1/2 to NPS 4, shall be the following:
   1. Hard copper tube, ASTM B 88, Type L; cast- or wrought-copper, solder-joint fittings; and soldered joints.

F. Aboveground domestic water piping, NPS 5 to NPS 8, shall be one of the following:
   1. Hard copper tube, ASTM B 88, Type L; cast-or wrought-copper, solder-joint fittings; and soldered joints.

END OF SECTION 221116
SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Pipe, tube, and fittings.
   2. Specialty pipe fittings.

B. Related Section:
   1. Section 221313 "Facility Sanitary Sewers" for sanitary sewerage piping and structures outside the building.

1.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

   1. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
2.2 COPPER TUBE AND FITTINGS

A. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.

B. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

C. Copper Flanges: ASME B16.24, Class 150, cast copper with solder-joint end.
   1. Flange Gasket Materials: ASME B16.21, full-face, flat, nonmetallic, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
   2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

D. Solder: ASTM B 32, lead free with ASTM B 813, water-flushable flux.

2.3 ABS PIPE AND FITTINGS

A. Solid-Wall ABS Pipe: ASTM D 2661, Schedule 40.

B. Cellular-Core ABS Pipe: ASTM F 628, Schedule 40.

C. ABS Socket Fittings: ASTM D 2661, made to ASTM D 3311, drain, waste, and vent patterns.

D. Solvent Cement: ASTM D 2235.
   1. ABS solvent cement shall have a VOC content of 325 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   2. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 SPECIALTY PIPE FITTINGS

A. Transition Couplings:
   1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
   2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
   3. Unshielded, Nonpressure Transition Couplings:
      a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
         1) Femco Inc.
c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

d. Sleeve Materials:

2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

4. Shielded, Nonpressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2) Mission Rubber Company; a division of MCP Industries, Inc.


c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping at indicated slopes.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.
H. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

I. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:
   1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 2 percent downward in direction of flow for piping NPS 4 and larger.
   2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
   3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

J. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

K. Install aboveground ABS piping according to ASTM D 2661.

L. Install aboveground PVC piping according to ASTM D 2665.

M. Plumbing Specialties:
   1. Install backwater valves in sanitary waste gravity-flow piping. Comply with requirements for backwater valves specified in Section 221319 "Sanitary Waste Piping Specialties."
   2. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."

N. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

O. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

P. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

Q. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

A. Join copper tube and fittings with soldered joints according to ASTM B 828. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.
B. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

C. Plastic, Nonpressure-Piping, Solvent-Cement 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. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
3. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.3 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in OD's.
2. In Drainage Piping: Shielded, nonpressure transition couplings.

3.4 VALVE INSTALLATION

A. Backwater Valves: Install backwater valves in piping subject to backflow.

1. Horizontal Piping: Horizontal backwater valves. Use normally closed type unless otherwise indicated.
2. Floor Drains: Drain outlet backwater valves unless drain has integral backwater valve.
3. Install backwater valves in accessible locations.
4. Comply with requirements for backwater valve specified in Section 221319 "Sanitary Waste Piping Specialties."

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
5. Vertical Piping: MSS Type 8 or Type 42, clamps.
6. Install individual, straight, horizontal piping runs:

   a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
   b. Longer than 100 Feet: MSS Type 43, adjustable roller hangers.
   c. Longer than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

F. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1-1/4: 72 inches with 3/8-inch rod.
   2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
   3. NPS 2-1/2: 108 inches with 1/2-inch rod.
   4. NPS 3 and NPS 5: 10 feet with 1/2-inch rod.
   5. NPS 6: 10 feet with 5/8-inch rod.
   6. NPS 8: 10 feet with 3/4-inch rod.

G. Install supports for vertical copper tubing every 10 feet.

H. Install hangers for ABS and PVC piping with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
   2. NPS 3: 48 inches with 1/2-inch rod.
   3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
   4. NPS 6 and NPS 8: 48 inches with 3/4-inch rod.

I. Install supports for vertical ABS and PVC piping every 48 inches.

J. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:
   1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
   2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
   3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
5. Install horizontal backwater valves with cleanout cover flush with floor.
6. Comply with requirements for backwater valves clean out sand drains specified in Section 221319 "Sanitary Waste Piping Specialties."
7. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.7 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.8 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-In Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-In Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.9 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.
B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
C. Place plugs in ends of uncompleted piping at end of day and when work stops.
D. Exposed ABS and PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

3.10 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
B. Aboveground, soil and waste piping NPS 4 and smaller shall be the following:
   1. Copper DWV tube, copper drainage fittings, and soldered joints.
   2. Solid-wall ABS pipe, ABS socket fittings, and solvent-cemented joints.
C. Aboveground, soil and waste piping NPS 5 and larger shall be the following:
   1. Solid-wall ABS pipe, ABS socket fittings, and solvent-cemented joints.
D. Aboveground, vent piping NPS 4 and smaller shall be the following:
   1. Copper DWV tube, copper drainage fittings, and soldered joints.
   2. Solid-wall ABS pipe, ABS socket fittings, and solvent-cemented joints.
E. Aboveground, vent piping NPS 5 and larger shall be the following:
   1. Solid-wall ABS pipe, ABS socket fittings, and solvent-cemented joints.

END OF SECTION 221316
SECTION 221319 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Backwater valves.
   2. Cleanouts.
   3. Floor drains.
   4. Roof flashing assemblies.
   5. Miscellaneous sanitary drainage piping specialties.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for grease interceptors.

1.3 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Exposed Cast-Iron Cleanouts:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      b. Watts Drainage Products.
      c. Zurn Plumbing Products Group.
   2. Standard: ASME A112.36.2M for cast iron for cleanout test tee.
   3. Size: Same as connected drainage piping.
   4. Body Material: Hubless, cast-iron soil pipe test tee as required to match connected piping.
   5. Closure: Raised-head, cast-iron plug.
   6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
B. Cast-Iron Floor Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   b. Watts Drainage Products Inc.
   c. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.36.2M for threaded, adjustable housing cleanout.
3. Size: Same as connected branch.
4. Type: Threaded, adjustable housing.
5. Body or Female: Cast iron.
7. Outlet Connection: Hubless.
8. Closure: Brass plug with tapered threads.
9. Adjustable Housing Material: Cast iron with threads.
11. Frame and Cover Shape: Round.
12. Top Loading Classification: See plans for intended use.
13. Riser: ASTM A 74, Extra-Heavy class, cast-iron drainage pipe fitting and riser to cleanout.

C. Cast-Iron Wall Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   b. Watts Drainage Products Inc.
   c. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Closure: Raised-head cast-iron plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

2.2 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Sleeve Flashing Device:

1. Description: Manufactured, cast-iron fitting, with clamping device that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend 2 inches above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.
2. Size: As required for close fit to riser or stack piping.
B. Stack Flashing Fittings:
   1. Description: Counter flashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
   2. Size: Same as connected stack vent or vent stack.

C. Vent Caps:
   1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
   2. Size: Same as connected stack vent or vent stack.

2.3 FLASHING MATERIALS

A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:
   1. General Use: 4.0-lb/sq. ft., 0.0625-inch thickness.
   2. Vent Pipe Flashing: 3.0-lb/sq. ft., 0.0469-inch thickness.

B. Fasteners: Metal compatible with material and substrate being fastened.

C. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

D. Solder: ASTM B 32, lead-free alloy.

E. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install backwater valves in building drain piping. For interior installation, provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing.

B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
   1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
   2. Locate at each change in direction of piping greater than 45 degrees.
   3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
   4. Locate at base of each vertical soil and waste stack.
C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
   1. Position floor drains for easy access and maintenance.
   2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
      a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
      b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
      c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
   3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
   4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

F. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.

G. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.

H. Assemble open drain fittings and install with top of hub 2 inches above floor.

I. Install deep-seal traps on floor drains and other waste outlets, if indicated.

J. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.
   1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
   2. Size: Same as floor drain inlet.

K. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

L. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.

M. Install vent caps on each vent pipe passing through roof.

N. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.
3.2 CONNECTIONS

A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:

1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft., 0.0938-inch thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft., 0.0625-inch thickness or thinner.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

E. Install flashing for piping passing through roofs with counter flashing or commercially made flashing fittings, according to Section 076200 "Sheet Metal Flashing and Trim."

F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

3.4 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each grease interceptor.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."
3.5 **PROTECTION**

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319
SECTION 226113 - COMPRESSED-AIR PIPING FOR LABORATORY AND HEALTHCARE FACILITIES

PART 1 - GENERAL

1.1 SUMMARY
   
   A. Section Includes:
      
      1. Medical compressed-air piping, designated "medical air."
      2. Gas-powered-tool compressed-air piping, designated "instrument air."

   B. Related Requirements:
      
      1. Section 221513 "General-Service Compressed-Air Piping" for general-service compressed-air piping and specialties.
      2. Section 226119 "Compressed-Air Equipment for Laboratory and Healthcare Facilities" for air compressors and specialties.
      3. Section 226400 "Medical Gas Alarms" for combined medical air, vacuum, and gas alarms.

1.2 ACTION SUBMITTALS
   
   A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS
   
   A. Qualification Data: For Installer.

   B. Material Certificates: Signed by Installer certifying that medical compressed-air piping materials comply with requirements in NFPA 99 for positive-pressure medical gas systems.

   C. Brazing certificates.

   D. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS
   
   A. Operation and maintenance data.

1.5 QUALITY ASSURANCE
   
   A. Installer Qualifications:
      
      2. Shape-Memory-Metal Coupling Joints: An authorized representative who is trained and approved by manufacturer.
B. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the vacuum piping testing indicated, that is a member of the Medical Gas Professional Healthcare Organization or is an NRTL, and that is acceptable to authorities having jurisdiction.

1. Qualify testing personnel according to ASSE Standard #6020 for medical-gas-system inspectors and ASSE Standard #6030 for medical-gas-system verifiers.

C. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code, Section IX, "Welding and Brazing Qualifications"; or AWS B2.2.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Medical air operating at 50 to 55 psig.

B. Instrument air operating at 175 psig.

2.2 PIPES, TUBES, AND FITTINGS

A. Comply with NFPA 99 for medical air piping materials.

B. Copper Medical Gas Tube: ASTM B 819, Type K, seamless, drawn temper that has been manufacturer cleaned, purged, and sealed for medical gas service or according to CGA G-4.1 for oxygen service. Include standard color marking "OXY," "MED," "OXY/MED," "OXY/ACR," or "ACR/MED" in green for Type K tube and in blue for Type L tube.

C. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type that has been manufacturer cleaned, purged, and bagged for oxygen service according to CGA G-4.1.

D. Copper Unions: ASME B16.22 or MSS SP-123, wrought-copper or cast-copper alloy.

E. Cast-Copper-Alloy Flanges: ASME B16.24, Class 150.

2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel.

F. Shape-Memory-Metal Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Aerofit, Inc.
   b. Smart Tap, Inc.

2. Description: Cryogenic compression fitting made of nickel-titanium, shape-memory alloy, and that has been manufacturer cleaned, purged, and sealed for oxygen service according to CGA G-4.1.
G. Flexible Pipe Connectors:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Flex-Hose Co., Inc.
   b. Flexicraft Industries.
   c. Hyspan Precision Products, Inc.
   d. Mercer Gasket & Shim, Inc.
   e. Metraflex Company (The).
   f. Proco Products, Inc.
   g. Unaflex.
   h. Universal Metal Hose; a Hyspan Co.

2. Description: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
   a. Working-Pressure Rating: 200 psig minimum.
   b. End Connections: Plain-end copper tube.

2.3 JOINING MATERIALS

A. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys.

B. Threaded-Joint Tape: PTFE.

2.4 VALVES

A. General Requirements for Valves: Manufacturer cleaned, purged, and bagged according to CGA G-4.1 for oxygen service.

B. Ball Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Allied Healthcare Products Inc.; Chemetron Division.
   b. Amico Corporation.
   c. BeaconMeades.
   d. Conbraco Industries, Inc.
   e. Marwin Valve; a division of Richards Industries.
   f. NIBCO INC.
   g. Ohio Medical Corporation.
   h. Tri-Tech Medical Inc.

3. Description: Three-piece body, brass or bronze.
4. Pressure Rating: 300 psig minimum.
5. Ball: Full-port, chrome-plated brass.
6. Seats: PTFE or TFE.
C. Check Valves:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Allied Healthcare Products Inc.; Chemetron Division.
      b. Amico Corporation.
      c. BeaconMedaes.
      d. Conbraco Industries, Inc.
      e. Ohio Medical Corporation.
      f. Tri-Tech Medical Inc.
   2. Description: In-line pattern, bronze.
   3. Pressure Rating: 300 psig minimum.

D. Safety Valves:
   1. Bronze body.
   2. ASME-construction, poppet, pressure-relief type.
   3. Settings to match system requirements.

E. Pressure Regulators:
   1. Bronze body and trim.
   2. Spring-loaded, diaphragm-operated, relieving type.
   4. Rated for 80-psig minimum inlet pressure.
   5. Capable of controlling delivered air pressure within 0.5 psig for each 10-psig inlet pressure.

2.5 MEDICAL COMPRESSED-AIR SERVICE CONNECTIONS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Allied Healthcare Products Inc.; Chemetron Division.
   2. Amico Corporation.
   4. Ohio Medical Corporation.
   5. Oxequip Health Industries; a division of Allied Healthcare Products Inc.
   6. Tri-Tech Medical Inc.

B. General Requirements for Medical Compressed-Air Service Connections:
   1. Suitable for specific medical air pressure and service listed.
   2. Include roughing-in assemblies, finishing assemblies, and cover plates.
   3. Individual cover plates are not required if service connection is in multiple unit or assembly with cover plate.
   4. Recessed-type units made for concealed piping unless otherwise indicated.
C. Finishing Assembly:
   1. Brass housing with primary check valve.
   2. Double seals that will prevent air leakage.
   3. Cover plate with gas-service label.

D. Quick-Coupler Pressure Service Connections:
   1. Outlets for instrument air with non-interchangeable keyed indexing to prevent interchange between services.
   2. Constructed to permit one-handed connection and removal of equipment.
   3. With positive-locking ring that retains equipment stem in valve during use.

E. D.I.S.S. Pressure Service Connections: Outlets, complying with CGA V-5, with threaded indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment.

F. Cover Plates:
   1. One piece.
   2. Stainless steel.
   3. Permanent, color-coded, identifying label matching corresponding service.

PART 3 - EXECUTION

3.1 PREPARATION

A. Cleaning of Medical Gas Tubing: If manufacturer-cleaned and -capped fittings or tubing are not available or if precleaned fittings or tubing must be recleaned because of exposure, have supplier or separate agency acceptable to authorities having jurisdiction perform the following procedures:
   1. Clean medical gas tube and fittings, valves, gages, and other components of oil, grease, and other readily oxidizable materials as required for oxygen service according to CGA G-4.1.
   2. Wash medical gas tubing and components in hot, alkaline-cleaner-water solution of sodium carbonate or trisodium phosphate in proportion of 1 lb of chemical to 3 gal. of water.
      a. Scrub to ensure complete cleaning.
      b. Rinse with clean, hot water to remove cleaning solution.
3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of compressed-air piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, air-compressor sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Comply with NFPA 99 for installation of compressed-air piping.

C. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and coordinate with other services occupying that space.

F. Install piping adjacent to equipment and specialties to allow service and maintenance.

G. Install compressed-air piping with 1 percent slope downward in direction of flow.

H. Install nipples, unions, special fittings, and valves with pressure ratings same as or higher than system pressure rating used in applications specified in "Piping Schedule" Article unless otherwise indicated.

I. Install eccentric reducers, if available, where compressed-air piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.

J. Install branch connections to compressed-air mains from top of main. Provide drain leg and drain trap at end of each main and branch and at low points.

K. Install thermometer and pressure gage on discharge piping from each air compressor and on each receiver. Comply with requirements in Section 220519 "Meters and Gages for Plumbing Piping."

L. Install piping to permit valve servicing.

M. Install piping free of sags and bends.

N. Install fittings for changes in direction and for branch connections.

O. Install medical air piping to medical air service connections specified in this Section, to medical air service connections in equipment specified in Section 226313 "Gas Piping for Laboratory and Healthcare Facilities," and to equipment specified in other Sections requiring medical air service.

P. Piping Restraint Installation: Install seismic restraints on compressed-air piping. Seismic-restraint devices are specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
Q. Install compressed-air service connections recessed in walls. Attach roughing-in assembly to substrate; attach finishing assembly to roughing-in assembly.

R. Connect compressed-air piping to air compressors and to compressed-air outlets and equipment requiring compressed-air service.

S. Install unions in copper compressed-air tubing adjacent to each valve and at final connection to each machine, specialty, and piece of equipment.

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

U. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 VALVE INSTALLATION

A. Install shutoff valve at each connection to and from compressed-air equipment and specialties.

B. Install check valves to maintain correct direction of compressed-air flow from compressed-air equipment.

C. Install valve boxes recessed in wall and anchored to substrate. Single boxes may be used for multiple valves that serve same area or function.

D. Install zone valves and gages in valve boxes. Rotate valves to angle that prevents closure of cover when valve is in closed position.

E. Install pressure regulators on compressed-air piping where reduced pressure is required.

F. Install flexible pipe connectors in discharge piping and in inlet air piping from remote air-inlet filter of each air compressor.

3.4 JOINT CONSTRUCTION

A. Remove scale, slag, dirt, and debris from outside of cleaned tubing and fittings before assembly.

B. Threaded Joints: Apply appropriate tape to external pipe threads.

C. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" chapter. Continuously purge joint with oil-free dry nitrogen during brazing.

D. Flanged Joints: Install flange on copper tubes. Use pipe-flange gasket between flanges. Join flanges with gasket and bolts according to ASME B31.9 for bolting procedure.

E. Shape-Memory-Metal Coupling Joints: Join new copper tube to existing tube according to procedures developed by fitting manufacturer for installation of shape-memory-metal coupling joints.
3.5 COMPRESSED-AIR SERVICE COMPONENT INSTALLATION

A. Install compressed-air pressure control panel in walls. Attach to substrate.

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements in Section 220548 “Vibration and Seismic Controls for Plumbing Piping and Equipment” for seismic-restraint devices.

B. Comply with requirements in Section 220529 “Hangers and Supports for Plumbing Piping and Equipment” for pipe hanger and support devices.

C. Vertical Piping: MSS Type 8 or Type 42, clamps.

D. Individual, Straight, Horizontal Piping Runs:
   1. 100 Feet and Less: MSS Type 1, adjustable, steel, clevis hangers.
   2. Longer than 100 Feet: MSS Type 43, adjustable, roller hangers.

E. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze. Comply with requirements in Section 220529 “Hangers and Supports for Plumbing Piping and Equipment” for trapeze hangers.

F. Base of Vertical Piping: MSS Type 52, spring hangers.

G. Support horizontal piping within 12 inches of each fitting and coupling.

H. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch- minimum rods.

I. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1/4: 60 inches with 3/8-inch rod.
   2. NPS 3/8 and NPS 1/2: 72 inches with 3/8-inch rod.
   4. NPS 1: 96 inches with 3/8-inch rod.
   6. NPS 1-1/2: 10 feet with 3/8-inch rod.
   7. NPS 2: 11 feet with 3/8-inch rod.
   8. NPS 2-1/2: 13 feet with 1/2-inch rod.
   9. NPS 3: 14 feet with 1/2-inch rod.
  10. NPS 3-1/2: 15 feet with 1/2-inch rod.
  11. NPS 4: 16 feet with 1/2-inch rod.

J. Install supports for vertical copper tubing every 10 feet.

3.7 IDENTIFICATION

A. Install identifying labels and devices for valves and specialties. Comply with requirements in Section 220553 “Identification for Plumbing Piping and Equipment.”
B. Install identifying labels and devices for medical compressed-air piping systems according to NFPA 99. Use the following or similar captions and color-coding for piping products where required by NFPA 99:

1. Medical Air: Black letters on yellow background.
2. Instrument Air: White letters on red background.

3.8 FIELD QUALITY CONTROL FOR MEDICAL COMPRESSED-AIR PIPING IN HEALTHCARE FACILITIES

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections of medical compressed-air piping in healthcare facilities and to prepare test and inspection reports.

B. Tests and Inspections:

1. Medical Compressed-Air Testing Coordination: Perform tests, inspections, verifications, and certification of medical compressed-air piping systems concurrently with tests, inspections, and certification of medical gas piping and medical vacuum piping systems.

2. Preparation: Perform the following installer tests according to requirements in NFPA 99 and ASSE Standard #6010:
   a. Initial blowdown.
   b. Initial pressure test.
   c. Cross-connection test.
   d. Piping purge test.
   e. Standing pressure test for positive-pressure medical compressed-air piping.
   f. Repair leaks and retest until no leaks exist.

3. System Verification: Perform the following tests and inspections according to NFPA 99, ASSE Standard #6020, and ASSE Standard #6030:
   a. Standing pressure test.
   b. Individual-pressurization or pressure-differential cross-connection test.
   c. Valve test.
   d. Master and area alarm tests.
   e. Piping purge test.
   f. Piping particulate test.
   g. Piping purity test.
   h. Final tie-in test.
   i. Operational pressure test.
   j. Medical air purity test.
   k. Verify correct labeling of equipment and components.

4. Testing Certification: Certify that specified tests, inspections, and procedures have been performed and certify report results. Include the following:
   a. Inspections performed.
   b. Procedures, materials, and gases used.
   c. Test methods used.
   d. Results of tests.

C. Remove and replace components that do not pass tests and inspections and retest as specified above.
3.9 PROTECTION

A. Protect tubing from damage.
B. Retain sealing plugs in tubing, fittings, and specialties until installation.
C. Clean tubing not properly sealed, and where sealing is damaged, according to “Preparation” Article.

3.10 PIPING SCHEDULE

A. Connect new tubing to existing tubing with memory-metal couplings.
B. Flanges may be used where connection to flanged equipment is required.
C. Instrument Air Piping Larger Than 1/4” and Operating at More Than 60 psig: Type K, copper tube; wrought-copper fittings; and brazed joints.

3.11 VALVE SCHEDULE

A. Shutoff Valves: Ball valve with manufacturer-installed ASTM B 819, copper-tube extensions.
B. Zone Valves: Ball valve with manufacturer-installed ASTM B 819, copper-tube extensions with pressure gage on one copper-tube extension.

END OF SECTION 226113
SECTION 226213 - VACUUM PIPING FOR LABORATORY AND HEALTHCARE FACILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Medical-surgical vacuum piping, designated "medical vacuum."

B. Related Requirements:
   1. Section 226219 "Vacuum Equipment for Laboratory and Healthcare Facilities" for vacuum producers and accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Material Certificates: Signed by Installer certifying that medical vacuum piping materials comply with requirements in NFPA 99.

C. Brazing certificates.

D. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:
   2. Shape-Memory-Metal Coupling Joints: An authorized representative who is trained and approved by manufacturer.
B. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the vacuum piping testing indicated, that is a member of the Medical Gas Professional Healthcare Organization or is an NRTL, and that is acceptable to authorities having jurisdiction.

1. Qualify testing personnel according to ASSE Standard #6020 for medical-gas-system inspectors and ASSE Standard #6030 for medical-gas-system verifiers.

C. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code, Section IX, "Welding and Brazing Qualifications"; or AWS B2.2, "Standard for Brazing Procedure and Performance Qualification."

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

2.2 Medical vacuum operating at 15 in. Hg PIPES, TUBES, AND FITTINGS

A. Comply with NFPA 99 for medical vacuum piping materials.

B. Copper Medical Gas Tube: ASTM B 819, Type L, seamless, drawn temper that has been manufacturer cleaned, purged, and sealed for medical gas service or according to CGA G-4.1 for oxygen service. Include standard color marking "OXY," "MED," "OXY/MED," "OXY/ACR," or "ACR/MED" in blue.

C. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type that has been manufacturer cleaned, purged, and sealed for medical gas service or according to CGA G-4.1 for oxygen service.

D. Copper Unions: ASME B16.22 or MSS SP-123, wrought-copper or cast-copper alloy.

E. Cast-Copper-Alloy Flanges: ASME B16.24, Class 150.

1. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, full-face type.

2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel.

F. Shape-Memory-Metal Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Aerofit, Inc.
   b. Smart Tap, Inc.

2. Description: Cryogenic compression fitting made of nickel-titanium, shape-memory alloy, and that has been manufacturer cleaned, purged, and sealed for oxygen service according to CGA G-4.1.
G. Flexible Pipe Connectors:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Flex-Hose Co., Inc.
   b. Flexicraft Industries.
   c. Hyspan Precision Products, Inc.
   d. Mercer Gasket & Shim, Inc.
   e. Metaflex Company (The).
   f. Proco Products, Inc.
   g. Unaflex.
   h. Universal Metal Hose; a Hyspan Co.

2. Description: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
   a. Working-Pressure Rating: 80 minimum.
   b. End Connections: Plain-end copper tube.

2.3 JOINING MATERIALS

A. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys.

B. Threaded-Joint Tape: PTFE.

2.4 VALVES

A. General Requirements for Valves: Manufacturer cleaned, purged, and bagged according to CGA G-4.1 for oxygen service.
   1. Exception: Factory cleaning and bagging are not required for valves for WAGD service.

B. Copper-Alloy Ball Valves:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Allied Healthcare Products Inc.; Chemetron Division.
      b. Amico Corporation.
      c. Beacon Mehdas.
      d. Conbraco Industries, Inc.
      e. Marwin Valve; a division of Richards Industries.
      f. NIBCO INC.
      g. Ohio Medical Corporation.
      h. Tri-Tech Medical Inc.
   3. Description: Three-piece body, brass or bronze.
   4. Pressure Rating: 300 psig minimum.
5. Ball: Full-port, chrome-plated brass.
6. Seats: PTFE or TFE.
8. Stem: Blowout proof with PTFE or TFE seal.

C. Check Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Allied Healthcare Products Inc.; Chemetron Division.
   b. Amico Corporation.
   c. BeaconMedaes.
   d. Conbraco Industries, Inc.
   e. Ohio Medical Corporation.
   f. Tri-Tech Medical Inc.

2. Description: In-line pattern, bronze.
3. Pressure Rating: 300 psig minimum.

2.5 MEDICAL VACUUM SERVICE CONNECTIONS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Allied Healthcare Products Inc.; Chemetron Division.
2. Amico Corporation.
4. Ohio Medical Corporation.
5. Oxequip Health Industries; a division of Allied Healthcare Products Inc.
6. Tri-Tech Medical Inc.

B. General Requirements for Medical Vacuum Service Connections:

1. Suitable for specific medical vacuum service listed.
2. Include roughing-in assemblies, finishing assemblies, and cover plates.
3. Individual cover plates are not required if service connection is in multiple unit or assembly with cover plate.
4. Recessed-type units made for concealed piping unless otherwise indicated.

C. Finishing Assembly:

1. Brass housing with primary check valve.
2. Seals that will prevent vacuum leakage.
3. Cover plate with gas-service label.

D. Quick-Coupler Suction Service Connections:

1. Inlets for medical vacuum with noninterchangeable keyed indexing to prevent interchange between services.
2. Constructed to permit one-handed connection and removal of equipment.
3. With positive-locking ring that retains equipment stem in valve during use.

E. D.I.S.S. Suction Service Connections:
1. Inlets complying with CGA V-5.
2. Threaded indexing to prevent interchange between services.
3. Constructed to permit one-handed connection and removal of equipment.

F. Vacuum Bottle Brackets: One piece, with pattern and finish matching corresponding service cover plate.

G. Cover Plates:
1. One piece.
2. Stainless steel.
3. Permanent, color-coded, identifying label matching corresponding service.

PART 3 - EXECUTION

3.1 PREPARATION
A. Cleaning of Medical Gas Tubing: If manufacturer-cleaned and -capped fittings or tubing is not available or if precleaned fittings or tubing must be recleaned because of exposure, have supplier or separate agency acceptable to authorities having jurisdiction perform the following procedures:
1. Clean medical gas tube and fittings, valves, gages, and other components of oil, grease, and other readily oxidizable materials as required for oxygen service according to CGA G-4.1.
2. Wash medical gas tubing and components in hot, alkaline-cleaner-water solution of sodium carbonate or trisodium phosphate in proportion of 1 lb of chemical to 3 gal. of water.
   a. Scrub to ensure complete cleaning.
   b. Rinse with clean, hot water to remove cleaning solution.

3.2 PIPING INSTALLATION
A. Drawing plans, schematics, and diagrams indicate general location and arrangement of vacuum piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, vacuum producer sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
B. Comply with NFPA 99 for installation of vacuum piping.
C. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and coordinate with other services occupying that space.

F. Install piping adjacent to equipment and specialties to allow service and maintenance.

G. Install vacuum piping with 1 percent slope downward in direction of flow.

H. Install nipples, unions, special fittings, and valves with pressure ratings same as or higher than piping pressure rating used in applications specified in “Piping Schedule” Article unless otherwise indicated.

I. Install eccentric reducers, if available, where vacuum piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.

J. Provide drain leg and drain trap at end of each main and branch and at low points.

K. Install thermometer and vacuum gage on inlet piping to each vacuum producer and on each receiver and separator. Comply with requirements in Section 220519 “Meters and Gages for Plumbing Piping.”

L. Install piping to permit valve servicing.

M. Install piping free of sags and bends.

N. Install fittings for changes in direction and for branch connections.

O. Install medical vacuum piping from medical vacuum service connections specified in this Section, to equipment specified in Section 226219 “Vacuum Equipment for Laboratory and Healthcare Facilities,” and to equipment specified in other Sections requiring medical vacuum service.

P. Install medical vacuum service connections recessed in walls. Attach roughing-in assembly to substrate; attach finishing assembly to roughing-in assembly.

Q. Install medical vacuum bottle bracket adjacent to each wall-mounted medical vacuum service connection suction inlet.

R. Connect vacuum piping to vacuum producers and to equipment requiring vacuum service.

S. Install unions in copper vacuum tubing adjacent to each valve and at final connection to each machine, specialty, and piece of equipment.

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 “Sleeves and Sleeve Seals for Plumbing Piping.”

U. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 “Escutcheons for Plumbing Piping.”