STANDARD SPECIFICATIONS

EXHIBIT A
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PART 1 - GENERAL

1.1 DESCRIPTION

1. Work Included: Excavate and grade in the areas designated in the Contract Documents as shown on the grading plan and specified herein, which shall include, but not be limited to, the following:

   1) Excavation and site preparation.
   2) Grading to establish subgrades for slabs, walks, pavements, gravel surfaces, and grassed areas.
   3) Excavation, filling and backfilling and compaction.
   4) Dewatering or addition of water as required.
   5) Placing of topsoil and finish grading.

2. Related Sections: Additional Sections of the Documents which are referenced in this Section include:

   1) Section 02315 - Excavation, Backfilling, and Compacting for Structures
   2) Section 02317 - Excavation, Backfilling, and Compacting for Utilities
   3) Section 02921 - Seeding

1.2 REFERENCES

1. General: The work shall comply with the most recent standards or tentative standards as published at the date of the contract and as listed in this specification using the abbreviation shown.


   1) D 698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft)
   2) D 1556 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
   3) D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³)(2,700 kN-m/m³)
   4) D 2167 Standard Test Method for Density and Unit Weight of Soil In Place by the Rubber Balloon Method
   5) D 2216 Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
   6) D 2487 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)
   7) D 2922 Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
   8) D 2937 Standard Test Methods for Density of Soil in Place by the Drive-Cylinder Method
   9) D 3017 Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
11) 303 Earthwork

1.3 DEFINITIONS

1) Controlled Fill: Controlled fill is fill required in all areas on which final grade is not placed on original excavated soil.
2) Unclassified Excavation: For the purposes of payment, material shall not be classified except for those items specifically listed in the soils report.
3) Unsuitable Material: For the purposes of classified excavation, unsuitable material shall be defined as material below subgrade elevation that exhibits excessive pumping or that does not meet density requirements due to unsatisfactory material as determined by Geotechnical Engineer.
4) Satisfactory Materials: Materials classified by ASTM D 2487 as GW, GP, GM, GC, SW, SP, SM, SC, ML, and CL are satisfactory as fill for overlot grading and are satisfactory in-situ. Materials shall have a minimum compacted density of 95 pounds per cubic foot and a plasticity index in excess of 15.
5) Unsatisfactory Materials: Materials classified by ASTM D 2487 as OL, OH, MH, CH, and PT are unsatisfactory in-situ and as fill. Unsatisfactory materials also include those materials containing roots and other organic matter, trash, debris, frozen materials, and stones larger than 6 inches. Fill materials containing stones larger than 3 inches shall not be used in the uppermost 2 feet.
6) Cohesionless and Cohesive Materials: Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Materials classified as GM and SM will be identified as cohesionless only when the minus #40 fraction has a plasticity index of zero as classified by ASTM D 4318.
7) Degree of Compaction: Degree of compaction is a percentage of the maximum density obtained by the test procedure presented in ASTM D 698 or ASTM D 1557 as specified, abbreviated below as a percent of laboratory maximum density.
8) Topsoil: Material obtained from excavations, suitable for topsoils shall consist of friable clay loam, free from roots, stones, other undesirable material and shall be capable of supporting a good growth of plant material.
9) Geotechnical Engineer: A representative of a commercial geotechnical testing laboratory which will be used by the Subcontractor to provide the required quality assurance testing.

1.4 SYSTEM DESCRIPTION

1) Soil Bearing Capacity: Soil underneath all footings and structures shall have a minimum bearing capacity as the Geotechnical Engineer and detailed in their soils report (Exhibit B).

1.5 SUBMITTALS

1) General: Copies of all test results and field and office worksheets shall be furnished to the Owner within 72 hours after the tests are complete.

2. Test Reports: The testing agency shall submit the following reports, in duplicate, directly to the Owner from the testing services, with a copy to the Subcontractor.
   1) Test report on borrow material for soil classification.
   2) Field density reports and map of test location.
   3) One optimum moisture-maximum density curve for each type of soil used for controlled fill.
   4) Other reports of any testing hereinafter specified deemed necessary by Soils Engineer or requested by the Owner.
   5) A test location plan shall be included with each submittal.

1.6 QUALITY ASSURANCE

1) Geotechnical Engineer: The Owner has retained a licensed independent Geotechnical Engineer and Test Laboratory to insure that earthwork meets the requirements of the specifications for density and moisture content. The Geotechnical Engineer shall attend the
Pre-Construction Conference. The Subcontractor is responsible for scheduling periodic site visits by the Geotechnical Engineer to facilitate testing and verification of work in place.

2) **Inclement Weather:** When fill operations are ceased due to weather (rain, freezing, snow, etc.), construction shall not be resumed until the Geotechnical Engineer has verified soil strength has not been adversely affected. If soil strength has been decreased, the affected portion of fill shall be rescarified, moistened, or dried as required and recompacted to the specified density.

3) **Inspection:** The Subcontractor shall conduct daily inspections and more often if necessary to verify that the specifications are being met for the installation of materials.

4) **Coordination:** The Subcontractor shall coordinate the work with the Owner's Inspector by notifying the Inspector of scheduled work in advance. The Subcontractor shall coordinate work with other trades whose work will be affected on the site.

5) **Utilities:** Prior to any excavation, the Subcontractor shall verify the locations of all utilities which may be in the area.

6) **Drainage:** The Subcontractor shall be responsible for the proper drainage of the site during construction of the project. Water shall not be allowed to accumulate in any of the excavated areas. Storm or ground water collecting on site during construction shall be removed by pumping, ditching, or other suitable means.

### 1.7 PROJECT CONDITIONS

1) **Topographic Survey:** Topographic information and boundary survey is by Miller Surveying, Inc. (Exhibit B)

2) **Test Borings:** A subsurface investigation has been made at the site of the project in order to ascertain character of materials to be excavated. This information is provided for general information only. Attention is directed to the fact that these logs indicate materials encountered at boring locations only. Nothing in plans or specifications shall be taken as a guarantee that materials other than those disclosed by borings will be encountered or that proportions of various materials will not vary from those indicated. If the Subcontractor has any questions or desires additional information it is their responsibility to acquire this information at their own expense. All excavation for project is to be considered and bid as "unclassified" and no allowances will be made for rock encountered or removal and replacement of unsuitable material.

3) **Existing Utilities:** Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
   a. Should uncharted, incorrectly charted, unmarked in field, or incorrectly marked in the field, piping or other utilities be encountered during excavation, Subcontractor shall consult utility Owner immediately for directions. Subcontractor shall cooperate with Owner and utility companies in keeping respective services and facilities in operation, and shall repair or arrange for repair, damaged utilities to satisfaction of utility owner.
   b. Subcontractor shall demolish and completely remove existing underground utilities as indicated on the plans and shall coordinate with utility companies for shut-off of services if lines are active.

4) **Protection of Persons and Property:** Barricade open excavations occurring as part of this work and post with warning lights.
   a. The Subcontractor shall operate warning lights as recommended by authorities having jurisdiction.
   b. The Subcontractor shall protect structures, utilities, sidewalks, pavements, trees and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
   c. The Subcontractor shall protect, maintain and restore bench marks, monuments, and other reference points affected by this work. If bench marks, monuments or other permanent reference points are displaced or destroyed, points shall be re-established and markers reset under supervision of a licensed Land Surveyor.
PART 2 - PRODUCTS

2.1 MATERIALS

1) **Materials:** All fill materials shall be free from mud, refuse, construction debris, organic material, rock or gravel greater than 6 inches in any dimension, frozen or otherwise unsuitable material. Materials for fills shall be secured from excavation after rejection of any unsuitable materials. Materials from other sources may be used upon approval by the Geotechnical Engineer. Fill materials in the uppermost 2 feet shall not have any rocks larger than 3 inches in diameter.

2) **Borrow:** Material for use in replacing undercut areas or in construction of embankments shall be approved by the Geotechnical Engineer and obtained from approved sources.

3) **Rock:** Rock shall be removed to a minimum depth of 12 inches below the subgrade elevation. The excavated area shall be brought up to subgrade with approved material placed and compacted as described herein.

4) **Unsuitable Materials:** Areas that exhibit excessive pumping or that do not meet density requirements due to unsuitable material as determined by Geotechnical Engineer shall be undercut and replaced with approved material in accordance with PART 3, EXECUTION.

PART 3 - EXECUTION

3.1 TOPSOIL

1) **Conservation of Topsoil:** Topsoil shall be removed as required without contamination with subsoil, and stockpiled convenient to areas for later application or at locations specified. Any surplus of topsoil from excavations and grading shall be stockpiled in a location approved by the Owner. A silt fence shall be installed on the downslope side and the stockpiles seeded.

2) **Placing Topsoil:** On areas to receive topsoil, the compacted subgrade shall be scarified to a 2 inch depth for bonding of topsoil with subsoil. Topsoil then shall be spread evenly and graded to the elevations and slopes shown. Topsoil shall not be spread when frozen or excessively wet or dry. All areas disturbed by work in this project shall be seeded in accordance with Section 02921 - Seeding.

3.2 EXCAVATION

1) **Excavation:** Excavation shall be unclassified except for those items specifically indicated in soils report. After topsoil removal has been completed, excavation of every description, regardless of material encountered, within the grading limits of the project shall be performed to the lines and grades indicated. Satisfactory excavation material shall be transported to and placed in fill areas within the limits of the work. All unsuitable material including any soil which is disturbed by the Subcontractor's operations and surplus material shall be disposed of at locations off site secured by the Subcontractor and approved by the Owner. Excavations carried below the depths indicated, shall, except as otherwise specified, be refilled to the proper grade with satisfactory material as directed. All additional work of this nature shall be at the Subcontractor's expense, unless otherwise provided for in the bidding documents. Excavation and filling shall be performed in a manner and sequence that will provide drainage at all times. Excavations shall be kept free from water while construction therein is in progress. If the Subcontractor fails to provide adequate drainage and any material becomes soft or otherwise unsuitable as a result, such material shall be removed and replaced with satisfactory on-site material or borrow material from approved sources, or shall be dried and recompressed as directed by the Geotechnical Engineer at no additional cost to the Owner.

2) **Excavation for Structures:** Excavation shall be in accordance with Section 02315 – Excavation, Backfilling, and Compacting for Structures.

3) **Excavation for Utilities:** Trenches for underground utilities systems and drain lines shall be in accordance with Section 02317 - Excavation Trenching and Backfilling for Utilities.
4) **Unauthorized Excavation:**
   a. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific instruction from the Owner or the Geotechnical Engineer.
   b. Under footings or foundations, fill unauthorized excavations by extending the indicated bottom elevation of the footing or base to the unauthorized excavation bottom, but in no way altering the required top elevation.
   c. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations, unless otherwise directed by the Geotechnical Engineer.

5) **Stability of Excavations:** Maintain sides and slopes of excavations in a manner such that the excavation provides safety of personnel, protection of work, and compliance with requirements of governmental agencies having jurisdiction.

### 3.3 FILL

1) **Preparation of Ground Surface for Fill:** All vegetation such as roots, brush, heavy sods, heavy growth of grass, and all decayed vegetative matter, rubbish, and other unsatisfactory material within the area upon which fill is to be placed, shall be stripped or otherwise removed before the fill is started. In no case will unsatisfactory material remain in or under the fill area. The areas shall then be scarified to a depth of at least 6 inches, moistened or aerated as required and compacted with vibratory rollers, pneumatic rollers, sheepsfoot rollers or other mechanical means acceptable to the Geotechnical Engineer. Sloped ground surfaces steeper than one vertical to four horizontal on which fill is to be placed shall be plowed, stepped, benched, or broken up, as directed, in such manner that the fill material will bond with the existing surface. Prepared surfaces on which compacted fill is to be placed shall be wetted or dried as may be required to obtain the specified moisture content and density.

2) **Fills and Embankments:** Fills and embankments shall be constructed at the locations and to lines and grades indicated. The completed fill shall conform to the grading plan indicated. Approved material obtained during excavation may be used in forming required fill. Fill shall be satisfactory material and shall be free from roots, other organic material. No frozen material will be permitted in the fill. Stones having a dimension greater than 3 inches shall not be permitted in the upper 2 feet of fill or horizontal embankment. The material shall be placed in successive horizontal layers of 8 inches in loose depth for the full width of the cross section and shall be compacted as specified. Each layer shall be compacted before the overlaying lift is placed. Moisture content of the fill or backfill material shall be adjusted by wetting or aerating as necessary to provide the moisture content specified.

3) **Backfilling Structures:** Backfilling for structures shall be in accordance with Section 02315 – Excavation, Backfilling, and Compacting for Structures.

### 3.4 COMPACTION

1) **Subgrade Compaction:** The cut subgrade material shall be compacted to 100 percent of its maximum dry density as determined by ASTM D 698. The moisture content should be within +/-5 percentage points of the material’s optimum as determined by ASTM D 2216.

2) **Compaction:** Each layer of the fill shall be compacted to at least 95 percent of the maximum theoretical density as determined by ASTM D 698. Moisture content shall be within +/-2 percent points of optimum as determined by ASTM D 2216. The top 1-foot of fill under pavement areas shall be compacted to 98 percent of maximum dry density as determined by ASTM D 698.

### 3.5 FINISHED GRADES

1) **General:** All areas covered by the project, including excavated and filled sections and adjacent transition areas, shall be uniformly smooth-graded. The finished surface shall be reasonably smooth, compacted, and free from irregular surface changes. The degree of finish shall be that ordinarily obtainable from blade-grader operations, except as otherwise specified. Ditches and gutters shall be finished to permit adequate drainage.

2) **Unsatisfactory Material:** Soft or otherwise unsatisfactory material shall be replaced with satisfactory excavated material or other approved materials.
3) **Finished Elevations:** Low areas resulting from removal of unsuitable material or from excavation of rock shall be brought up to required grade with satisfactory materials, and the entire area shall be shaped to line, grade, and cross section and shall be compacted as specified. The surface of embankments or excavated areas for road construction or other areas on which a base course or pavement is to be placed shall vary not more than 0.10 feet from the established grade and approved cross section. Surfaces other than those to be paved shall be finished not more than 0.20 feet above or below the established grade or approved cross section.

3.6 **PROTECTION**

1) **Site Preservation:** The Subcontractor shall protect newly graded areas from traffic, erosion, settlement or washout that may occur from any cause; prior to acceptance shall be repaired and reestablished to the required gradients. All work shall be conducted in accordance with the Erosion Control provisions of these specifications.

3.7 **FIELD QUALITY CONTROL**

1) **Testing:** Testing shall be the responsibility of the Subcontractor and shall be performed by an approved commercial testing laboratory qualified to perform such tests and approved by the Engineer. Tests conforming to ASTM D 698, shall be made by the Geotechnical Engineer or his representative on each soil type found in the areas prepared to receive fill and in the soil to be used for fill. Field Density tests shall be made by the Geotechnical Engineer or his representative in accordance with ASTM D 1556 or ASTM D 2922 and ASTM D 3017 on the areas prepared to receive fill and on each layer of compacted fill. Testing shall be the responsibility of the Subcontractor and shall be performed at no additional cost to the Owner. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted if necessary by the procedure described in ASTM D 2922, paragraph “ADJUSTING CALIBRATION CURVE”. ASTM D 2922 results in a wet unit weight of soil and when using this method, ASTM D 3017 shall be used to determine the moisture gauges along with density calibration checks as described in ASTM D 3017. ASTM D 2937 shall be used only for soft, fine-grained, cohesive soils. At least one test shall be performed on the compacted backfill. More tests shall be performed if in the judgment of the Inspector or Owner the compactive effort of the Subcontractor will not result in the specified density.

2) **Testing Frequency:** The following submittals are required.
   a. A minimum of one moisture-density test shall be performed for each classification of fill material, and existing subgrade material.
   b. One Atterberg limits test and one gradation analysis is required for every six field density tests.
   c. Field density tests shall be performed as follows: a minimum of one test per lift per 5,000 square feet or fraction thereof is required for fill material and a minimum of one test per lift per 5,000 square feet or fraction thereof is required for subgrades prior to filling.

3) **Visual Inspection:** Upon completion of all excavation of unsuitable material, and for all footings, the Geotechnical Engineer shall visually inspect the subgrade and excavations. The visual inspection shall be conducted to assure that the data obtained from the test borings and used as a basis of design was representative of the site conditions. Upon completion of the inspection, the Geotechnical Engineer shall provide written notification to the Owner.

4) **Proof Rolling:** Following visual inspection, Subcontractor shall demonstrate to the Geotechnical Engineer that the exposed subgrade does not contain previously unidentified soft areas by proof rolling. Proof rolling shall consist of rolling the entire surface with approved mechanical equipment while observing the subgrade for displacement or deformation.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

1) Related Documents:
   a. Drawings and general provisions of the Subcontract apply to this Section.
   b. Review these documents for coordination with additional requirements and information
      that apply to work under this Section.

2) Section Includes:

3) Related Sections:
   a. Section 02 - General Requirements

1.2 REFERENCES

1) General:
   a. The following documents form part of the Specifications to the extent stated. Where
      differences exist between codes and standards, the one affording the greatest protection
      shall apply.
   b. Unless otherwise noted, the referenced standard edition is the current one at the time of
      commencement of the Work.
   c. Refer to "General Requirements" for the list of applicable regulatory requirements.

2) American Concrete Institute (ACI):
   a. ACI 211.1 Proportioning Concrete Mixtures
   b. ACI 301 Specifications for Structural Concrete
   c. ACI 303.1 Specification for Cast-in-Place Architectural Concrete
   d. ACI 305 Hot Weather Concreting
   e. ACI 306 Specifications for Cold Weather Concreting
   f. ACI 308 Specifications for Curing Concrete
   g. ACI 309 Consolidation of Concrete
   h. ACI 318 Building Code Requirements for Structural Concrete

3) American Society for Testing and Material (ASTM)
   a. ASTM C31 Practice for Making and Curing Concrete Test Specimens in the Field
   b. ASTM C33 Specification for Concrete Aggregates
   c. ASTM C94 Specification for Ready Mix Concrete
   d. ASTM C143 Test Method for Slump of Hydraulic Concrete
   e. ASTM C150 Specification for Portland Cement
   f. ASTM C156 Standard Test Method for Water Retention by Liquid Membrane Forming
      Curing Compounds for Concrete
   g. ASTM C171 Specification for Sheet Materials for Curing Concrete
   h. ASTM C172 Practice for Sampling Freshly Mixed Concrete
   i. ASTM C260 Specifications for Air Entraining Admixtures for Concrete
   j. ASTM C309 Specification for Liquid Membrane - Forming Compounds for Curing
      Concrete
   k. ASTM C330 Specification for Lightweight Aggregates for Structural Concrete
   l. ASTM C494 Specification for Chemical Admixtures for Concrete
   m. ASTM C567 Test Method for Determining Density of Structural Lightweight Concrete
   n. ASTM C618 Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use in
      Concrete
1.3 SUBMITTALS

1) Submit under provisions of Division 01 "General Requirements."
2) Product Data: Provide data form proprietary materials, including admixtures curing materials, and finish materials.
3) Submit Placement Shop Drawings, showing location of construction joints, clearly indicate the construction joints in different locations shown in the Drawings.
4) Samples: As requested by Testing Laboratory.
5) Mix design for each concrete mix sealed by an engineer registered in Arizona.
   a. Include compression test data used to establish mix proportions.
6) Submit certification that the facilities of the ready-mix plant comply with the requirements of ASTM C94.
7) Material Certificates.
   a. Cementitious materials, including supplemental cementitious material.
   b. Aggregates, including gradation and combined gradation.
   c. Admixtures. Where more than one admixture is proposed, include statement from admixture manufacturer indicating that admixtures proposed for use are compatible, such that desirable effects of each admixture will be realized.
8) Submit ticket to Testing Laboratory for each batch of concrete delivered, bearing the following information. Refer to "Field Quality Control" Article of this Section.
   a. Mix identification.
   b. Weights of cementitious materials, aggregates, water and admixtures, and aggregate size.
9) Submit test reports from the independent testing agency for review by the Engineer.

1.4 QUALITY ASSURANCE

1) Quality assurance and inspection shall be in accordance with and under the supervision of the Project Soils and Structural Engineer.
2) Standards: Comply with provisions of ACI 301, except where more stringent requirements are indicated. Evaluation and acceptance of concrete structures will be in accordance with ACI 301.
3) Concrete Mix Design: Testing Laboratory shall, under direction of its Registered Engineer, design concrete mixes in accordance with the Soil and Structural Engineer recommendations (Exhibit B). Each mix shall bear the signature, seal and registration expiration date of the engineer directing the design work. For mixes containing greater than twenty five percent fly ash, the Testing Laboratory shall produce calculations and test batches in accordance with the recommendations of ACI 211.1 to determine the minimum water content and to confirm workability, curing time and compressive strength.
4) Certificates of Compliance: Acceptability of the following materials will be based upon documentation furnished by the manufacturer identifying each batch of material and certifying compliance with the requirements specified:
   a. Portland cement.
   b. Fly ash.
   c. Chemical admixtures.
5) Certified Laboratory Test Reports: Before delivery of materials, submit certified copies of the reports of the tests required in referenced standards or otherwise specified here. The testing shall have been performed by an independent laboratory approved by the University within one year of submittal of test reports for approval. Test reports on a previously tested material shall be accompanied by notarized certificates from the manufacturer certifying that the previously tested material is of the same type, quality, manufacture and make as that proposed for use in the Project. Certified test reports are required for the following:
   a. Portland cement.
b. Aggregates.
c. Admixtures.

6) Survey anchor bolts for placement and alignment prior to casting concrete.

PART 2 - CONCRETE MATERIALS

1) Cementitious materials and aggregates for exposed concrete shall be from same source throughout the work.
2) Cementitious Material: Submit for review and Approval by the Project Engineer. An intimate blend of Portland cement and supplemental cementitious material. Cementitious material shall include [15 percent minimum to a maximum of 25 percent] [50 percent minimum to a maximum of 60 percent] fly ash or ground blast furnace slag by weight, unless the strength is specified to be achieved in 7 or 14 days. Cementitious material shall comply with ACI 318 Chapter 4 requirements for exposure class S1.
3) Aggregate for Standard Weight Concrete: ASTM C33, except as modified herein.
   a. Coarse Aggregates: Cleanness Value of not less than 75 when tested as per CMM-Test Method.
   b. Coarse Aggregate for Shrinkage Controlled Concrete: per submittal.
   c. Fine Aggregates: Sand Equivalent of not less than 75 when tested per CMM-Test Method.
4) Water: Mixing water shall be clean, potable and free from deleterious material.
5) Admixtures: Submit for review and Approval by the Project Engineer.
   a. General:
      i. Where mix contains more than one admixture, all admixtures shall be supplied by one manufacturer. Manufacturer shall certify that admixtures are compatible such that desirable effects of each admixture will be realized.
      ii. Liquid admixtures shall be considered part of the total water.

PART 3 - EXECUTION

3.1 EXAMINATION

1) Verify site conditions under “General Requirements”.
2) Verify requirements for concrete cover over reinforcement.
3) Verify that anchor bolts, embedded plates, reinforcement, sleeves and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete or framing walls.

3.2 FORMWORK ERECTION

1) Verify lines, levels, and measurements before proceeding with formwork.
2) Hand trim sides and bottom of earth forms; remove loose dirt.
3) Align form joints.
4) Do not apply form release agent to concrete surfaces which receive [special finishes] [or] [applied coatings] that may be affected by agent.
   a. Coordinate work of other sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

3.3 REINFORCEMENT AND EMBEDDED ITEMS

1) Place, support, and secure reinforcement and embedded items against displacement.
2) Installation tolerances for anchor bolts for structural steel columns shall comply with the AISC Code of Standard Practice for Steel Buildings and Bridges requirements for tolerances.
3) Only items that are dimensionally located on the drawings may be embedded in concrete regardless of the trade responsible for placing them.
3.4  PLACING CONCRETE

1) Notify the Owner at least 48 hours prior to commencement of concreting operations. No concrete shall be placed until all subgrade, formwork, reinforcing steel, embedded items and surfaces against which concrete is to be placed have been accepted by the Engineer, Inspector and Owner. The rate of delivery, haul time, missing time and hopper capacity shall be such that all mixed concrete delivered shall be placed in forms within 90 minutes from the time of the introduction of cement and water into the mixer. No water shall be added after transit mixer leaves the batching plant without the approval of the Soils and/or Structural Engineer.

2) Foundation surfaces against which concrete is to be placed must be free from standing water, mud and debris. Surfaces shall be clean and free from oil, objectionable coatings, and loose or unsound material.

3) All surfaces of forms and embedded items shall be free of grout before placing concrete.

4) Install [joint fillers] and [waterstops] in accordance with manufacturer’s instructions. Install [1/2-inch (13 mm)] thick joint filler to separate slabs on grade from vertical surfaces. Extend joint filler from bottom of slab to within ¼-inch (6 mm) of finished slab surface.

5) Locate construction joints where indicated on the Structural Drawings.

6) When ambient temperature is expected to exceed 80 degrees F during placing or finishing operations, steps shall be taken in accordance with ACI 305, "Recommended Practices for Hot Weather Concreting", to reduce concrete temperature and water evaporation by proper attention to the ingredients, production methods, handling, placing, protection and curing. The Subcontractor shall submit a detailed hot weather concreting procedure to the Project Engineer for approval at least two business days before concrete placement is planned. The A/E testing agency will produce trial batches in accordance with ACI 305. Slabs will be fog sprayed from the completion of screeding until curing is begun; the fog spray may be discontinued on sections during troweling.

3.5  FLOOR SLABS

1) Place floor slabs as indicated on Drawings. Saw cut control joints at an optimum time after finishing. Cut slabs with a 3/16-inch (8 mm) thick blade to 1 inch (25 mm) depth.

2) Separate slabs on grade from vertical surfaces with joint filler. Extend joint filler from bottom of slab to within ¼ inch of finished slab surface.

3) Trowel finish surfaces.

4) Install joint devices and joint device anchors in accordance with manufacturer’s instructions. Maintain correct position to allow joint cover flush with floor finish.

3.6  CURING AND PROTECTION

1) The requirements of this section may be modified only by the Structural Engineer of Record (SER) for the design.

2) Wheeling, working and walking on concrete shall be avoided for at least 24 hours after casting. Protect concrete from sun and rain. Do not permit concrete to become dry during curing period. Concrete shall not be subjected to any loads until concrete is completely cured, and until concrete has attained its 28 day strength and 14 day minimum.

3) Protect concrete during and after curing from damage during subsequent building construction operations.

4) Cover traffic areas with plywood or other suitable means for as long as necessary to protect concrete from damage.

5) Specific curing requirements for slabs shall include the following: Immediately upon completion of finishing operation, the surface of slabs shall be sealed against moisture loss by the application of a curing blanket made of polyethylene bonded to burlap in accordance with the manufacturer’s instructions. Alternatively, waterproof curing paper may be used with edges lapped and sealed with tape. The curing membrane shall be weighted down. Tears and rips in curing membrane shall be repaired immediately during curing period. Curing shall be maintained for a minimum of 14 – 21 days.
3.7 FIELD QUALITY CONTROL

1) Inspection and Testing will be performed under the General Requirements provision.

2) Testing Laboratory will:
   a. Collect and review tickets for each batch of concrete delivered. Annotate water or admixtures added subsequent to batching.
   b. Special Inspect concrete placement, as required for conformance with the Contract Documents.
   c. Slump: ASTM C143; one test at point of placement at start of each day’s pour; additional tests when concrete consistency appears to have changed.
   d. Compressive Strength: Test concrete for compressive strength in accordance with ASTM C39. Conform to testing frequency. Take 4 specimens per sample, test one at seven days, two at 28 days, and retain one specimen.
   e. Temperature: ASTM C1064; one test hourly. Take additional tests where warranted by weather conditions or delays in delivery.
   f. Air Content: ASTM C173; for mixes with more than 3 percent air, take one test hourly at point of placement.

3) The Subcontractor will be responsible for all Testing Laboratory costs for investigating low-strength compressive test results in accordance with CBC Section 1905.6.5.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 061000
ROUGH CARPENTRY

PART 1 – GENERAL

1.1 SUMMARY
1) Provide labor, material, equipment, and services necessary for installation and completion of all rough carpentry as shown on the drawings and as noted herein.

2) See Structural Sheets by [Bingham Engineering, Inc.].

3) Related Documents:
4) Drawings and general provisions of the Subcontract apply to this Section.
5) Review these documents for coordination with additional requirements and information that apply to work under this Section.
6) Section Includes: Execution and completion of Rough Carpentry in accordance with the Specifications and Drawings including but not limited to;
   a. Dimensional lumber.
   b. Wall, floor, and roof sheathing.
7) Related Sections:
   c. Division 01 Section "General Requirements."
   d. Division 01 Section "Special Procedures."
   e. Division 01 Section "Construction Waste Management".
   f. Division 06 Section "Finish Carpentry'.
   g. Division 08 Section "AAMA Standard 2400-02"

1.2 REFERENCES
1) General:
   a. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work. Refer to Division 01 Section "General Requirements" for the list of applicable regulatory requirements.
   b. Conduct all work in conformance with the International Residential Code. All materials will be in compliance with the West Coast Lumber Inspection Bureau (WCLIB) and the American Plywood Association (APA) standards.
2) Refer to Division 01 Section "General Requirements" for the list of applicable regulatory requirements.
   a. ASTM International.
   b. American Wood Preservers Association (AWPA).
   c. Douglas fir Protection Association (DFPA).

1.3 DEFINITIONS
1) Certified Sustainably Harvested Lumber: Dimensional lumber derived from a Well Managed Forest as certified by one of the following Certification Organizations accredited by the Forest Stewardship Council:
a. Green Cross Certification Program: Scientific Certification Systems  
b. Smart Wood Certification Program: Rainforest Alliance  
c. Pacific Certified Ecological Forest Products: Institute for Sustainable Forestry  
d. Community Forestry Certification Program: Rogue Institute for Ecology and Economy.

PART 2 – PRODUCTS

2.1 MATERIALS

1) General: Material shall conform to these specifications and to the applicable current editions of the Standard Specifications of ASTM and CBC. [The source of new lumber shall be certified sustainable harvested lumber.]

2) Lumber Grading:

3) Lumber Grade Marking: Each piece of lumber shall bear the official grade mark of the appropriate inspection bureau of the American Lumber Association, California Redwood Association, WCLIB, etc.

4) Lumber Size and Patterns: Surface four sides, dress sizes to UBC Chapter 23; work to sizes shown. Sizing and surfacing shall be as required and approved for the particular location. Framing shall be sized and where exposed shall be surfaced.


6) Dimensional lumber 2 inches (50 mm) or less in thickness shall have an average moisture content of 19 percent or less but no portion of a shipment shall be over 25 percent. Air dried lumber is desired but, if necessary, lumber may be kiln dried, however, the drying process must be slow and regulated to cause only an amount of checking comparable with air-dried stock. Wood thicker than 2-1/2 inches (63 mm) shall be well seasoned stock, moisture content not to exceed 18 percent.

7) Sills and equipment curbs which rest on concrete shall be foundation grade Redwood or preservative pressure treated Douglas fir, cut ends are to be treated in the field.

8) Framing, blocking, backing, etc., unless otherwise shown, shall be Douglas fir. All interior wood and plywood used for blocking and built into roofing, or otherwise shown shall receive fire retardant pressure treatment in accordance with paragraph 2.5.B. Exterior stair framing and decking, and wood exposed to the exterior, or otherwise shown, shall receive the preservative type pressure treatment in accordance with paragraph 2.5.A.

9) Dimensional lumber shall be derived from either Certified Sustainable Harvested Lumber or Salvaged and/ or Recovered
   a. Lumber.

10) Redwood lumber shall be derived from either Certified Sustainable Harvested Lumber or Salvaged and/ or Recovered Lumber. No old growth redwood shall be used unless sustainable harvested, salvaged or recovered.

2.2 WALL, FLOOR AND ROOF SHEATHING

1) Plywood: See Paragraph 2.1 E.
2) Oriented Strand Board: Phenolic-glued low-formaldehyde board made with Douglas fir veneers and fibers. Plywood / particleboard 5 ply composite sheathing and flooring.

3) Fiberboard Sub-Floor: Structural, noise-deadening fiberboard sub-floor and insulating carpet underlayment
   a. 100 percent post-consumer recycled waste paper.
   b. No added formaldehyde or asbestos.

4) Particleboard: Compressed wood fibers with phenol formaldehyde resin binder.

2.3 LUMBER FASTENINGS (EXCEPT FOR PRESERVATIVE PRESSURE TREATED LUMBER FASTENINGS)

1) Nails and Spikes: Common Wire unless otherwise noted
   a. Nailing of wood members shall conform to Uniform Building Code and/or as indicated. Box nails are not permitted.
   b. Penetration: half-length of nail into piece receiving point.
   c. To connect pieces 2 inches (25 mm) net in thickness, 16d nails may be used.
   d. Do not drive nails closer together than half their length, nor closer to edge of piece of lumber or timber than 1/4 their length
   e. Spacing and size of nails to be such that splitting will not occur. Pre-bore holes for nails wherever necessary to prevent splitting. Bore diameter of holes smaller than diameter of nail or spike (3/4 dia.).
   f. For plywood nailing, barbed plywood nails, size and spacing as indicated. Nails shall have edge distances of not less than 3/8 inch (9.5 mm).
   g. Use galvanized nails where exposed to weather or where members are built-in to roofing.

2) Screws: Bright steel wood screws:
   a. Screws are to be turned into place, not driven. Self-tapping where required for fastening to metal framing.
   b. Countersink where heads will interfere or as required.
   c. Screw bolt holes the same diameter and depth as shank; bore holes for threaded portion of screws with bit no larger than base of thread.
   d. Use galvanized or cadmium plated screws on fastenings exposed to weather or where members are built-in to roofing.

3) Bolts: Standard mild steel, square or hex head machine bolts with square nuts and malleable iron or steel plate washers, conforming to ASTM A307.
   a. To be installed in drilled holes the diameter of the bolt, 1/32 inch (0.8 mm) to 1/16-inch (1.6 mm) over size.
   b. Bolting of wood members shall conform to CBC requirements and as called for on the drawings.
   c. Washers: Provide bolts bearing on wood, unless noted otherwise on the drawings, with malleable iron, or steel plate washers under heads and nuts. Do no final bolting until structure has been properly aligned.
   d. Use galvanized bolts, nuts and washers where exposed to weather or where members are built-in to roofing.

   a. Lag screws shall be screwed and not driven into place. Penetration in each timber shall not be less than 2/3 of the length of the lag screw.
   b. Hole shall be bored the same diameter and depth as the shank, after which the hole shall be continued to a depth equal to the length of the lag screw with a diameter no larger than 3/4 of the shank diameter.
a. Washers: Provide lag screws bearing on wood with malleable iron or steel plate washers under heads.
b. Use galvanized lag screws and washers where exposed to weather or where members are built-in to roofing.

5) Columns and Posts:
a. Columns and posts located on concrete or masonry floors or decks exposed to the weather or to water splash or in basements and which support permanent structures shall be supported by concrete piers or metal pedestals projecting above floors unless approved wood of natural resistance to decay or treated wood is used. The pedestals shall project at least 8 inches above exposed earth and at least 1 inch above such floors. Individual concrete or masonry piers shall project at least 12 inches above exposed ground unless the columns or posts which they support are of approved wood of natural resistance to decay or treated wood is used.

6) Manufactured Floor and Roof Trusses:
a. Manufacturer shall supply to the Architect/Engineer and the Building Department calculations and shop drawings for approval of design loads, configuration (2 or 3 point bearing) and shear transfer prior to fabrication. All calculations and shop drawings shall be signed by a professional engineer registered in the State wherein the project is to be built. It shall be the responsibility of the manufacturer to obtain Building Department approval of calculations and shop drawings prior to fabrication.
b. Trusses shall be designed in accordance with the latest local Building Code for all loads imposed, including lateral loads and mechanical equipment loads.
c. All corrections shall be ICC approved and of adequate strength to resists stresses due to the loadings involved.
d. Cross bridging and/or bracing shall be provided and detailed as required to adequately brace all trusses. See structural calculations.

2.4 ROUGH HARDWARE (EXCEPT FOR PRESERVATIVE PRESSURE TREATED LUMBER FASTENINGS)

1) Provide rough hardware related to carpentry work which is not specifically called out under other headings. This shall include, but not be limited to, the following:
a. General: Fastenings, devices, and other rough hardware not specifically indicated on drawings or specified herein shall be submitted for approval prior to installation.
b. Conform to ASTM A7 or A36. Framing clips, hangers, etc.: Standard products of Universal Company, Simpson, or Silver.
c. Sheet metal straps: Galvanized sheet steel of gauges and designs indicated.
d. Expansion anchors shall have a current ICC evaluation report and be size, number and type shown, installed as described in the evaluation report.
e. Powder Driven Fasteners: shall have a current ICC evaluation report and be size, number and type shown, installed as described in the evaluation report.

2.5 PRESSURE TREATMENT

1) Where called for on the drawings or specified herein, exposed lumber to receive preservative-type pressure treatment shall have a minimum moisture content of 19 percent after pressure treatment and shall be pressure treated using Ammoniacal copper quaternary compound (ACQ). Preservative shall penetrate a minimum of 3/8-inch (9.5 mm) deep into Wood. Materials shall be compatible with stain coatings when specified in Division 09 Section "Painting". Fasteners and connectors used with preservative pressure treated lumber shall be G185 hot dip galvanized, Type 304 stainless steel or Type 316 stainless steel.
a. Dimensioned Lumber Posts: AWPA C-2, retention of 0.4 lbs/c.f. per quality standard for LP-22 for in-ground contact.
b. Dimensioned Lumber (all other): AWPA C-2, retention of 0.25 lbs/c.f. per quality standard LP-2 for above ground use.
c. Pre-treated lumber shall be preserved with ACQ Preserve®, Chemical Specialties Inc.
d. Field treatment shall be Boracol® or Impel® Rods, Chemical Specialties Inc. applied in accordance with the manufacturer’s instructions.

2) All interior wood and plywood used for blocking and built into roofing, or otherwise shown, shall receive fire retardant pressure treatment in accordance with American Wood Preservers Association (AWPA). Treat wood with Kopper's "Non-Com", or Baxter fire retardant treatment, or equal, and provide UL label. Plywood shall have flame spread rating after treatment of 25 or less.

3) Wood and Earth Separation: No untreated wood, except foundation redwood, shall be nearer than 6 inches to any earth unless separated by concrete at least 4 inches in thickness with an impervious membrane installed between the earth and concrete.

4) Subcontractor shall furnish to the Project Manager, upon delivery of the members to the job, a certificate certifying that the material has been pressure treated as specified.

PART 3 - EXECUTION

3.1 WORKMANSHIP

1) General: Rough carpentry shall produce joints true, tight, and well nailed with members assembled in accordance with the Drawings and with pertinent codes and regulations.
2) Selection of lumber pieces: Carefully select members. Select individual pieces so that knots and obvious defects will not interfere with placing bolts or proper nailing or making proper connections.
3) All members shall be framed, anchored, tied and braced so as to develop the strength and rigidity necessary for the purposes for which they are used.
4) Protection Against Decay and Termites:
   a. Wood embedded in the ground or in direct contact with the earth and used for the support of permanent structures shall be treated wood.
   b. Wood joists or the bottom of wood floors closer than 18 inches, or wood girders closer than 12 inches to the ground under floor areas and their supports, shall be treated wood or all heart-wood of approved naturally durable species as listed in the International Residential Code, applicable edition.

3.2 WOOD PRESERVATIVE

1) All exterior framing and wood trims coming in contact with concrete or masonry, whether or not Redwood, and not specified or otherwise shown to be pressure treated shall be treated with ACQ Preserve®. Preservatives shall be compatible with stain coatings when specified in Division 09 Section "Painting".

3.3 SITE-APPLIED WOOD TREATMENT

1) Brush apply two coats of preservative treatment on site cut ends and site cut wood in contact with other wood surfaces.
2) Apply preservative treatment in accordance with manufacturer’s instructions.
3) Allow preservative to cure prior to erecting members.
3.4 INSTALLATION - LUMBER AND DECKING

1) Secure decking perpendicular to framing members with ends staggered over firm bearing where possible.
2) Maintain deck joints of 1/16 inch (1.6 mm).
3) Surface Flatness: +/- 1/4-inch (6 mm) in 10 feet (3 m) maximum.

3.5 FRAMING

1) Install framing in strict accordance with the requirements of CBC Chapter 23 unless more stringent requirements are specified herein or shown on the Drawings.
2) Optimum Value Engineering: Where indicated on drawings or, with prior approval by the Project Manager, the following framing techniques may be employed. Nothing in this Section shall supersede requirements of CBC Chapter 23 as modified by Division 01 Section "Lateral Force Procedures", or other requirements in the Drawings or Specifications.
   a. Wall studs spaced at 24 inches (600 mm) on center (Verify with Project Manager and ensure that wall finish materials can meet spans)
   b. On non-bearing walls, or where upper level framing aligns with lower floor, a single continuous top plate may be used.
   c. Built up headers may be used in lieu of solid lumber.
   d. Frame corners with two studs and framing clips.
   e. Use blocking for attachments in lieu of continuous stud.
   f. Delete headers at non-load bearing walls.
   g. Layout framing to take advantage of sheathing or siding dimensions.
3) Attic Ventilation where determined necessary by the Building Official. Enclosed attic spaces and enclosed roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain and snow. The net free ventilating area shall be not less than 1/150 of the area of the space ventilated, except that the area may be 1/300 provided at least 50 percent of the required ventilating area is provided by the ventilators located in the upper portion of the space to be ventilated at least 3 feet above eave or cornice vents, with the balance of the required ventilation provided by eave or cornice vents. The openings shall be covered with corrosion-resistant metal mesh with mesh openings of 1/4 inch in dimension. Do not block vents with insulation.
4) Fire and Draft Stops: In combustible construction, fireblocking and draftstopping shall be installed to cut off all concealed draft openings (both vertical and horizontal) and shall form an effective barrier between floors, between a top story and roof or attic space, and shall subdivide attic spaces, concealed roof spaces and floor-ceiling assemblies. The integrity of all fire and draft stops shall be maintained. Fireblocks, where required shall be provided in the following locations:
   a. In concealed spaces of stud walls and partitions, including furred spaces, at the ceiling and floor levels and at 10-foot intervals both vertical and horizontal.
   b. At all interconnections between concealed vertical and horizontal spaces such as occur at soffits, drop ceilings and cove ceiling.
   c. In concealed spaces between stair stringers at the top and bottom of the run and between studs along and in line with the run of stairs if the walls under the stairs are unfinished.
   d. In openings around vents, pipes, ducts, chimneys, fireplaces and similar openings which afford a passage for fire at ceiling and floor levels, with noncombustible materials.
5) Fire Block Construction: Except as provided in item 4 above, firestopping shall consist of 2 inches nominal lumber or two thicknesses of 1-inch nominal lumber with broken lap joints or one thickness of 23/32-inch plywood with joints backed by 23/32-inch plywood. Fire blocks may also be of gypsum board, glass fiber, mineral fiber or other approved materials securely fastened in place. Loose fill insulation cannot be used unless UL approved for designated insulation.

6) Draft Stops, where required shall be provided in the following locations: Single-family dwelling. When there is useable space above and below the concealed space of a floor-ceiling assembly in a single-family dwelling, draft stops shall be installed so that the area of the concealed space does not exceed 1,000 square feet. Draft-stopping shall divide the concealed space into approximately equal areas.

7) Draft Stop Construction: Draft-stopping materials shall be not less than ½-inch gypsum board, 3/8-inch plywood or other approved materials adequately supported.

8) All stairways, landings, guardrails and handrails shall comply fully with I.R.C. Section R311, R312. Required handrails at stairways shall be continuous the full length of the stairs and may be interrupted as specified in IRC section R311.5.6.2.

3.6 QUALITY ASSURANCE

1) Inspection: Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is completed to the point where this installation may properly commence.

2) Discrepancies: In the event of discrepancy, immediately notify the Project Manager. Do not proceed with installation in areas of discrepancy until such discrepancies have been fully resolved.

3) Lumber may be rejected by the Project Manager, whether or not it has been installed, for excessive warp, twist, bow, crook, mildew, fungus, or mold, as well as for improper cutting and fitting.

3.7 DELIVERY, STORAGE, AND HANDLING

1) Materials shall be properly packed and handled while in transit so as to arrive at the job site in undamaged condition. Manufactured materials shall be delivered in suitable containers plainly marked with brand and manufacturer's name.

2) Storage arrangements shall be subject to Project Manager's approval and shall afford every access for inspection and identification of each item. Lumber shall be piled off the ground, on skids, in a manner which prevents twisting or warping and affords proper ventilation, drainage and protection from termites and decay, rain and excessive sun. Plywood shall be protected from dampness. Material shall be protected from the elements and from damage or deterioration.

3) Damaged or deteriorated materials or assemblies shall not be used in the work and shall be replaced at no extra cost to Owner.
3.8 CLEANUP

1) At the end of each shift and upon completion of the work, remove debris, rubbish and surplus materials from the site which resulted from work under this section. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill. Take positive measures to ensure that saw dust and wood shavings do not enter the storm drainage system.

3.9 WASTE MANAGEMENT

1) Conform with Division 01 Section “Construction Waste Management.”

2) Separate wood waste in accordance with the Waste Management Plan.

3) Separate stained, painted and treated lumber from clean lumber and place in designated area for hazardous materials.

4) Separate and store separately in a clean and dry location the following categories for salvage or re-use on site:
   a. Sheet materials larger than 2 square feet (1.19 m).
   b. Framing members larger than 16 inches (400 mm).
   c. Multiple offcuts of sizes larger than 12 inches (300 mm).

5) The following categories may be re-used in the manufacture of particle board or MDF.
   a. Composite wood, (for example, plywood, OSB, LVL, I-Joist, parallel strand, MDF, particleboard).
   b. Clean dimensional lumber.

6) Set aside damaged wood for acceptable alternative uses, for example use as bracing, blocking, cripples, or ties.

7) Do not burn in an open fire, wood stove, fireplace or other non-industrial incinerator lumber that is less than a year old or
   a. wood treated with creosote, pentachlorophenol, CCA, ACA, or other pressure treatment.

8) Separate the following categories for disposal and place in designated areas for hazardous materials: treated, stained,
   a. painted, or contaminated wood.

9) Sequence work to minimize use of temporary HVAC to dry out building and control humidity.

END OF SECTION
“AAMA Standard 2400-02”

Standard Practice for Installation of Windows with a Mounting Flange in Stud Frame Construction
1.0 SCOPE

1.1 This practice covers the installation of windows in residential buildings of no more than four (4) stories in height.

1.2 This practice applies to windows with a mounting flange where the flange is employed for securing the window into a vertical stud frame wall.

1.3 This practice covers the installation process from pre-installation procedures through post-installation procedures. It does not cover the fabrication or assembly of units whether such fabrication takes place in a factory or at the intended installation site.

1.4 This practice covers aspects of installation relating to installation effectiveness and reasonable durability in service. It does not cover aspects of installation relating to window handling and storage or the safety of the person installing the units.

1.5 This practice provides minimum requirements that will help to ensure the installation of windows in an effective manner. Actual conditions in buildings vary greatly, and in some cases substantial additional care and precaution will have to be taken.

1.6 This practice does not purport to address all of the safety problems associated with its use. It is the responsibility of whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

1.7 This practice is not intended to replace a manufacturer’s installation instructions or federal, state, or local building codes. In all cases follow manufacturer’s instructions and applicable building codes for any special procedures, applications, or requirements.

1.8 This practice may not apply to windows whose mounting flange has been bent, cracked, cut, or removed. If such damage or modification has occurred, consult the manufacturer for repair or special installation instructions.

1.9 This practice only addresses the recommended methods and/or sequences used to apply/modify the weather resistant barrier or other flashing and sealing materials to the rough framed opening.

1.10 The primary units of measure in this document are metric. The values stated in SI units are to be regarded as the standard. The values given in parentheses are for reference only.

2.0 REFERENCED DOCUMENTS

References to the standards listed below shall be to the edition indicated. Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as to referring to the latest edition of that code or standard.

2.1 ASTM, American Society for Testing and Materials

E 2112 “Standard Practice for Installation of Exterior Windows, Doors and Skylights”

B 633 c1 “Specification for Electrodeposited Coatings of Zinc on Iron and Steel”

B 766 “Specification for Electrodeposited Coatings of Cadmium”

B 456 “Specification for Electroplated Coatings of Copper plus Nickel plus Chromium”

C 755 “Practice for Selection of Vapor Retarders for Thermal Insulation”


2.2 AAMA, American Architectural Manufacturers Association

800 “Voluntary Specifications and Test Methods for Sealants”

TIR-A9 “Metal Curtain Wall Fasteners”

IM-TM “Installation Masters Training Manual”

3.0 DEFINITIONS

3.1 Galvanic Corrosion: A form of deterioration of metal resulting from the electrochemical reaction that occurs when certain dissimilar metals are in contact in the presence of moisture.

3.2 Residential Building: Any building used or intended primarily for a single or multiple family dwelling.

3.3 Mounting Flange: A fin projecting from the window frame parallel to the plane of the wall, also known as a railing fin, for the purpose of securing the frame to the structure.

3.4 Flashing: Sheet material that bridges and protects the joint (gap) between the window frame members and the adjacent construction for the purpose of preventing water
penetration by draining water away from the window flange to the exterior.

3.5 Weather Resistant Barrier: The surface or surfaces of a wall responsible for preventing water infiltration into the building interior.

3.6 Shims: A thin, flat or wedge shaped piece of suitable material used to level or plumb a window frame during installation.

3.7 Sealant: Any of a variety of compounds used to fill and seal joints or openings in wood, metal, masonry, and other materials, as contrasted to a sealer, which is a liquid used to seal a porous surface. Some common types of sealants are polysulfide rubber, silicone, acrylic latex, butyl rubber, and polyurethane.

4.0 SIGNIFICANCE AND USE

4.1 This practice recognizes that the effectiveness and durability of installed units depend not only on the choice and quality of materials, design, adequacy of assembly, and support system, but also on their proper and workmanlike installation.

4.2 Improper installation of units may reduce their effectiveness, lead to excessive air, water and sound leakage, condensation, and may promote the deterioration of wall constructions, windows, doors, and their respective finishes.

4.3 The application of this practice also requires a working knowledge of applicable Federal, State, and local codes and regulations regarding windows, specifically, but not limited to:
   a) required means of egress or rescue;
   b) requirements for safety glazing; and
   c) minimum grades of weather resistant barrier materials. Consult with local building codes prior to installation.

4.4 The application of this practice also requires a working knowledge of the tools, equipment, and methods necessary for the installation of windows. It further assumes familiarity with caulking and sealing and with glass handling procedures, painting where applicable, and an understanding of the fundamentals of residential construction that affect the installation of these units.

4.5 Finish and Sealant Protection

4.5.1 Caution shall be used to avoid damage to windows during and after installation. Prior to installation, store windows in a near vertical position in a clean area, free of circulants or debris and protected from exposure to weather elements.

4.5.2 Field-applied protective coatings may damage window sealants and gaskets and may not be recommended. Contact the window manufacturer before applying any such coatings.

5.0 PROCEDURE

5.1 Framing Requirements
The rough framed opening to receive the window shall be sufficiently larger in width and height than the actual frame dimensions of the window. To assure adequate clearance, the framer shall follow the manufacturer’s literature for the recommended rough opening dimensions. The framing shall be plumb, square, level, and structurally adequate. The stiles shall be free of voids, holes, chipping, twisting, or other conditions that will not allow the sealant to maintain continuous contact. (See Figure 1.)

5.2 Corrosion Resistance

5.2.1 Metal products shall be isolated from dissimilar or corrosive materials with a nonconductive coating or sealant material.

5.2.2 All fasteners shall be corrosion resistant, in accordance with ASTM B 633, B 765, or B 456 as indicated in AAMA TIR-A9.

5.3 Flashing Requirements
Proper flashing and/or sealing is necessary as a barrier to prevent water from infiltrating into the building. Flashing and/or an appropriate method of sealing shall be designed as a part of an overall weather resistant barrier system. It is not the responsibility of the window manufacturer to design or recommend a flashing system appropriate to each job condition.

NOTE 1: The responsibility for protecting any flashing material from damage caused by weather, other trades, or vandalism, and properly integrating the flashing system into the weather resistant barrier for the entire building, is the responsibility of the general contractor or his designated agent.

5.3.1 Penetration Flashing Material - Flashing material shall be barrier coated reinforced and shall provide twenty-four (24) hour minimum protection from water penetration when tested in accordance with ASTM D 779. Flashing material shall carry continuous identification.

5.4 Sealant Requirements

5.4.1 Sealing caulking required between the window and the flashing can be accomplished with sealant material conforming to AAMA 800. Use sealant recommended and approved by the sealant/flash manufacturer, following their printed application procedures. ASTM E 2112 gives guidance on sealant selection and application.
5.5.2 Where sealant is required in this standard, an application of a nominal 10 mm (3/8 in) diameter sealant bead or an equivalent butylastic sealant tape as recommended by the sealant manufacturer is intended.

5.5.3 Where wet sealant is used, the installer shall look for the sealant to "squeeze out" or appear along the edge of the flange/flushing to assure a continuous seal. "Squeeze out" shall be promptly removed smooth.

5.5.4 Install the window immediately after sealant application, before skin forms or contamination occurs on the sealant surface.

5.5 Application

5.5.1 One of the two following methods shall be selected as the application to be followed. Once a method is selected, all procedures of that method shall be performed in the described sequence. Substitution of a procedure from one method to the other is not permitted.

5.5.2 If the weather-resistant barrier is applied to the wall prior to the window installation, the weather-resistant barrier may need to be modified. See AAMA Installation Masters Training Manual Section 16.8.4 for recommended weather-resistant barrier modifications.

5.5.3 Method A

5.5.3.1 A strip of approved flashing material shall be at least 230 mm (9 in) wide. Flashing shall be applied in a weatherboard fashion around the full perimeter of the opening according to the following procedures:

5.5.3.2 Apply the first strip horizontally immediately below the sill, cut it sufficiently long to extend past each side of the window, so that it projects even with the vertical jamb flashing to be applied later. (See Figure 2).

5.5.3.3 Fasten the top edge of the sill flashing to the framing. Place fasteners along the edge of the rough opening where they will be covered by the mounting flange of the window later. Fasten the top edge of the sill flashing, but do not fasten the lower edge or the last 230 mm (9 in) of each end, so the weather resistant barrier applied later may be slipped up and underneath the flashing in a weatherboard fashion. (See Figure 2).

5.5.3.4 For mechanically joined frames, apply sealant at corners and the full length of the seam where mounting flanges meet and to the outside of the frame corner joints. (See Figure 3A). Apply a continuous seal to the underside (interior) of the window mounting flange in line with any pre-punched holes or slots in the mounting flange. (See Figure 3A). The window shall then be installed in accordance with Section 5.6 installation procedures.

5.5.3.5 Next, apply a continuous seal to the exposed mounting flange at the top (head) and sides (jambs) of the installed window. Apply sealant in line with any pre-punched holes or slots in the mounting flange and over the heads of the fasteners. Continue jamb sealant vertically approximately 215 mm (8 1/2 in) above the top of the window. The sealant applied horizontally across the head should not extend beyond the jamb sealant. (See Figure 4A).

NOTE 2: The application of sealant to the exterior surface of the mounting flange may not be necessary if using a self-adhesive type flashing over the mounting flange. Consult the flashing manufacturer.

5.5.3.6 Starting at each jamb, embed the jamb flashing into the seal and fasten in place. Do not fasten the bottom 230 mm (9 in) of the jamb flashing, so the weather resistant barrier applied later may be slipped up and underneath the flashing in a weatherboard fashion. Extend this flashing to approximately 13 mm (1/2 in) less than the bottom of the sill flashing and beyond the top of the window to approximately 13 mm (1/2 in) less than the top of the head flashing. (See Figure 4A & 5).

5.5.3.7 Finally, embed the flashing into the sealant on the mounting flange at the window head. Cut this flashing sufficiently long so that it will extend approximately 25 mm (1 in) beyond each jamb flashing. Fasten flashing in place. (See Figure 5).

5.5.4 Method B

5.5.4.1 A strip of approved flashing material shall be at least 230 mm (9 in) wide. Flashing shall be applied in a weatherboard fashion around the full perimeter of the opening according to the following procedures:

5.5.4.2 Apply the first strip horizontally immediately below the sill, cut it sufficiently long to extend past each side of the window, so that it projects even with the vertical jamb flashing to be applied later. (See Figure 2).

5.5.4.3 Fasten the top edge of the sill flashing to the framing. Place fasteners along the edge of the rough opening where they will be covered by the mounting flange of the window later. Fasten the top edge of the sill flashing, but do not fasten the lower edge or the last 230 mm (9 in) of each end, so the weather resistant barrier applied later may be slipped up and underneath the flashing in a weatherboard fashion. (See Figure 2).

5.5.4.4 Next, fasten strips of flashing along each vertical edge (jamb) of the opening. Position fasteners along the edge of the rough opening where they will be covered by the mounting flange of the window later. Extend this flashing to approximately 13 mm (1/2 in) less than the bottom of the sill flashing and beyond the top of the window to approximately 13 mm (1/2 in) less than the top
of the head flashing. (See Figure 3B). Do not fasten the bottom 230 mm (9 in) of the jamb flashing, so the weather resistant barrier applied later may be slipped up and underneath the flashing in a weatherboard fashion.

5.5.4.5 Apply a continuous seal to the backside (interior) of the mounting flange near the outer edge or a continuous seal to the perimeter of the opening at a point to assure contact with the backside (interior) of the mounting flange. Apply sealant in line with any pre-punched holes or slots on the mounting flanges. (See Figure 4B).

NOTE 5: Caution shall be taken to avoid disrupting the continuance seal.

5.5.4.6 For mechanically joined frames, apply sealant at corners the full length of the seam where mounting flanges meet and the outside of the frame corner joints. (See Figure 4B).

5.5.4.7 The window shall be installed in accordance with Section 5.6 installation procedures.

5.5.4.8 Next, apply a continuous seal to the exterior face of the mounting flange at the window head in line with any pre-punched holes or slots on the mounting flange and over the heads of the fasteners. Cut the head flashing sufficiently long so that it will extend approximately 25 mm (1 in) beyond each jamb flashing. Embed the bottom of the flashing over the sealant and the mounting flange and fasten in place. (See Figure 5).

5.6 Installation

5.6.1 Shim window as necessary to insure a square, level and plumb installation. The sill must be supported in a straight and level position to prevent sagging, deflection and sill rotation.

Some manufacturers require a continuous shim under the window sill. Follow manufacturer’s recommendations.

5.6.2 Close and lock the window. Shim and adjust the window as necessary to achieve a plumb, square and level condition, as well as centering the window in the frame opening. Secure the full perimeter with the minimum equivalent of 6d fasteners on a maximum of 405 mm (16 in) centers using pre-punched holes, if provided. Hinged and pivoted windows may require additional fasteners located near the hinge or pivot point. For certain windows it may be appropriate to fasten the band in a manner to allow for possible movement. In all cases follow the manufacturer’s instructions for any special procedures or applications.

NOTE 4: Avoid overdriving fasteners. Use an appropriately sized fastener to cover the width of any pre-punched hole and adequately secure the window to the structure.

5.6.3 In each direction from all corners there shall be a fastener within 250 mm (10 in), but no closer than 75 mm (3 in) to prevent frame distortion or fracture of joint seals.

NOTE 5: If any damage to window frame joint seals or mounting flanges is observed during installation, the installer shall repair it or consult the manufacturer.

5.6.4 The Owner/General Contractor is responsible to ensure that the weather resistant barrier (i.e., building paper, insulating board, or other materials by other trades) is effectively integrated around the window frame in a weatherboard fashion. (See Figure 6).

5.6.5 After installation is complete, check the window for proper operation and locking.
6.0 DRAWINGS

Figure 1: Rough Window Opening

ROUGH FRAMED OPENING
SUUFFICIENTLY LARGER IN
WIDTH & HEIGHT THAN THE
ACTUAL FRAME DIMENSIONS
OF THE WINDOWS. TO ASSURE
ADEQUATE CLEARANCE
CONSULT THE WINDOW
MANUFACTURER'S LITERATURE
FOR THE RECOMMENDED
ROUGH OPENING DIMENSIONS.
Figure 2: Sill Flashing
Figure 3A: Window Installation (Method “A”)

NOTE: In applications where wall sheathing is used, sheathing shall be applied prior to flashing and window installation.
Figure 3B: Jamb Flashing (Method "B")

- Extend to 12 mm (0.5") below top of head.
- Flashing to be installed later.
- Jamb flashing at both sides of opening.
- Extend beyond sill.
- Flashings and above where head flashings will intersect, lap jamb.
- Flashing over top of sill flashing.
- Leave bottom edge unattached.
Figure 4A: Jamb Flashing (Method “A”)
Figure 4B: Window Installation (Method "B")

- Extend jamb flashing to 19mm (0.75") below the top of the head flashing.
- To seal the window frame to opening, apply continuous seal to the backside of the mounting flange near the outer edge and in line with any pre-punched holes or slots on the mounting flange.
- Shim and adjust window to achieve square, flush, level condition.
- Use corrosion resistant fasteners.
- Fasten within 200mm (7") and no closer than 10mm (0.4") in each direction from every corner. Secure window around frame opening with equivalent of 6 fasteners at 400mm (16") O.C. maximum before installation. Reseal all outer joints of mechanically joined frames.
Figure 6: Primary Weather Barrier Application By Others
PART 1 GENERAL

1.1 SECTION INCLUDES
   1) Surface preparation.

1.2 RELATED SECTIONS
   1) Section 2 – General Requirements
   2) Section 07 21 00 – Thermal Insulation.
   3) Section 08 10 00 – Doors and Frames.
   4) Section 08 50 00 – Windows.
   5) Section 09 20 00 – Plaster and Gypsum Board.

1.3 REFERENCES
   5) ASTM E 154 – Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

1.4 SUBMITTALS
   1) Submit alternate manufacturer’s product data and application instructions.
   2) Submit product samples.

1.5 QUALITY ASSURANCE
   1) Installer Qualifications: Use an experienced installer and adequate number of skilled personnel who are thoroughly trained and experienced in the application of self-adhesive membranes.
   2) Obtain self-adhesive flashing membrane materials from a single manufacturer regularly engaged in manufacturing the product.

1.6 DELIVERY, STORAGE, AND HANDLING
   1) Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
   2) Store materials in a clean, dry area in accordance with manufacturer’s instructions.
   3) Store adhesives at temperatures of 40°F (4°C) and above to facilitate handling.
   4) Store membrane cartons on pallets.
   5) Do not store at temperatures above 90°F (32°C) for extended periods.
   6) Keep away from sparks and flames.
   7) Completely cover when stored outside. Protect from rain.
   8) Protect materials during handling and application to prevent damage or contamination.
1.7 ENVIRONMENTAL REQUIREMENTS

1) Product not intended for uses subject to abuse or permanent exposure to the elements.
2) Protect rolls from direct sunlight until ready for use.
3) Do not apply membrane when air or surface temperatures are below 40°F (4°C).
4) Do not apply to frozen surfaces.

1.8 WARRANTY

1) A five (5) year system and workmanship warranty.

PART 2 PRODUCTS

2.1 MANUFACTURER

1) Polyguard Products Inc., or approved equal
2) Alternates will be considered.

2.2 MATERIALS

1) Polyguard® 300 Flashing, or approved equal
2) Or approved alternate. PHYSICAL

PROPERTIES:

<table>
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<tr>
<th>PROPERTY</th>
<th>TEST METHOD</th>
<th>TYPICAL VALUE</th>
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<td>750 PSI Min.</td>
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<td>0.1 Perms Max.</td>
</tr>
<tr>
<td>WATER ABSORPTION</td>
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<td>0.1%</td>
</tr>
</tbody>
</table>


2.3 ACCESSORIES

1) Surface Primer Roller-grade Adhesive:
   a. A rubber-based sealant in solvent solution formulated to provide excellent adhesion and waterproofing. VOC (Volatile Organic Compound) content meeting the SouthCoast Air Quality Management District regulations established under the February 1, 1991 version of Rule 1168 ©)
(2) Adhesion and Sealant Applications. Sealant is classified as an Architectural Sealant Primer Porous, with VOC of 521 g/L.

2) Edge Termination:
   a. A single-component, elastomeric sealant, non-isocyanate product in place of silicone and urethane sealants. A low VOC/HAPS free, cold-applied, self-adhesive, elastomeric sealant for filling minor cast concrete cracks, concrete, masonry cracks, gaps at head joints, penetrations, and gypsum sheathing joints.

3) End Dams and Corners:
   a. 40-mil rubberized asphalt inside Corner Flashing and End Dams bonded to laminated polyethylene film.

PART 3 EXECUTION

3.1 EXAMINATION

1) Examine surfaces to receive membrane. Notify Project Manager if surfaces are not
acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.2 SURFACE PREPARATION

1) Protect adjacent surfaces not designated to receive self-adhering flashing membrane.
2) Clean surfaces to receive membrane in accordance with manufacturer’s instructions.
3) Do not apply membrane to surfaces unacceptable to manufacturer.
4) All surfaces must be clean, smooth, dry; and clean of oil, dust, and excess mortar.
5) In flashing applications, trim the forward edge 5/8-inch from either the face of the wall or from the forward bend in exposed metal drips or counters.
6) Flashing requires support across gaps and openings greater than 1/8-inch. 90-degree intersections, i.e. between walls and ledges, should be modified to have a less severe angled transition from vertical to horizontal.
7) Creation of an even and sloped support and drainage plane at transitions and gaps should be accomplished as follows:
   a. At wall-to-ledge intersections, form a cant surface using: mortar or formed metal, or plastic with hemmed, smooth, or soft edges.
   b. Across wall cavities and gaps greater than 1/8-inch between materials use: wall fastened formed metal or plastic with hemmed, smooth, or soft edges; wall fastened tapered/beveled edged rigid foam.
8) Install row and end overlays with a minimum 2-inch overlap.

3.3 APPLICATION

1) Apply a coating liquid adhesive at a rate of 250-300 square feet per gallon, or selected Spray Adhesive; and allow the adhesive to dry to the touch before covering with associated accessories. Do not thin Liquid Adhesive.
2) Form a cant along the vertical to horizontal intersection.
3) Install Flashing in accordance with the manufacturers specifications.
4) Apply pressure over the face of the installed membrane with a hard surfaced rubber roller or similar blunt instrument.
5) Terminate the top edge of flashing as follows: In cavity wall assemblies, install Termination Bars along the top edge of the flashing.
6) Apply Sealant in-and-along the flare of termination bars along the top edge of non-restrained flashing and along end laps.
7) Install weeps over the face of the flashing prior to installing the exterior finish.

3.4 PROTECTION

1) Cover the membrane and protect from UV exposure for periods in excess of thirty (30) days or more.
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 07
CONCRETE ROOF TILE

PART 1 - GENERAL

1.1 SECTION INCLUDES

1) Concrete roof tiles and roof system components.
2) Metal roof flashing.
3) Underlayments.
4) Related roof accessories.

1.2 RELATED SECTIONS

1) Section 06100 - Rough Carpentry; Roof sheathing and nailers.
2) Section 077220 - Roof and Deck Insulation.
3) Section 07600 - Flashing and Sheet Metal.
4) Section 07720 - Roof Accessories.

1.3 REFERENCES

4) ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
5) ASTM C 1492 - Standard Specification for Concrete Roof Tile.
9) CAN/CSA-A220. Series-06 - Concrete Roof Tiles.
10) ICC AC 188 for underlayments.
11) AC 48 for underlayments in severe climates.

1.4 DESIGN REQUIREMENTS

1) Roofing tile materials and installation shall conform to the requirements of the applicable building code.

1.5 SUBMITTALS

1) Product Data: Manufacturer's data sheets on each product to be used, including:
   a. Preparation instructions and recommendations.
   b. Storage and handling requirements and recommendations.
   c. Installation methods.
2) Shop Drawings: Indicate metal flashing profiles, joint locations, fastening locations, and installation details. Indicate tile layout with location of cut and special shaped tiles identified.
3) Selection Samples: For each finish product specified, two complete sets of tile colors representing manufacturer’s full range of available colors and patterns.

4) Verification Samples: For each finish product specified, two full size samples representing actual product, color, and patterns.

5) Certificates of Compliance: Submit to certify compliance with referenced standards.

1.6 QUALITY ASSURANCE

1) Manufacturer Qualifications: Minimum five years documented experience producing concrete roof tile and member of Tile Roof Institute.

2) Installer Qualifications: Minimum five years documented experience installing products specified in this section and/or supervision by a manufacturers authorized installation representative.

1.7 PROJECT CONDITIONS

1) Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

2) Do not overload the roof. Distribute stacks of tile uniformly on roof at not greater than 12 inches (305 mm) in height.

1.8 WARRANTY

1) Roof Tile: Limited Lifetime, Fully Transferable, Non-Prorated Product Warranty against defects in roof tile for the life of the structure.

2) Installation Warranty: Warrants products of this section, as installed, to be in accord with the Contract Documents and free from faults and defects in materials and workmanship for a period of 5 years after completion.

1.9 EXTRA MATERIALS

1) Furnish extra materials packaged with protective covering for storage and identified with labels clearly describing contents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1) Acceptable Manufacturer: Boral, Eagle, Hanson, or approved equal.

2) Substitutions: or equal and in like-kind will be considered

2.2 CONCRETE ROOF TILE - ARIZONA

   b. Size: 16-1/2 inches (419 mm) by 13 inches (330 mm), nominal.
   c. Coverage: 90 field tiles per 100 square feet (9.29 sm) of roof area.
   d. Installed weight per square: Approximately 1030 lbs (467 kg).

2.3 ACCESSORY MATERIALS - ARIZONA

1) Underlayment:
   a. 2-layers of 15# Recycled Material Underlayment fastened to plywood or OSB substrate.

2) Fasteners: Sized to penetrate deck minimum 3/4 inch (19 mm) or through thickness of deck or batten.

3) Flashings:
   a. Ribbed Valley Metal 1 inch Center Diverter, 26 gauge, Galvanized Sheet Steel.
   b. Plumbing Stacks and Other Pipes Penetrating Roofs: Wakaflex Pipe Flashing or approved equal.
4) Adhesive: Code approved adhesive suitable to bond to concrete roof tile.
5) Eave Closures:
   a. Provide to match tile profile.
6) Battens:
   a. Elevated Batten System 1 inch (25 mm) by 2 inches (51 mm) by 8 feet (2.44 m).
7) Hip & Ridge
   a. Ridge Riser: Elevates ridge board to proper height. For all profiles.
8) Rake & Gable End
   a. Rake and Ridge tiles. Choose to match tile profile and color.
9) Field Venting
   a. Zephyr Vents, or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

1) Do not begin installation until substrates have been properly prepared.
2) Verify surfaces are uniform, smooth, clean and dry
3) If substrate preparation is the responsibility of another installer, notify Project Manager of unsatisfactory preparation before proceeding.

3.2 PREPARATION

1) Clean surfaces thoroughly prior to installation.
2) Prepare surfaces using the methods recommended by the manufacturer for achieving the best result under the project conditions.

3.3 INSTALLATION - GENERAL

1) Install in accordance with manufacturer's instructions.

3.4 UNDERLAYMENT APPLICATION:

1) Underlayment: Install in accordance with the manufacturer's instructions.
2) Install ridge vents; follow vent manufacturer's installation recommendations.
3) Install nailer boards or ridge risers with 2 inch by 2 inch (51 mm by 51 mm) nailer boards at hips and ridges:
   a. Use fasteners of sufficient length to penetrate minimum 3/4 inch (19 mm) into trusses.
   b. Attach with No. 26 gage (0.018 inch) galvanized strapping minimum 24 inches (610 mm) on center.

3.5 FLASHING INSTALLATION

1) Install flashings to shed water and prevent water penetration under tiles.
2) Counter Flashing:
   a. Lap Top Flange of Base Flashing: 3 inches (76 mm), minimum.
   b. Lap Joints: 3 inches (76 mm), minimum.
3) Install batten extenders to support tile over flashing.
4) Install tiles so as not to inhibit water flow on flashings.
5) Head and Apron Flashing:
   a. Nail near top edge of vertical flange with minimum 4 inches (102 mm) on tile surface.
   b. Lap metal as required including flash bar 6 inches (152 mm) and seal laps with flashing cement. Seal wall junctions with flashing cement.
6) Flashing at Plumbing Stacks, Pipes, Turbines, Vents, Etc.:
   a. Install base flashing sealed or lapped by underlayment.
   b. Install second flashing interlaced with tile coursing.
   c. Seal with sealant if not self-sealing.
7) Coatings: Apply color coordinated paint to all exposed metal flashings.
3.6 BATTEN INSTALLATION

1) Install battens in accordance with the manufacturer’s instructions.

3.7 TILE INSTALLATION

1) Layout:
   a. Minimum Head Lap: 3 inches (76 mm).
2) Set perimeter tiles in mortar; apply sealer to exposed mortar.
3) Secure field and perimeter tile in accordance with UBC Table 15-D-2.
4) Cut field tile to form straight edge at center of hip, ridge and valley.
5) Install eave closures.

3.8 CLEANING

1) Remove all broken tile, debris and excess tile from roof.
2) Sweep cut tiles clean.

3.9 REPAIR AND REPLACEMENT

1) Damaged Tile:
   a. Break out damaged roof tile.
   b. Repair torn underlayment.
   c. Drive fastener flush.
   d. Apply minimum 3/8 inch (10 mm) by 2 inch (51 mm) bead of approved adhesive on tile in course below replacement tile.
   e. Immediately set replacement tile in position assuring proper contact.

2) Damaged Small Valley and Hip Cuts:
   a. Apply a minimum of 3/8 inch (10 mm) by 2 inch (51 mm) bead of approved adhesive at head of cut tile.
   b. Immediately set tile in course above in position assuring proper contact.

3.10 PROTECTION

1) Protect installed products until completion of project.
2) Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION
CONSTRUCTION REQUIREMENTS

SECTION 07
SRI 29+ CONCRETE ROOF TILE & SELF-ADHERING UNDERLAYMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES
  1) Concrete roof tiles and roof system components.
  2) Metal roof flashing.
  3) Underlayment and self-seal membrane.
  4) Related roof accessories.

1.2 RELATED SECTIONS
  1) Section 06100 - Rough Carpentry; Roof sheathing and nailers.
  2) Section 07220 - Roof and Deck Insulation.
  3) Section 07600 - Flashing and Sheet Metal.
  4) Section 07720 - Roof Accessories.

1.3 REFERENCES
  4) ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.
  5) ASTM C 1492 - Standard Specification for Concrete Roof Tile.
  9) CAN/CSA-A220. Series-06 - Concrete Roof Tiles.
  10) ICC AC 188 for underlayment.
  11) AC 48 for underlayment in severe climates.

1.4 DESIGN REQUIREMENTS
  1) Roofing tile materials and installation shall conform to the requirements of the applicable building code.

1.5 SUBMITTALS
  1) Product Data: Manufacturer's data sheets on each product to be used, including:
     a. Preparation instructions and recommendations.
     b. Storage and handling requirements and recommendations.
     c. Installation methods.
  2) Shop Drawings: Indicate metal flashing profiles, joint locations, fastening locations, and installation details. Indicate tile layout with location of cut and special shaped tiles identified.
  3) Selection Samples: For each finish product specified, two complete sets of tile colors representing manufacturer's full range of available colors and patterns.
4) Verification Samples: For each finish product specified, two full size samples representing actual product, color, and patterns.
5) Certificates of Compliance: Submit to certify compliance with referenced standards.

1.6 QUALITY ASSURANCE
1) Manufacturer Qualifications: Minimum five years documented experience producing concrete roof tile and member of Tile Roof Institute.
2) Installer Qualifications: Minimum five years documented experience installing products specified in this section and/or supervision by a manufacturer's authorized installation representative.

1.7 PROJECT CONDITIONS
1) Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
2) Do not overload the roof. Distribute stacks of tile uniformly on roof at not greater than 12 inches (305 mm) in height.

1.8 WARRANTY
1) Roof Tile: Limited Lifetime, Fully Transferable, Non-Prorated Product Warranty against defects in roof tile for the life of the structure.
2) Installation Warranty: Warrants products of this section, as installed, to be in accord with the Contract Documents and free from faults and defects in materials and workmanship for a period of 10 years after completion.

1.9 EXTRA MATERIALS
1) Furnish extra materials packaged with protective covering for storage and identified with labels clearly describing contents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
1) Acceptable Manufacturer: Boral, Eagle, Hanson, or approved equal having an SRI of 29 or greater
2) Substitutions: or equal and in like-kind will be considered

2.2 CONCRETE ROOF TILE - ARIZONA
1) Standard Weight Tile: Mission "S" profile with an SRI of 29 or greater.
   b. Size: 16-1/2 inches (419 mm) by 13 inches (330 mm), nominal.
   c. Coverage: 90 field tiles per 100 square feet (9.29 sm) of roof area.
   d. Installed weight per square: Approximately 1030 lbs (467 kg).

2.3 ACCESSORY MATERIALS - ARIZONA
1) Underlayment:
   a. 60 mil, self-adhering, high temperature, 30-year bitumous underlayment fastened to plywood or OSB substrate.
2) Fasteners: Sized to penetrate deck minimum 3/4 inch (19 mm) or through thickness of deck or batten.
3) Flashings:
   a. Ribbed Valley Metal 1 inch Center Diverter, 26 gauge, Galvanized Sheet Steel.
   b. Plumbing Stacks and Other Pipes Penetrating Roofs: Wakaflex Pipe Flashing or approved equal.
4) Adhesive: Code approved adhesive suitable to bond to concrete roof tile.
5) Eave Closures:
   a. Provide to match tile profile.
6) Battens:
   a. Elevated Batten System 1 inch (25 mm) by 2 inches (51 mm) by 8 feet (2.44 m).
7) Hip & Ridge
   a. Ridge Riser: Elevates ridge board to proper height. For all profiles.

8) Rake & Gable End
   a. Rake and Ridge tiles. Choose to match tile profile and color.

9) Field Venting
   a. Zephyr Vents, or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION
1) Do not begin installation until substrates have been properly prepared.
2) Verify surfaces are uniform, smooth, clean and dry.
3) If substrate preparation is the responsibility of another installer, notify Project Manager of unsatisfactory preparation before proceeding.

3.2 PREPARATION
1) Clean surfaces thoroughly prior to installation.
2) Prepare surfaces using the methods recommended by the manufacturer for achieving the best result under the project conditions.

3.3 INSTALLATION - GENERAL
1) Install in accordance with manufacturer's instructions.

3.4 UNDERLAYMENT APPLICATION:
1) Underlayment: Install in accordance with the manufacturer's instructions.
2) Install ridge vents; follow vent manufacturer's installation recommendations.
3) Install nailer boards or ridge risers with 2 inch by 2 inch (51 mm by 51 mm) nailer boards at hips and ridges:
   a. Use fasteners of sufficient length to penetrate minimum 3/4 inch (19 mm) into trusses.
   b. Attach with No. 26 gage (0.018 inch) galvanized strapping minimum 24 inches (610 mm) on center.

3.5 FLASHING INSTALLATION
1) Install flashings to shed water and prevent water penetration under tiles.
2) Counter Flashing:
   a. Lap Top Flange of Base Flashing: 3 inches (76 mm), minimum.
   b. Lap Joints: 3 inches (76 mm), minimum.
3) Install batten extenders to support tile over flashing.
4) Install tiles so as not to inhibit water flow on flashings.
5) Head and Apron Flashing:
   a. Nail near top edge of vertical flange with minimum 4 inches (102 mm) on tile surface.
   b. Lap metal as required including flash bar 6 inches (152 mm) and seal laps with flashing cement. Seal wall junctions with flashing cement.
6) Flashing at Plumbing Stacks, Pipes, Turbines, Vents, Etc.
   a. Install base flashing sealed or lapped by underlayment.
   b. Install second flashing interlaced with tile coursing.
   c. Seal with sealant if not self-sealing.
7) Coatings: Apply color coordinated paint to all exposed metal flashings.

3.6 BATTEN INSTALLATION
1) Install battens in accordance with the manufacturer's instructions.

3.7 TILE INSTALLATION
1) Layout:
   a. Minimum Head Lap: 3 inches (76 mm).
2) Set perimeter tiles in mortar; apply sealer to exposed mortar.
3) Secure field and perimeter tile in accordance with UBC Table 15-D-2.
4) Cut field tile to form straight edge at center of hip, ridge and valley.
5) Install eave closures.

3.8 CLEANING

1) Remove all broken tile, debris and excess tile from roof.
2) Sweep cut tiles clean.

3.9 REPAIR AND REPLACEMENT

1) Damaged Tile:
   a. Break out damaged roof tile.
   b. Repair torn underlayment.
   c. Drive fastener flush.
   d. Apply minimum 3/8 inch (10 mm) by 2 inch (51 mm) bead of approved adhesive on tile in course below replacement tile.
   e. Immediately set replacement tile in position assuring proper contact.

2) Damaged Small Valley and Hip Cuts:
   a. Apply a minimum of 3/8 inch (10 mm) by 2 inch (51 mm) bead of approved adhesive at head of cut tile.
   b. Immediately set tile in course above in position assuring proper contact.

3.10 PROTECTION

1) Protect installed products until completion of project.
2) Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 08 51
ALUMINUM WINDOWS

PART 1 – GENERAL

1.1 SUMMARY

1) Section Includes:
   a. Tubular extruded aluminum framed windows, with fixed and operable sash.
   b. Shop glazing.
   c. Operating hardware and insect screens.

2) Related Sections:
   a. Division 2 – General Requirements

3) Alternates:
   a. Reference Exhibit D of the Bidding Documents for Alternates

1.2 SUBMITTALS

1) Submittal Procedures; submit following items:
   a. Shop Drawings: Sections, details and multiple window assembly details, elevations, opening dimensions, relationship to adjacent construction, clearances, and attachments.
   b. Product Data: Provide information on window components, sash and frame profiles, glazing, hardware, and accessories.
   c. Window corner, minimum 12” x 12” inches, showing sash and frame components, corner construction, glazing, and finish.
   d. 3 x 3 inch finish samples showing available colors.

   Quality Assurance/Control Submittals:
   i. Qualifications: Proof of manufacturer's qualifications.
   ii. U-Factor and structural rating charts required for AAMA and NFRC labeling requirements.
   iii. Installation Instructions – AAMA 2400 (Mounting Flange Installation)

2) Closeout Submittals; submit following items:
   a. Temporary window labels marked to identify windows that labels were applied to.
   b. Maintenance instructions.
   c. Special Warranties.

1.3 QUALITY ASSURANCE

1) Overall Standards: Comply with ANSI/AAMA 101.I.S.2, except as otherwise noted herein.

2) Qualifications:
   a. Manufacturer Qualifications:
   b. Minimum five years' experience in producing aluminum windows of the type(s) specified.
   c. Member AAMA, NFRC.

3) Regulatory Requirements:
   a. Housing and Urban Development (HUD) Standards for Housing
      International Residential Code (I.R.C.) with City of Phoenix amendments
   c. Current Phoenix Zoning Ordinance
4) Certifications for insulated glass windows:
   5) AAMA: Windows shall be Gold Label certified with label attached to frame per AAMA requirements.
   6) NFRC: Windows shall be NFRC certified with temporary U-factor label applied to glass and an NFRC tab added to permanent AAMA frame label.

1.4 DELIVERY, STORAGE AND HANDLING
1) Product Storage and Handling Requirements.
2) Follow manufacturer’s instructions on label applied to windows.

1.5 WARRANTY
1) Commercial Special Warranty:
   a. 10-year guarantee.
   b. Guarantee windows against defects in manufacturing and workmanship including costs for parts and labor.

PART 2 – PRODUCTS

2.1 MANUFACTURER
1) Builder Series: Per Specification
2) Substitutions: or equal and in like-kind are permitted, but subject to approval.

2.2 MATERIALS
1) Aluminum: Comply with requirements of AAMA/WDMA/CSA 101/I.S.2/A440-05, 6063-T5 temper for strength, corrosion resistance and application of required finish.
2) Extruded frame members are to be .060” in thickness for structural walls.

2.3 GENERAL PERFORMANCE REQUIREMENTS:
1) Thermal Performance: Comply with NFRC 100.

2.4 WINDOW TYPES:
1) Picture Window – Builder Series, 1 3/8 inch (35mm) nail fin setback with stucco key
   1. Frame:
      a. 2 1/16” (52mm) & 2 3/8” (60mm)
   2. Performance Class:
      a. 95 ½” x 71 ½” and smaller: FW-HC40
2) Horizontal Slider –Builder Series, 1 3/8 inch (35mm) nail fin setback with stucco key
   1. Frame:
      a. 2 1/16” (52mm) & 2 3/8” (60mm)
   2. Sash: Depth of 1 1/8” (29 mm), hollow aluminum extrusion.
   3. Sightlines: Non-equal sightlines between sash and fixed glass.
   4. Performance Class:
      a. 119 ½” x 71 ½” Double Vent, 36” vent set: HS-LC25.
   5. Hardware:
      a. Nylon rollers with stainless steel axles, aluminum integral monorail track.
      b. Single pull rail on meeting rail sash.
      c. Automatic, spring loaded, height adjustable positive lock.
2.5 GLAZING

1) Insulated Glass Units: ASTM E 774, Class A, 3/4 inch (19mm) thick overall.
   a. Glazing Type: [Clear/Clear]

2) Dual Pane Glass:
   a. Glazing Type: [Clear]

2.6 DIVIDED LITE GRIDS

1) 5/8 inch (16 mm) wide flat, grids between the glass that are color matched to frame and sash.

2.7 INSECT SCREENS

1) Provide tight-fitting screen for operating sash with hardware to allow easy removal.
   a. Screen Cloth: Charcoal colored fiberglass mesh.
   b. Frame:
      a. Cambered formed aluminum with rigid plastic corner keys.
      b. Pull tabs for removal.

2.8 FABRICATION

1) Fabricate windows to AAMA/WDMA - 101/I.S.2.
   c. All fixed glass is exterior glazed and all sashes are marine glazed with flexible PVC glazing.
      The fixed glazing shall be removed without disassembly of a sash. The vents will need to be
      disassembled to replace the glazing.
   d. Fabricate with minimum clearances and shim spaces around perimeter, yet enabling
      installation and dynamic movement.
   e. Accurately fit and secure joints and intersections. Make joints flush, hairline, and
      weathertight.
   f. Fabricate in largest practical units.
   g. Fabricate units with integral prepunched nailing fin.
   h. Weatherstrip operable sash.
   i. Provide internal drainage weep holes and channels to route moisture to exterior.
   j. Form glass stops, exterior sills, closures, weatherstops, and flashings of same material as
      frame.
   k. Mount screens in removable, rewirable tubular aluminum frame.

2.9 FINISHES

1) Frame and Sash Color: [Tan] Painted Exterior Finish: Equaling 0.3 mils dry film thickness to
   AAMA 603.8-92.
2) Frame and Sash Color: [Bronze] [Clear] Anodized Exterior Finish: Provide AA-C22-A32 Class II
   Bronze or AA-C22-A31 Class II Clear finish, minimum 0.4 mils thick, electrostatically deposited
   color anodized finish.
3) Color match screen frame to window frame and sash color.

2.10 SOURCE QUALITY CONTROL

1) Windows inspected in accordance with manufacturer’s Quality Control Program as required by
   AAMA Gold Label certification.

PART 3 - EXECUTION

3.1 EXAMINATION

1) Examine openings in which windows will be installed.
   a. Verify that framing complies with AAMA 2400 ("Mounting Flange Installation") or AAMA 2410
      ("Flush Fin Installation").
2) Verify that fasteners in framed walls are fully driven and will not interfere with window installation.
   a. Coordinate with responsible entity to correct unsatisfactory conditions.
   b. Commencement of work by installer is acceptance of substrate conditions.

3.2 INSTALLATION

1) Install windows in framed walls in accordance with AAMA 2400 (Mounting Flange Installation)
2) Install windows in accordance with manufacturer's instructions and approved Shop Drawings.
3) Close and lock operating sash during installation.
4) Set plumb, level, and rigid, free from warpage or deflection.
5) Permanently attach windows to supporting construction.
   a. Installation Tolerances:
   b. Maximum variation from plumb or level: 1/8 inch in 3 feet or 1/4 inch in any 10 feet, whichever is less
   c. Maximum misalignment of members abutting end to end: 1/16 inch.
6) Seal corners and mounting flanges for full length to prevent moisture infiltration.
7) Do not remove temporary labels.
8) Install insect screens on operable sash.

3.3 CLEANING

1) Reference Cleaning and Waste Management.
2) Prevent damage to glass and finishes.
3) Remove temporary labels and retain for Closeout Submittals.
4) Clean soiled surfaces and glass using a mild detergent and warm water solution with soft, clean cloths. Do not use petroleum distillates for cleaning.
5) Clean interior and exterior glass and aluminum surfaces promptly after installation.
6) Adjust windows for smooth operation.

END OF SECTION
Exhibit A – Alternate 006
CONSTRUCTION REQUIREMENTS
SECTION 08 53
VINYL WINDOWS

PART 1 - GENERAL

1.1 SUMMARY
1) Section Includes:
   a. Tubular extruded vinyl framed windows, with fixed and operable sash.
   b. Shop glazing.
   c. Operating hardware and insect screens.
2) Related Sections:
   a. Division 2 – General Requirements
   b. Alternates:
      i. Reference Exhibit A of the Bidding Documents.

1.2 REFERENCES
1) American Architectural Manufacturers Association (AAMA) 303 - Voluntary Specification for Poly
   (Vinyl Chloride) (PVC) Exterior Profile Extrusions.
2) American Architectural Manufacturers Association/Window and Doors Manufacturers Association
   (AAMA/WDMA) - 101/I.S.2-97 - Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood
   Windows and Glass Doors.
3) ASTM International (ASTM):
   b. C1048-04 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT, Coated
      and Uncoated Glass.
   c. D3656-04 - Standard Specification for Insect Screening and Louver Cloth Woven from Vinyl-
      Coated Glass Yarns.
   d. E90-04 - Standard Test Method for Laboratory Measurement of Airborne Sound
      Transmission Loss of Building Partitions and Elements.
   e. E413-04 - Classification for Sound Rating Insulation.
4) California Association of Window Manufacturers (CAWM) 301-90 - Forced Entry Resistance of
   Windows.
5) National Fenestration Rating Council (NFRC):
   b. 200-2004 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and
      Visible Transmittance at Normal Incidence.

1.3 SYSTEM DESCRIPTION

1) Performance Requirements:
   d. Forced entrance resistance: Tested to CAWM 301.
   e. U-factor: 0.56, tested to NFRC 100.
   f. Solar heat gain coefficient: 0.26, tested to NFRC 200.
   g. Visible light transmittance: 0.46, tested to NFRC 200.
   h. Sound transmission class: 31, tested to ASTM E90 and classified to ASTM E413.
1.4 SUBMITTALS

1) Submittals for Review:
   1. Shop Drawings: Include window locations, types, elevations, opening dimensions, relationship to adjacent construction, clearances, and attachments.
   2. Product Data: Provide information on window components, sash and frame profiles, glazing, hardware, and accessories.
   3. Samples:
      a. Window corner, minimum 12” x 12” inches, showing sash and frame components, corner construction, glazing, and finish.
      b. 3 x 3 inch finish samples showing available colors.
2) Sustainable Design Submittals:
   1. Regional products: Indicate location of manufacturing facility and distance from facility to project site.

1.5 QUALITY ASSURANCE

1) Overall Standards: Comply with ANSI/AAMA 101.I.S.2, except as otherwise noted herein.
2) Qualifications:
   1. Manufacturer Qualifications:
      a. Minimum five years’ experience in producing aluminum windows of the type(s) specified.
      b. Member AAMA, NFRC.
3) Regulatory Requirements:
   a. 2012 International Building Code (I.B.C.) with City of Phoenix amendments
   b. 2012 International Residential Code (I.R.C.) with City of Phoenix amendments
   c. Current Phoenix Zoning Ordinance
   d. Housing and Urban Development (HUD) Standards for Housing
4) Certifications for insulated glass windows:
   a. AAMA: Windows shall be Gold Label certified with label attached to frame per AAMA requirements.
   b. NFRC: Windows shall be NFRC certified with temporary U-factor label applied to glass and an NFRC tab added to permanent AAMA frame label.

1.6 DELIVERY, STORAGE AND HANDLING

1) Product Storage and Handling Requirements.
2) Follow manufacturer’s instructions on label applied to windows.

1.7 WARRANTY

1) Commercial Special Warranty:
   a. 10-year guarantee.
   b. Guarantee windows against defects in manufacturing and workmanship including costs for parts and labor.

PART 2 - PRODUCTS

2.4 MANUFACTURERS

1) Substitutions: Under Exhibit A of the Bidding Documents
2) Substitutions: or equal and in like-kind are permitted, but subject to approval.
2.5 MATERIALS

1) Extruded PVC: AAMA 303; hollow, multi-chambered sections of extruded polyvinyl chloride (PVC), with integral ultraviolet inhibitors.

2) Glass:
   c. Clear glass: ASTM C1036; 2.5, 3, 4, or 5 mm thick to suit window size.
   d. Clear tempered glass: ASTM C1048, Kind FT; 3, 4, or 5 mm thick to suit window size.
   e. Tinted glass: ASTM C1036; 3, 4, or 5 mm thick to suit window size, bronze.
   f. Tinted tempered glass: ASTM C1048, Kind FT; 3, 4, or 5 mm thick to suit window size, bronze.
   g. Tinted tempered solar reflective glass: ASTM C1036; 3, 4, or 5 mm thick to suit window size, bronze by PPG Industries, coating on No. 1 surface, or approved equal.
   h. Tinted tempered solar reflective glass: ASTM C1048, Kind FT; 3, 4, or 5 mm thick to suit window size, bronze by PPG Industries, coating on No. 1 surface, or approved equal.
   i. Sealed insulating glass: ASTM E774, Grade CBA, consisting of an outer lite of tinted, with low-e coating on No. 3 surface.
   j. Provide tempered glass where required by Code.

3) Hardware:
   c. Material: Aluminum, stainless steel, Zinc, or plated steel.
   d. Positive latch system engaging keeper in center mullion. Panels not removable from exterior when in locked position.
   e. Adjustable Delrin rollers with stainless steel axles.

2.6 ACCESSORIES

1) Anchors: Corrosion resistant coated.
2) Weather-stripping: Silicone treated nylon pile with center fin.
3) Insect Screens: Glass fiber, ASTM D3656, 18 x 16 mesh.
4) Divided Lite Grids: Type SDL.

2.6 FABRICATION

1) Fabricate windows to AAMA/WDMA - 101/I.S.2.
2) Fabricate with minimum clearances and shim spaces around perimeter, yet enabling installation and dynamic movement.
3) Accurately fit and secure joints and intersections. Make joints flush, hairline, and weathertight.
4) Fabricate in largest practical units.
5) Fabricate units with integral prepunched nailing fin.
6) Weatherstrip operable sash.
7) Miter and fusion weld corners and intersections.
8) Provide internal drainage weep holes and channels to route moisture to exterior.
9) Form glass stops, exterior sills, closures, weatherstops, and flashings of same material as frame.
11) Mount screens in removable, rewireable tubular aluminum frame.

2.7 FINISHES

1) PVC: Integrally colored; color to be selected from manufacturer’s standards.
2) Screens:
   a. Screen mesh: Charcoal.
   b. Frame: Color to match windows.
PART 3 - EXECUTION

3.6 INSTALLATION

1) Install windows in accordance with manufacturer's instructions and approved Shop Drawings.
2) Close and lock operating sash during installation.
3) Set plumb, level, and rigid, free from warpage.
4) Permanently attach windows to supporting construction.
5) Seal corners and mounting flanges for full length to prevent moisture infiltration.
6) Installation Tolerances:
   a. Maximum variation from plumb or level: 1/8 inch in 3 feet or 1/4 inch in any 10 feet, whichever is less.
   b. Maximum misalignment of members abutting end to end: 1/16 inch.

3.7 CLEANING

1) Clean interior and exterior glass and vinyl surfaces promptly after installation.
2) Prevent damage to glass and finishes.
3) Do not use petroleum distillates for cleaning.

3.8 ADJUSTING

1) Adjust windows for smooth operation.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 09220
EXTERIOR STUCCO – SINGLE COAT

PART I – GENERAL

1.1 SCOPE:

1) This specification describes the minimum requirements for the application of the Exterior System consisting of weather barrier, insulating foam boards, lath & fasteners, and Portland cement plaster.

1.2 REFERENCE SECTION:

1) Section 06110 – Wood Framing
2) Section 06160 - Sheathing
3) Section 07250 - Vapor Retarders
4) Section 07600 – Flashing and Sheet Metal
5) Section 07900 – Joint Sealants
6) Section 09290 – Gypsum Board
7) Section 09900 - Painting

1.3 REFERENCES:

1) Portland Cement Plaster Resource Guide - Latest Revision
2) Federal Specification FS UUB 790-A Building Paper
3) American Society for Testing and Materials (ASTM)
4) International Residential Code: Current Adopted Edition
   a) C 847 – Metal Lath
   c) C 926 – Specification for Application of Portland Cement-Based Plaster.
   e) C 834 / C 920 Sealants

1.4 SYSTEM DESCRIPTION:

1) Weather barrier, woven, welded or expanded metal lath reinforcement, insulating foam boards, sanded basecoat, and textured color coat finish.

1.5 QUALITY ASSURANCE:

1) Obtain cement plaster, stucco finish, lath, fasteners and trim that comply with the approved manufacturer requirements.
2) Manufacturer: Omega, Western 1-Kote, La Habra, or approved equal.
3) Contractor shall provide trained personnel qualified to install lath weather barrier, insulating foam boards, plaster and finishes per the scope of work described in this specification.
1.6 DELIVERY, STORAGE & HANDLING:

1) Deliver, store, handle, and protect products for use on the project.
2) Deliver product to job site:
   a) Without exposure to weather or other sources of moisture.
   b) In manufacturer's unopened container, packages or bundles; clearly identified.
3) Store in dry, ventilated space off of the ground.
4) Protect materials from soiling, rusting and damage.

1.7 SITE CONDITIONS:

1) Owner shall have reasonable and safe access to the jobsite for delivery, staging, storing, mixing and application of materials required for the described scope of work.

1.8 ENVIRONMENTAL CONDITIONS:

1) Cold Weather Requirements: Provide heat and protection, temporary or permanent, as required to protect each coat of plaster from freezing – during or at least 24 hours after application or longer – to insure curing of the base and finish coats without freezing. Distribute heat uniformly to prevent concentration of heat on plaster near heat sources; provide deflection or protective screens. (Use of Xccelerate Cold Weather NON-Chloride additive is permissible.)
2) Warm Weather Requirements: Protect plaster against uneven and excessive evaporation and from strong flows of dry air, both natural and artificial. Apply and moist cure plaster to prevent dry out during the first forty-eight (48) hours or longer as required by climatic conditions. Provide suitable coverings, moist curing, barriers to deflect sunlight and wind, or combinations of these as required.
3) Application Requirements: Apply plaster when substrate or ambient air temperature is 40 degrees F and rising (unless sand and mixing water are heated to 70 degrees F and temporary protection is provided to keep minimum 40 degrees F or above in plastered areas for 24 hours minimum after set has occurred in accordance with PCA Portland Cement Plaster Stucco Manual. Do not use frozen materials in mixes and do not apply materials to frozen bases.
4) Protection: Protect finished surface installed prior to plastering by covering with suitable drop cloths. When application of cement plaster is to interior spaces, screen openings with plastic film when building is subject to hot, dry winds, or when temperature differentials between interior and exterior spaces of more than 20 degrees F are present.

1.9 SEQUENCING

1) Coordinate communications between the trades and scheduling of the work prior to project commencement and while the work is in progress.
2) Consult other trades in advance and make provisions for their work to avoid cutting and patching.
3) Applicator of the Cement Plaster System shall schedule all inspections required by local authorities or product manufacturers, at each required stage, before continuing with the next stage of the system.
4) All wall penetrations shall be installed with proper flashing details by the appropriate trades before lathing shall begin. Flashing materials shall be compatible with sealant, building paper and flashings installed for the lath.
5) Attachment of drywall or other products to the interior sides of walls receiving shall be complete before the installation of the exterior cement plaster.
6) Tile, Stone or other roofing materials of significant weight shall be loaded onto roof before application of exterior cement plaster.
7) Adequately moist cure per manufacturer's specification.
PART II – PRODUCTS

2.1 MANUFACTURERS

1) Sacramento Stucco Company, West Sacramento, CA.
2) Western Stucco Company, Glendale, AZ.
3) Rio Grande Stucco Company, El Paso, TX
4) Ash Grove Packaging, Precision Packaging, Materials Packaging
5) Dow, Western Insulfoam, AFP or equal.
6) Fortifiber
7) Clark Western, Cemco or equal
8) Davis, K-lath, Structalath or equal
9) Stockton Wire Products or equal

2.2 WEATHER BARRIER, LATH AND TRIM MATERIALS:

1) All products used for the system shall be approved for exterior application.
2) All weather barriers, flashings, metal reinforcing, trims, woven and welded wire, fasteners and other lath accessories for vertical and horizontal applications, shall be sized, spaced and installed per the listed reference standards and the latest adopted building codes.
3) Expanded Metal Lath: Meeting requirements of ASTM C 847.
   a) Self-furring where attached directly to substrate.
   b) Flat or High-Rib where required.
4) Strip Mesh: Expanded metal lath, minimum 2.5 pounds per square foot; 2 inch wide by 24 inches long.
5) Sheathing Paper: Breather type asphalt saturated paper, water vapor permeable. Barrier to meet the following standards: FS UU-B-790a, Type 1, Style 2, Grade D 60 minute 2 ply UBC 1707a / 4706d. Sealant meeting ASTM C 834 or ASTM C920. Building paper, flashing and sealant shall be Fortifiber High Performance Window Flashing System
6) Foam Board: One inch 4 sided Tongue and Groove or EPS top and bottom T&G.
7) Trim:
   a) Casing Bead: Galvanized roll-formed sheet steel minimum 26 gauge, depth governed by plaster thickness. Maximum lengths.
   c) Control Joint: Galvanized formed sheet steel minimum 26 gauge, V or J profile, protected with plastic tape for removal after plastering, depth governed by plaster thickness; maximum lengths.
   d) Plastic Nose corner aid where specifically called out meeting ASTM D 1784

PART III – EXECUTION

3.1 EXAMINATION:

1) Verify that surfaces and site conditions are ready to receive work.

3.2 PREPARATION:

1) Protect surfaces near the work of this Section from damage or disfiguration. Protect fixtures, frames, inserts and other adjacent work from rusting, soiling or clogging due to plastering.
2) Apply an approved bonding agent to block, concrete or masonry surfaces.
3.3 LATHING – WALLS:

1) Install weep screeds where required.
2) Install Fortifiber weather resistive barrier in accordance with section 2.2 of this specification.
3) Install Casing Beads where required.
4) Install Fortifiber High Performance Window Flashing System
5) Install metal head flashing with end dams over all window penetrations per NWCB Resource Guide detail FWB9
6) Apply foam boards over solid backing in compliance with ICC requirements for drainage channels. Foam must be gapped 1/8” above any horizontal penetrations into the system to allow proper drainage.
7) Apply metal lath or woven wire per manufacturers’ instructions. Fasten per ASTM C 1063
8) Control joints should be utilized at all areas where movement may be anticipated such as: Wall penetrations, structural plate lines, or between dissimilar materials, columns and cantilevered areas.
9) Stucco panel shall be designed to be no longer than twenty (20) feet without the use of a control joint and entire panel should not exceed a three to one ratio.
10) As a general rule, stucco panels should be as square as possible and not in excess of one hundred and eighty square feet (144 sq. ft.)
11) Install 3/8” horizontal and vertical control joints over continuous lath. Vertical joints shall be continuous. Abut horizontal joints to vertical joints. Intersections and end-to-end terminations shall be embedded in sealant. Install level, plumb and true to line; secure firmly in place.
12) Fasten all trims to wood or steel framing or wire tie. Attachment to sheathing is not permissible.
13) Install casing beads where indicated on drawings or where plaster terminations are exposed. Butt and align ends. Install level, plumb and true to line; secure firmly in place.

3.4 MIXING:

1) (Premixed Stucco) Exterior Stucco Finish mixed with clean water in a mechanical mixer for ten to twelve-minutes. Two to three gallons of water are added until the mix is at a working consistency. Amount of water may vary due to weather conditions and desired texture. The contractor shall be consistent from batch to batch with the quantities of water.
2) Mixing: (Color Packages) Color Packages for each batch shall be mixed thoroughly in a pail of clean, potable water before being added to the appropriate base (A or B) as designated on the chart. The diluted color shall be added to 1 sack of Exterior Stucco Finish and 5 gallons of water and allowed to completely disperse through the slurry. When the color is completely dispersed, add additional sacks of Exterior Stucco Finish to complete the batch. Do not add water over the recommended amount for one bag if additional bags will not be batched together at the same time.
3) Continuous batching (adding additional sacks to an existing batch) is recommended for either Premixed Stucco or batches consisting of base and color packages.

3.5 APPLICATION – PLASTER:

1) Apply 3/8” to 1/2” base coat without cold joints.
   a) The brown coat shall be hard floated to promote densification of the coat.
   b) Cut brown coat through full depth with trowel at intersection of plastered walls and plastered soffit.
1) Exterior Stucco Finish shall be applied by hand or machine application to a finished thickness of 1/16 to 1/8 inch.
2) Hand Application over Portland cement base- Prior to application of Exterior Stucco Finish, the base coat shall be sprayed with clean water to control and equalize water absorption.
3) Machine Application over Portland cement base - Base coat shall be dry. (It is not necessary to spray the base coat before application of Exterior Stucco Finish by machine, as the compound itself has ample moisture when mixed for this purpose.) Spray the first coat in a
Thin consistency over the dry surface and cover base coat completely. After first coat has dried, which may take two or more hours depending on climatic conditions, spray second coat in a thicker consistency and bring to the desired texture. Second coat may be sprayed the following day.

3.6 CURING:

1) Western 1-Kote must be hydrated for the first forty-eight (48) hours after application to ensure proper curing. Environmental conditions will determine the schedule and volume of hydration. Hot, windy or dry conditions may dictate curing for an extended period.

2) Portland cement is a high pH surface, efflorescence is to be expected. Use of clean potable water for hydration is required to minimize discoloration of Exterior Stucco Finish.

END OF SECTION
Exhibit A – Alt. 07
CONSTRUCTION REQUIREMENTS
SECTION 09240
EXTERIOR STUCCO – 3 COAT SYSTEM

PART 1- GENERAL

1.1 SUMMARY

1) Section Includes: Work includes all labor, materials, and equipment necessary to install all aspects of Portland cement plaster.

2) Related Sections
   a) Section 06110 - Wood Framing
   b) Section 06160 - Sheathing
   c) Section 07250 - Vapor Retarders
   d) Section 07600 – Flashing and Sheet Metal
   e) Section 07900 – Joint Sealants
   f) Section 09290 – Gypsum Board
   g) Section 09900 - Painting

1.2 References

1) ASTM C150 – Portland Cement
2) ASTM C847 – Standard Specification for Metal Lath
3) ASTM C1032 - Woven Wire Plaster Base
4) ASTM C933 - Welded Wire Lath
5) ASTM C144/C897 – Aggregate for Job-Mixed Portland Cement-Based Plaster
6) ASTM C926 – Application of Portland Cement-Based Plaster
7) ASTM C1063 – Installation of Lathing and Furring for Portland Cement Based Plaster
8) PCA (Portland Cement Association) – Plaster (Stucco) Manual
10) ICC-ES Acceptance Criteria for Weather-resistant Barriers (AC38)

1.3 SYSTEM DESCRIPTION

1) General: Portland cement plaster is comprised of a water-resistive barrier, optional sheathing, metal lath, scratch and brown coats, and a finish color coat.

2) Application Methods: The plaster is applied directly to a structure at the construction site.

1.4 SUBMITTALS

1) Product Data: All product data sheets, evaluation reports, details, and warranty information that pertain to the project in accordance with the General Requirements.

2) Samples: Submitted upon request.
   a) Samples of the finish coat shall be of an adequate size as required to represent each color and texture to be utilized on the project and produced using the same techniques and tools required to complete the project.
   b) Retain approved samples at the construction site throughout the application process.
1.5  QUALITY ASSURANCE

1) Qualifications:
   a) Manufacturer: System and component materials shall be approved by Owner, manufacturer, and shall be distributed by the same or its authorized dealers.

2) Plastering Contractor:
   a) Shall specialize in cement plasterwork with documented experience.
   b) Shall provide proof of current contractor’s license and bond where required.

3) On-Site Mock-Ups: Produced upon request.

1.6  DELIVERY, STORAGE, AND HANDLING

1) Delivery: Deliver all materials to the construction site in their original, unopened packaging with labels intact.

2) Inspection: Inspect the materials upon delivery to assure that specified products have been received. Report defects or discrepancies to the responsible party according to the construction documents; do not use reported material for application.

3) Storage: Store all products per manufacturer’s recommendations. Generally, store materials in a cool, dry location; away from direct contact with the ground and/or concrete; out of direct sunlight; and protect from weather and other damage.

1.7  PROJECT CONDITIONS

1) Environmental Requirements: Follow product manufacturer’s recommendations for environmental conditions and surface preparation.
   a) Temperatures: Before, during and following the application of the cement plaster, the ambient and surface temperatures must remain above 40°F (4°C) for a minimum period of 24 hours. Protect stucco from uneven and excessive evaporation, especially during hot, dry and/or windy weather. Protect the cement plaster from freezing for a period of not less than 24-hours after set has occurred.
   b) Substrates: Prior to installation, inspect the wall for surface contamination or other defects that may adversely affect the performance of the materials, and shall be free of residual moisture. Do not apply the cement plaster to substrates whose temperature are less than 40°F (4°C) or contain frost or ice.
   c) Inclement Weather: Protect applied material from inclement weather until dry.

2) Existing Conditions:
   a) Jobsite Resources: Provide access to electrical outlets, clean, potable water, and a suitable work area at the construction site throughout the application of the cement plaster.

1.8  SEQUENCING AND SCHEDULING

1) Sequencing: Coordinate the installation of the cement plaster with all other construction trades. To reduce the likelihood of the stucco cracking, it is recommended the building carry a minimum of 90 percent of the dead building load and the interior gypsum be installed prior to installation of the stucco.

2) Staffing: Provide sufficient manpower to ensure continuous operation, free of cold joints, scaffolding lines, variations in texture, etc.
1.9 WARRANTY

1) System Warranty: Submit documentation on standard warranties. At completion of work, provide written system warranty documentation.
2) Warranty Length: Five (5) years commencing at the time of substantial completion.

1.10 MAINTENANCE

1) The following materials shall be presented to the Owner following the application of the work:
   1) One container of finish for each color and texture utilized on the project.
   2) A maintenance program for finishes as required.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1) Acceptable Manufacturer:
   a) Western Stucco Company, Glendale, AZ, or Owner approved alternate.
   b) Portland Cement
   c) Ash Grove Packaging, Precision Packaging, Materials Packaging
   d) Dow, Western Insulfoam, AFP or equal.
   e) Fortifiber
   f) Clark Western, Cemco or equal
   g) Davis, K-lath, Structalath or equal
   h) Stockton Wire Products or equal

2.2 SCRATCH AND BROWN COAT

1) Cement: Low alkali Portland Plastic cement complying with ASTM C1328.
2) Sand:
   a) Sand must be clean and free from deleterious amounts of loam, clay, silt, soluble salts and organic matter.
   b) Sampling and testing must comply with ASTM C144 or C897.
3) Water: Clean and potable without foreign matter.

2.3 WATER-RESISTIVE BARRIER

1) Over Open Framing:
   a) Equivalent material recognized in a current evaluation report as complying with the ICC-ES Acceptance Criteria for Water-resistive Barriers (AC38).
   b) Acrylic-based, vapor-permeable water-resistive/air barrier.
2) Over Wood-based Sheathing:
   a) Double layer of equivalent material recognized in a current evaluation report as complying with the ICC-ES Acceptance Criteria for Water-resistive Barriers (AC38).
   b) Acrylic-based, vapor-permeable water-resistive/air barrier.

2.4 LATH

1) Welded Wire: Nominal No. 16 gauge (0.065 inch), 2-inch-by-2-inch opening, galvanized steel complying with ASTM C933.
2.5 SHEATHING

1) Gypsum Board: Water-resistant exterior fiber-reinforced gypsum sheathing must comply with ASTM C1278 and be recognized in a current evaluation report.

2.6 ACCESSORIES

1) Caulking: Polyurethane or silyl-terminated polyether elastomeric sealant complying with ASTM C920.

2) Vapor Retarder: A vapor retarder complying with the International Energy Conservation Code (IECC) Section 402.5 or 502.5 or IRC Section R318.1 must be provided.

3) Flashing: Flashing complying with IBC Section 1404.2, 1405.3 or IRC Section R703.8, as applicable, must be provided.

4) Fasteners: Nails, staples, or screws used to rigidly secure lath and associated accessories shall be corrosion-resistant and meet the minimum requirements of ASTM C1063.
   a) Zinc and Zinc-Coated (Galvanized) Accessories: The following accessories shall be fabricated from zinc-coated (galvanized) steel.
      I. Corner Aid: Minimum 26-gauge thick; expanded flanges shaped to permit complete embedding in plaster; minimum 2 in. wide; Square-edge style; use unless otherwise indicated.
      II. Strip Mesh: Metal Lath, 3.4 lbs./yd.² expanded metal; 6 in. wide x 18 in. Long.
      III. Vent Screed: Minimum 26-gauge thick; thickness governed by plaster thickness; minimum 4-inch (102 mm) width, double “V” profile, with perforated expanse between “V’s” of longest possible lengths.
      IV. Casing Bead: Minimum 26-gauge thick; thickness governed by plaster thickness; maximum possible lengths; expanded metal flanges, with square edges.
      V. Drip Screed: Minimum 26-gauge thick, depth governed by plaster thickness, minimum 3-1/2 in. high flange, and maximum possible lengths.
      VI. Control and Expansion Joints: Depth to conform to plaster thickness; use maximum practical lengths.
         a) Control Joints: One-piece-type, folded pair of unperforated screeds in double V configuration; removable protective tape on plaster face of control joint.
         b) Expansion Joints: Two-piece-type formed to produce a slip-joint or pair of casing beads with sealant between.

2.7 FOAM ARCHITECTURAL DETAILS

1) Foam: EPS foam, 1.0 lbs./ft² minimum density.

2) Foam Mesh: Alkali resistant, 4.5 oz., woven glass fiber fabric.

2.8 FINISHES

1) Knockdown –to match texture used elsewhere in same subdivision.

2) Color and Texture: Color and finish texture shall be as selected by the Owner.

2.9 MIXES

1) Portland cement Plaster: Mix and proportion cement plaster in accordance with ASTM C926.

2) Finishes: Mixing and tinting instructions per manufacturer’s product data sheets.
PART 3 - EXECUTION

3.1 EXAMINATION

1) Prior to the application of the cement plaster the plastering contractor shall ensure that:
   a) Surface and site conditions are ready to receive work.
   b) Grounds and Blocking: Verify that the items within the walls for other sections of work have been installed.

2) Substrates:
   a) Acceptable substrates must be securely fastened per applicable building code requirements.
   b) Acceptable substrates and adjacent materials must be dry, clean, and sound. Substrate surface must be flat, free of fins or planar irregularities greater than ¼-inch in 10-feet (6mm in 3m).

3) Flashings:
   a) All flashing around windows, at deck attachments, utility penetrations, roof lines, etc. and all kick-out flashing must be properly installed prior to application of cement plaster.
   b) Unsatisfactory conditions shall be reported to the Owner and/or Project Manager without delay. Do not proceed until all unsatisfactory conditions have been corrected. Beginning of installation constitute acceptance of existing conditions.

3.2 PREPARATION

1) Substrate: Clean the substrate to which the plaster is to be applied, ensuring that there are no foreign materials present; including, but are not limited to, oil, dirt, dust form release agents, efflorescence, paint, wax, water repellants, moisture, frost, and or extended nails that may rupture the water-resistive barrier.

2) Surrounding Areas: Protect surfaces near the work of this section from damage, disfiguration, and overspray. Mask off all dissimilar materials.

3.3 INSTALLATION, GENERAL

1) General Installation: In accordance with Section 2, #00.01-13 of the General Requirements, ASTM C926, ASTM C1063, and/or the appropriate manufacturer’s product data sheet for additional installation requirements and recommendations.

3.4 INSTALLING WEATHER PROTECTION

1) Water-Resistive Barrier: Apply water-resistive barrier complying with Section 1404.2 of the IBC, Section R703.2 of the IRC or Section 1402.1 of the UBC.

2) Flashing: Install flashing and trim in accordance with Section 2, #00.01-13 of the General Requirements, Install flashing and trims properly to insure moisture does not accumulate and can easily drain to the exterior. All openings shall be properly flashed and designed to allow water to escape to the outside of the wall. All penetrations shall be properly flashed and/or sealed using approved methods. Walls should be designed to prevent bulk water from getting behind the stucco or running down the face of the stucco. The bottom of the wall is required to have weep screed or another effective means to drain any water that may get behind the stucco.

3.5 INSTALLING LATH

1) General: Installed per ASTM C1063.
3.6 INSTALLING CEMENT PLASTER
1) Application Over Metal Lath: Apply per ASTM C926 and C1063. Apply cement plaster by hand-troweling or machine-spraying to a nominal thickness of 3/8-inch (9.5mm) scratch coat and to a nominal thickness of 3/8-inch (9.5 mm) brown coat.
2) Moist Curing: Provide sufficient moisture by fog or moist curing to permit proper hydration of the cementitious materials. The length of time and most effective procedure for curing will depend on climatic and job conditions.

3.7 INSTALLING CRACK ISOLATION SYSTEM
1) Brown Coat Method: Before final set has occurred, fully embed fiber mesh into the brown coat around corners of all door and window openings. Trim material to butterfly around the corners in a triangular configuration with a minimum two-inch (51 mm) overlap. Brown coat surface shall be left suitable for the application of the finish coat.

3.8 INSTALLING FOAM ARCHITECTURAL DETAILS
1) Attaching Foam: Apply foam shapes after the plaster has set. Use foam adhesive to attach EPS foam shapes to the wall. See base coat product data sheet for additional information.
2) Coating Foam: Apply foam base coat and embed mesh. Overlap mesh onto the plaster a minimum of 1.5-inches (38mm).
3) Lath Wrapped Foam Details: Attach foam shape to wall using mechanical attachment prior to application of base coat. Lath foam shape using approved metal lath and corner aid.

3.9 INSTALLING FINISH COAT
1) General: Apply per manufacturer’s product data sheet.
2) Verification: Verify the desired color and texture match the approved sample and/or mock-up prior to installation.

3.10 CLEANING
1) Cleaning: Remove any and all materials used, overspray from adjacent surfaces, and all protective masking.

3.11 PROTECTION
1) Protection: Protect applied material from inclement weather until dry and prevent it from freezing for a minimum of 24-hours after set and/or until dry. Refer to manufacturer’s product data sheet for additional requirements.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 07 21 00
BATT INSULATION

PART 1 GENERAL

1.1 SUMMARY
1) Section Includes: Insulation:
   a) Unfaced Fiberglass Batt insulation.

1.2 REFERENCE STANDARDS
1) American Architectural Manufacturers Association (AAMA)
   a) AAMA 812: Voluntary Practice for Assessment of Single Component Aerosol
      Expanding Polyurethane Foams for Sealing Rough Openings of Fenestration
      Installations.
2) ASTM International:
   a) ASTM C 1320 Standard Practice for Installation of Mineral Fiber Batt and Blanket
      Thermal Insulation for Light Frame Construction.
   b) ASTM D 543 Standard Practices for Evaluating the Resistance of Plastics to
      Chemical Reagents.
   c) ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building
      Materials.
   d) ASTM E 90 Standard Test Method for Laboratory Measurement of Airborne Sound
      Transmission Loss of Building Partitions and Elements.
   f) ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and
      Materials.
   g) ASTM E 136 Standard Test Method for Behavior of Materials in a Vertical Tube
      Furnace at 750°C.
   h) ASTM E 283 Standard Test Method for Determining Rate of Air Leakage Through
      Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences
      Across the Specimen.
   i) ASTM E 413 Classification for Rating Sound Insulation.
4) OSHA: Occupational Safety and Health Administration.
5) SWRI: Sealant, Waterproofing, & Restoration Institute

1.3 ACTION SUBMITTALS
1) Product Data: Submit data on product characteristics, performance criteria, and
   limitations.
2) Warranty: Submit sample of manufacturer’s special warranty.

1.4 INFORMATIONAL SUBMITTALS
1) Manufacturer’s Certificate: For each product, provide written letter, signed by
   manufacturers, certifying that products provided meet or exceed specified requirements.
2) Test Reports: Provide test report, produced by an independent laboratory, showing test
   results that indicate physical properties of the products provided meet or exceed the
   requirements of this section.
3) Manufacturer’s Instructions: Submit the following:
a) General installation/application instruction.
b) Environmental conditions required for installation and installation techniques.
c) Safety requirements for application of products.

4) Qualification Statements:
a) Installer’s/Applicator’s: Submit qualification statement including a copy of manufacturer’s certificate.

1.5 SUSTAINABLE DESIGN SUBMITTALS
1) Manufacturer’s Certificate: Provide certificates prepared by an independent, third party certifying to the following:
a. Recycled material content for products with recycled content.
2) Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
a. Provide cost data for the following products:
   I. Products with recycled material content.

1.6 CLOSEOUT SUBMITTALS
1) Warranty: Submit Manufacturer’s Special Warranty.

1.7 QUALITY ASSURANCE
1) Qualifications, Installer’s/Applicator’s: Company specializing in performing work of this section with the following minimum requirements:
a) Successfully competed manufacturer’s training.
b) Certified by manufacturer as an approved Installer/Applicator.

1.8 SUSTAINABLE DESIGN QUALITY ASSURANCE
1) Certifications:
a. VOC Emissions: Complies with GREENGUARD Product Emission Standard For Children & Schools.
b. Recycled Content: For fiberglass insulation, 58 percent minimum.

1.9 DELIVERY, STORAGE, AND HANDLING
1) Protection, General:
a) Store and protect products in accordance with manufacturers’ instructions.
b) Store with seals and labels intact and legible.
c) Store inside and in a dry location.
   I. Protect insulation materials from moisture and soiling.
   II. Provide ventilation to prevent condensation and degradation of products.
d) Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
2) Deliver materials in recyclable containers and packaging.

1.10 WARRANTY
1) Manufacturer’s Standard Warranty.
2) Third-party installation/workmanship warranty for 10-years

PART 2 PRODUCTS
2.1 PRODUCT
1) Glass fiber thermal insulation, inorganic, pre-formed unfaced blankets, designed for friction-fit installation in frame cavities.
2.2 PERFORMANCE CRITERIA
   1) Minimum R-Value, Batt Insulation:
      a) Thickness, 5-1/2 inch: R-19.
      b) Thickness, 12” inch: R-38

2.3 MATERIALS
   1) Batt Insulation (Type 1): ASTM C 665, Type I, preformed glass fiber batt type, unfaced.
      a) Thermal Resistance: As indicated on drawings.
      b) Batt Size: Friction fit of sizes to fit stud spacing.

2.4 ACCESSORIES
   1) Provide accessories per insulating system manufacturer's recommendations.

PART 3 EXECUTION

3.1 GENERAL
   1) Comply with Manufacturer’s Instructions for safety, preparation, and application of products.

3.2 INSTALLATION OF INSULATION, GENERAL
   1) Comply with 2009 IECC requirements indicated on Table 402.4.2 Air Barrier and Insulation Inspection Component Criteria.
   2) Install insulation system according to manufacturer’s instructions.
   3) Do not install insulation on top of or within 3” of recessed light fixtures unless the fixtures are approved for such use.
   4) Install exterior thermal envelope insulation for framed walls in substantial contact and in continuous alignment with building envelope vapor retarder or air barrier.
   5) Within exterior wall framing, install insulation between pipes and backside of sheathing. Cut insulation material as required to fit around wiring and plumbing.
   6) Where showers and bath tubs are located on exterior walls, install insulation and vapor retarder air barrier between units and exterior.

3.3 INSTALLATION - BATT INSULATION
   1) Install batt insulation in accordance with ASTM C 1320.
   2) Install in exterior walls, roof and ceiling spaces without gaps or voids.
      a) Fluff insulation to full thickness for specified R-value before installation.
      b) Do not compress insulation.
   3) Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
   4) Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation.
      a) Friction fit at wall cavities.
      b) Retain in place with wire mesh secured to framing members or nylon straps.

3.4 WASTE MANAGEMENT
   1) Recycle empty containers and packaging according to requirements of Division 01 Section "Construction Waste Management and Disposal.
   2) Follow owner’s written recycling plan posted at jobsite.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 07 21 00
BLOWN INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

1) Thermal insulation in ceilings.

1.2 RELATED SECTIONS

1) Section 07 24 00 - Exterior Insulation and Finish Systems: Insulation that is part of the finish system assembly.

1.3 REFERENCES


1.4 SUBMITTALS

1) Product Data: Submit manufacturer's literature describing the products to be used, showing compliance with specified requirements; include installation instructions.

1.5 DELIVERY, STORAGE AND HANDLING

1) Protect insulation from physical damage and from becoming wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation.
2) Label insulation packages to include material name, production date and/or product code.
1.6 QUALITY ASSURANCE

1) 3rd Party Validation UL Environment Required for Minimum 50% Post Consumer Recycle Content and Formaldehyde Free.

PART 2 PRODUCTS

2.1 MANUFACTURERS

1) DOW, Owens Corning, CertainTeed, or approved equal.

2.2 APPLICATIONS/SCOPE

1) Attic/Ceiling Rafters: Blown type.
   a) R-Value: 38

2.3 MATERIALS

1) Blown Insulation: Unbonded, virgin fibrous glass, for pneumatic placement, complying with ASTM C 764, Type I; non-combustible when tested in accordance with ASTM E 136
   a) Installed Thickness in Open Applications: As required to achieve R-value of 38 based on testing in accordance with ASTM C518.
   b) Closed Cavity Applications.
   c) Surface Burning Characteristics: Maximum flame spread of 5, maximum smoke developed of 5, when tested in accordance with ASTM E 84.
   d) Critical Radiant Flux: Greater than 0.12 W/sq cm, when tested in accordance with ASTM E 970.
   e) Color: White.
   f) Free of Formaldehyde: Insulation is manufactured with no formaldehyde.
   g) VOC Emission: Low VOC emission certified by UL Environment GREENGUARD Gold. (formerly Children and Schools)
   h) Recycled Content: Minimum 50% “post-consumer” recycled material.
   i) Product Transparency and Ingredient Disclosure-Declare Red List Free and UL Environment-EPD(Environmental Product Declarations)

2) Accessory Materials and Fasteners: Provide all materials required for complete and proper installation of insulation, whether specified or not

PART 3 EXECUTION

1) EXAMINATION
   a) Examine the areas and conditions under which work of this section will be installed.
   b) Verify that adjacent materials are dry and ready to receive insulation.
   c) Verify mechanical and electrical services have been tested and inspected.
   d) Notify Owner in writing of conditions detrimental to performance of work in this section.
   e) Do not proceed with installation until unsatisfactory conditions have been corrected.

2) INSTALLATION - BLOWN INSULATION
   a) Install in accordance with NAIMA "Recommendations for Installation in Residential and Other Light-Frame Construction - Fiber Glass Loose Fill Insulation" and manufacturer's instructions; follow manufacturer's coverage chart.
b) In open applications, install to depth necessary to achieve specified R-value.
c) In closed cavities, install to fill entire cavity.

3) PROTECTION

a) Protect insulation from damage and from becoming wet before, during and after installation.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 07 21 00
THERMAL INSULATION-AIR SEALING

PART 1 GENERAL

1.1 SUMMARY
1) Section Includes: Air Sealing system, including the following items:
   a) Air infiltration barrier with Flexible Seal Technology.

1.2 REFERENCE STANDARDS
1) American Architectural Manufacturers Association (AAMA)
   a) AAMA 812: Voluntary Practice for Assessment of Single Component Aerosol Expanding Polyurethane Foams for Sealing Rough Openings of Fenestration Installations.
2) ASTM International:
   a) ASTM C 665 Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
   f) ASTM C 1320 Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
   m) ASTM E 136 Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C.
   o) ASTM E 413 Classification for Rating Sound Insulation.
4) OSHA: Occupational Safety and Health Administration.
5) SWRI: Sealant, Waterproofing, & Restoration Institute
1.3 ACTION SUBMITTALS
1) Product Data: Submit data on product characteristics, performance criteria, and limitations.
2) Warranty: Submit sample of manufacturer’s special warranty.

1.4 INFORMATIONAL SUBMITTALS
1) Manufacturer’s Certificate: For each product, provide written letter, signed by manufacturers, certifying that products provided meet or exceed specified requirements.
2) Test Reports: Provide test report, produced by an independent laboratory, showing test results that indicate physical properties of the products provided meet or exceed the requirements of this section.
3) Manufacturer’s Instructions: Submit the following:
   a) General installation/application instruction.
   b) Environmental conditions required for installation and installation techniques.
   c) Safety requirements for application of products.
4) Qualification Statements:
   a) Installer’s/Applicator’s: Submit qualification statement including a copy of manufacturer’s certificate.

1.5 SUSTAINABLE DESIGN SUBMITTALS
1) Manufacturer’s Certificate: Provide certificates prepared by an independent, third party certifying to the following:
   a) Recycled material content for products with recycled content.
   b) Volatile organic compound content for each interior adhesive and sealant and related primer.
2) Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
3) Provide cost data for the following products:
   a) Products with recycled material content.

1.6 CLOSEOUT SUBMITTALS
1) Warranty: Submit Manufacturer’s Special Warranty.

1.7 QUALITY ASSURANCE
1) Qualifications, Installer’s/Applicator’s: Company specializing in performing work of this section with the following minimum requirements:
   a) Successfully competed manufacturer’s training.
   b) Certified by manufacturer as an approved Installer/Applicator.

1.8 SUSTAINABLE DESIGN QUALITY ASSURANCE
1) Certifications:
   a) VOC Emissions: Complies with GREENGUARD Product Emission Standard For Children & Schools.

1.9 DELIVERY, STORAGE, AND HANDLING
1) Protection, General:
   a) Store and protect products in accordance with manufacturers’ instructions.
   b) Store with seals and labels intact and legible.
   c) Store inside and in a dry location.
      I. Protect insulation materials from moisture and soiling.
      II. Provide ventilation to prevent condensation and degradation of products.
2) Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
3) Deliver materials in recyclable containers and packaging.

1.10 WARRANTY
1) Manufacturer’s Standard Warranty.
2) Third-party installation/workmanship warranty for 10-years

PART 2 PRODUCTS

2.1 PRODUCT
1) Air Sealing System with Flexible Seal Technology, Owens Corning, Knauf, or approved equal.

2.2 SYSTEM DESCRIPTION
2) General: System consists of an air infiltration barrier applied to joints between materials of the exterior and interior wall framing to eliminate air infiltration into the building.

2.3 PERFORMANCE CRITERIA (with insulation)
1) Minimum R-Value, Loose-Fill Insulation:
   b) Attic Floor: R-38
2) Minimum R-Value, Batt Insulation:
   a) Thickness, 5-1/2 inch: R-19.
   b) Thickness, 10-1/4 inch: R-38.
   c) Thickness, 12 inch: R-38.
3) Bldg. Infiltration Rate: 5ACH50
4) Minimum STC: 39, ASTM E 90 and E 413, for exterior wall of the following construction:
   a) Interior surface: One layer of 1/2 inch thick gypsum board.
   b) Framing: 2-inch by 6-inch wood studs at 16 inches on center.
   c) Insulation System: Flexible Seal Technology utilizing R-19 Fiberglass BATT insulation, 5.5” thick.
   d) Exterior Sheathing: 7/16 inch thick oriented strand board (OSB).
   e) Exterior Finish: 3/8” plaster over 1” of rigid insulating foam.

2.4 MATERIALS
1) 2-part latex-based Foam Sealant.
2) Tack-Free: Dry to the touch within 20 minutes.
3) Pressure Build: AAMA 812, less than 0.1 psi.
4) Water Vapor Permeance:
   a) ASTM E 96 (dry cup): 40 perm.
   b) ASTM E 96 (wet cup): 110 perm.
5) Dimensional Stability: ASTM D 2126, maximum 1.0% linear change at -40°F, ambient RH after 2 weeks max 2.0% linear change at 100°F, 97% RH after 2 weeks.
6) Durability: ASTM C 719, more than 10 cycles; no cohesive failure or cracking.
7) Flame Spread: ASTM E 84, 10.
9) Leakage Rate: ASTM E 283, less than 0.01 cfm/ft.2 at 1.57 psf (75 Pa) and 6.24 psf (300 Pa) pressure.

2.5 ACCESSORIES
1) Provide accessories per air sealing system manufacturer’s recommendations.
2) Air Barriers: Comply with requirements of Section 07 27 00 “Air Barriers.”
PART 3 EXECUTION

3.1 GENERAL
1) Comply with Manufacturer’s Instructions for safety, preparation, and application of products.

3.2 EXAMINATION
1) Verify that fire stopping is in place before beginning to apply the air infiltration barrier with flexible seal technology.
2) Examine substrates, flashing conditions, penetrations, adjoining construction and the conditions under which work is to be installed.
3) Verify that surfaces are dry and free of oil, grease, dust, rust, or other contaminant.
4) Report unacceptable conditions.
5) Do not proceed with the Work until unsatisfactory conditions have been corrected and surfaces are acceptable.
6) Verify the following conditions have been sealed with the air infiltration barrier before installing insulation and before closing in framing cavities:
   a) Gaps between window units and framing.
   b) Gaps between door heads, jambs, and sills and wall framing.
   c) Interface of foundation or slab and sill plate.
   d) Interface of band joists or rim joists and plates and subfloor.
   e) Duct shafts, utility penetrations, knee walls and flue shafts opening to exterior or unconditioned space.
7) Verify the following work is complete before installing insulation and before closing in framing cavities:
   a) Vapor retarder or air barrier is installed at fireplace walls.
   b) Air sealing is provided between the garage and conditioned spaces.
   c) Vapor retarder or air barrier is installed in common walls between dwelling units.
   d) Recessed light fixtures are air tight, IC rated, and sealed to gypsum board.
      I. Exception: Light fixtures in locations with conditioned spaces on both sides do not need to be air tight and do not need to be sealed unless required by another Section of the Project Manual.

3.3 PREPARATION
1) Before beginning work, protect windows, plumbing fixtures, finish materials, and finish surfaces within work area from overspray by covering them with a plastic film. Secure edges of film to assure air infiltration barrier with flexible seal technology does not get behind the film.
2) Sweep area to receive air infiltration barrier application to remove dust and other contaminants that will interfere with providing a thorough seal.
3) Wear chemical gloves, goggles or a face shield, a long sleeved shirt, and, if the installation site is dusty, a dust mask when applying Air Infiltration Barrier with Flexible Seal Technology.
4) If using products other than Air Infiltration Barrier with Flexible Seal Technology that contain isocyanate, comply fully with OSHA regulations regarding protective clothing, breathing apparatus, ventilation, and restricting access to areas of application.
5) Fill, with fiberglass insulation, medium-sized gaps (gaps between 3/8 inch and 3 inches) between surfaces to be sprayed. Cover gaps greater than 3 inches with rigid, nonporous material such as gypsum board, expanded polystyrene insulation, extruded polystyrene insulation, sheathing, OSB, particle board, agrifiber particle board, or plywood secured to framing and apply sealant at the perimeter.

3.4 AIR INFILTRATION BARRIER WITH FLEXIBLE SEAL APPLICATION
1) Apply in accordance with manufacturers instructions.
2) Apply continuously and evenly to joints in the following conditions:
   a) At penetrations between conditioned and unconditioned spaces.
   b) At interface between the sheathing and stud where a sheathing seam is known to exist.
   c) At the interface between windows/doors and the framed opening – if not filled with other
      sealant.
   d) On the face of all top plates of exterior walls adjacent to unconditioned attic space.
   e) On the face of all top plates of interior walls adjacent to the unconditioned attic space.
   f) At interface between the sill plate and foundation.
   g) At interface between the bottom plate and the sheathing.
   h) At interface between the top plate and the sheathing.
   i) At interface between the bottom plate and the subfloor or slab for first floor of slab-on-
      grade construction.
   j) At any horizontal, mid-cavity sheathing seams.
   k) At garage-to-house common wall.
   l) At wall behind fireplace (block and seal).
   m) At joist bays connecting exterior to conditioned space, such as at garage, porch, or
      overhang (block and seal).
   n) At attic knee-walls (block and seal).
   o) At insulated floor of room above unconditioned space.
   p) At joist bays beneath cantilevered floors, such as for bay windows.
3) Spray those gaps and penetrations filled with loose fill insulation during preparation and
   thoroughly cover them with spray foam.
4) Do not install air infiltration barrier with flexible seal technology within 3” of a heat source.
5) For unvented/conditioned attic space, roof penetrations, roof decking seams and eave
   transitions may be sealed with can-based, expanding foam. Sealant not required where
   membrane sealing products are installed at exterior of roof deck.

3.5 INSTALLATION OF AIR SEAL, GENERAL
1) Comply with 2009 IECC requirements indicated on Table 402.4.2 Air Barrier and Insulation
   Inspection Component Criteria.

3.6 CLEANING
1) Remove plastic film coverings.
2) Clean overspray from materials, equipment, and fixtures that were not to receive flexible
   seal technology.
3) Remove damaged materials, equipment, and fixtures if overspray can not be cleaned
   without blemish and install new materials, equipment, and fixtures identical to item before
   damage occurred.

3.7 WASTE MANAGEMENT
1) Recycle empty containers and packaging according to requirements of Division 01 Section
   “Construction Waste Management and Disposal.
2) Follow owner's written recycling plan posted at jobsite.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 09 29 00
GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

1) Related Documents:
   a) Drawings and general provisions of the Contract, apply to this Section.

2) Section Includes:
   a) Standard Gypsum Board (Gold Bond® BRAND Gypsum Board)
   b) High Strength Ceiling Board (Gold Bond® BRAND Gypsum Board)
   c) Fire-Resistance Rated Gypsum Board (Gold Bond® BRAND Fire-Shield® Gypsum Board, and Gold Bond® BRAND Fire-Shield® C Gypsum Board)
   d) Mold and Moisture Resistant Gypsum Board (Gold Bond® BRAND XP® Gypsum Board)
   e) Exterior Gypsum Ceiling Board (Gold Bond® BRAND Exterior Soffit Board, and Gold Bond® BRAND Fire-Shield® Exterior Soffit Board)

3) Related Sections:
   a) Section 061000 Rough Carpentry
   b) Section 071000 Thermal Insulation
   c) Section 081000 Exterior Plaster

1.2 REFERENCES

1) General:
   a) The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.
   b) Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.
   c) Refer to "General Requirements" for the list of applicable regulatory requirements.

2) American Society for Testing and Material (ASTM)
   b) ASTM C 840 - Standard Specification for Application and Finishing of Gypsum Board
   c) ASTM C 919 - Standard Practice for Use of Sealants in Acoustical Applications
   d) ASTM C 1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
   e) ASTM C 1396 - Standard Specification for Gypsum Board
   f) ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials
   g) ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials
i) ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

3) Gypsum Association (GA)
   a) GA-214 - Recommended Levels of Gypsum Board Finish
   b) GA-216 - Application and Finishing of Gypsum Panel Products

1.3 SUBMITTALS

1) Product Data: Manufacturer's specifications and installation instructions for each type of product.
   a) GREENGUARD: Product Certificate for GREENGUARD Indoor Air Quality Certified and GREENGUARD Children & Schools Certified for low emissions of volatile organic compounds (VOCs) by GREENGUARD Environmental Institute.
   b) Samples:
      I. Trim Accessories: Full-size Sample in 12-inch (300-mm-) long length for each trim accessory indicated.

1.4 QUALITY ASSURANCE

1) Mockups: Before beginning gypsum board installation, provide Owner or Project Manager with 24"x24" taped and textured mockups with finished ends to demonstrate aesthetic effects and set quality standards for materials and execution.

2) Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

3) STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

1.5 DELIVERY, STORAGE AND HANDLING

1) Store materials inside, under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

2) Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

1.6 FIELD CONDITIONS

1) Environmental Limitations: Comply with ASTM C 840 or GA-216 requirements, whichever are more stringent.

2) Do not install interior products until installation areas are enclosed.

3) Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
   a) Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   b) Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.
PART 2 - PRODUCTS

2.1 GYPSUM BOARD, GENERAL

1) Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 MANUFACTURER

1) Products of National Gypsum Company, or approved equal.

2.3 STANDARD GYPSUM BOARD

1) Gold Bond® BRAND Gypsum Board, GREENGUARD Certified
   a) Panel Physical Characteristics
      I. Core: Regular gypsum core
      II. Surface Paper: 100 percent recycled content paper on front, back and long edges
      III. Long Edges: Round
      IV. Overall thickness: [1/2 inch]
      V. Panel complies with requirements of ASTM C 1396

2.4 HIGH STRENGTH GYPSUM CEILING BOARD

2) Gold Bond® BRAND Gypsum Board, GREENGUARD Certified
   a) Panel Physical Characteristics
      I. Core: Regular gypsum core
      II. Surface Paper: 100 percent recycled content paper on front, back and long edges
      III. Long Edges: Round
      IV. Overall thickness: [1/2 inch]
      V. Panel complies with requirements of ASTM C 1396

2.5 FIRE-RESISTANCE RATED GYPSUM BOARD

1) Gold Bond® BRAND Fire-Shield® Gypsum Board, Gold Bond XP Fire-Shield
   a) Panel Physical Characteristics
      I. Core: Fire-resistance rated gypsum core
      II. Surface paper: 100 percent recycled content paper on front, back and long edges
      III. Long Edges: Round
      IV. Overall thickness: 5/8 inch
      V. Panel complies with Type X requirements of ASTM C 1396

2.6 MOLD AND MOISTURE RESISTANT GYPSUM BOARD

1) Gold Bond® BRAND XP Gypsum Board, Gold Bond XP
   a) Panel Physical Characteristics
      I. Core: Mold and moisture resistant gypsum core
      II. Surface paper: 100 percent recycled content moisture/mold/mildew resistant paper on front, back, and long edges
      III. Long Edges: Round
      IV. Overall thickness: 1/2 inch
      V. Panel complies with requirements of ASTM C 1396
2.7 EXTERIOR GYPSUM CEILING BOARD

1) Gold Bond® BRAND Exterior Soffit Board, Gold Bond ESB
   a) Panel Physical Characteristics
      I. Core: Regular gypsum core
      II. Surface paper: 100 percent recycled content extra resistance to moisture and sagging
      III. Long Edges: Round
      IV. Overall thickness: 1/2 inch
      V. Panel complies with requirements of ASTM C 1396

2.8 ACCESSORY PRODUCTS

1) Interior Trim: ASTM C 1047
   a) Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
   b) Shapes:
      I. Cornerbead.
      II. Bullnose bead.
      III. LC-Bead: J-shaped; exposed long flange receives joint compound.
      IV. Curved-Edge Cornerbead: With notched or flexible flanges.

2) Exterior Trim: ASTM C 1047
   a) Materials: Hot-dip galvanized steel sheet, or rolled zinc.
   b) Shapes:
      I. Cornerbead.
      II. LC-Bead: J-shaped; exposed long flange receives joint compound.
      III. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

3) Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.

4) Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.9 JOINT TREATMENT MATERIALS

1) General: Comply with ASTM C 475/C 475M.

2) Joint Tape:
   a) Interior Gypsum Board: Paper.
   c) Paper Tape: 2-1/16 inches wide (ProForm BRAND Joint Tape)
   d) Paper Tape: 2 inches wide with metal strips laminated along the center crease to form inside and outside corners (ProForm BRAND Multi-Flex Tape Bead)
   e) Fiberglass Tape: Nominal 2 inches wide self-adhering tape (ProForm BRAND Fiberglass Mesh Tape)

3) Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
   a) Prefilling: At open joints, rounded edges and damaged surface areas, use setting-type taping compound.
   b) Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use all purpose joint compound. Use setting-type compound for installing paper-faced metal trim accessories.
I. Fill Coat: For second coat, use setting-type, sandable topping compound.

II. Finish Coat: For third coat, use setting-type, sandable topping compound.

c) Drying Type Compound:
   I. Ready Mix vinyl base compound (ProForm BRAND All Purpose Ready Mix Joint Compound; ProForm BRAND Lite-Blue Ready Mix Joint Compound; ProForm BRAND Lite Ready Mix Joint Compound; ProForm BRAND Multi-Use Ready Mix Joint Compound)
   II. Ready Mix vinyl base compound formulated for enhanced mold and mildew resistance (ProForm BRAND XP Ready Mix Joint Compound)
   III. Ready Mix vinyl base topping compound for finish coating (ProForm BRAND Topping Compound)
   IV. Ready Mix vinyl base compound for embedding joint tape, cornerbeads or other accessories (ProForm BRAND Taping Joint Compound)
   V. Field Mix vinyl base compound (ProForm BRAND Triple-T Compound)

d) Joint Compound for Exterior Applications:
   I. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.

PART 3 - EXECUTION

3.1 EXAMINATION

1) Examine areas and substrates including framing, with carpenter and Project Manager present, for compliance with requirements and other conditions affecting performance.

2) Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

3) Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

1) Comply with ASTM C 840, GA-216

2) 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 panels not less than one framing member.

3) Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

4) 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.

5) Form control and expansion joints with space between edges of adjoining gypsum panels.

6) Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
7) 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.

8) Fit gypsum panels around ducts, pipes, and conduits.

9) 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 3/8-inch-(9.5-mm-) wide joints to install sealant.

10) Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4 (6.4--mm-) 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.

12) Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

13) 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.

3.3 APPLYING INTERIOR GYPSUM BOARD

1) Install interior Gypsum board in the following locations:
   Regular Type: Vertical or horizontal surfaces, unless otherwise indicated.
   Type X: Where required for fire-resistance-rated assembly.
   Ceiling Type: Ceiling surfaces.
   Moisture- and Mold-Resistant Type: As specified.

2) Single-Layer Application:
   a) On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
   b) On partitions/walls, apply gypsum panels [vertically (parallel to framing)] [horizontally (perpendicular to framing)] unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
      I. Stagger abutting end joints not less than one framing member in alternate courses of panels.
      II. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
   c) On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
   d) Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3) Multilayer Application:
   a) 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 (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
4) 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.

5) 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.
   a) Fastening Methods: [Fasten base layers and face layers separately to supports with screws] [Fasten base layers with screws; fasten face layers with adhesive and supplementary fasteners].

3.4 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

1) Apply panels perpendicular to supports, with end joints staggered and located over supports.

2) Install with 1/4-inch (6.4-mm) open space where panels abut other construction or structural penetrations.
   a) Fasten with corrosion-resistant screws.

3.5 INSTALLING TRIM ACCESSORIES

1) 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.

2) Control Joints: Install control joints at locations indicated on Drawings and if not shown, according to ASTM C 840 or GA-216 and in specific locations approved by Owner for visual effect.
   a) Interior Trim: Install in the following locations:
      I. Cornerbead: Use at outside corners, unless otherwise indicated.
      II. LC-Bead: Use at exposed panel edges.
   b) Exterior Trim: Install in the following locations:
      I. Cornerbead: Use at outside corners.
      II. LC-Bead: Use at exposed panel edges.

3.6 FINISHING GYPSUM BOARD

1) 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.

2) Prefill open joints rounded edges and damaged surface areas.

3) Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

4) Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
   Level 1: Ceiling plenum areas, concealed areas, and where indicated.
   Level 2: Panels that are substrate for tile where specified.
   Level 3: Where specified.
   Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

5) Primer and its application to surfaces are specified in "Interior Painting."
3.7 APPLYING TEXTURE FINISHES

1) Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.

2) Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.

3) Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

3.8 PROTECTION

1) Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

2) Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

3) Remove and replace panels that are wet, moisture damaged, and mold damaged.
   a) Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   b) Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 22 11 16
DOMESTIC WATER PIPING
(Hot & Cold Potable Water Distribution)

PART 1 - GENERAL

1.1 SUMMARY

1) Section includes: Potable hot and cold water distribution system, using crosslinked polyethylene (PEX) tubing and ASTM F1960 cold expansion fittings.

1.2 REFERENCES

1) General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to the extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

2) ASTM International
   a) ASTM D 2765 - Test Methods for Determination of Gel Content and Swell Ratio of Crosslinked Ethylene Plastics.
   b) ASTM D 6394 - Specification for Sulfone Plastics (SP).
   c) ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
   e) ASTM E814 Standard Test Method for Fire Tests of Through-Penetration Fire Stops
   f) ASTM F876 Standard Specification for Cross-linked Polyethylene (PEX) Tubing
   g) ASTM F877 Standard Specification for Cross-linked Polyethylene (PEX) Plastic Hot-and Cold-Water Distribution Systems
   h) ASTM F1960 Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing

3) American Water Works Association:
   a) AWWA C904 Standard for Cross-linked Polyethylene (PEX) Pressure Pipe, 1/2 in. Through 3 in., for Water Service.

4) American National Standards Institute (ANSI)/National Sanitation Foundation (NSF)
   a) ANSI/NSF Standard 14 Plastics Piping System Components and Related Materials
   b) ANSI/NSF Standard 61 Drinking Water System Components - Health Effects

5) American National Standards Institute (ANSI)/Underwriters Laboratories, Inc. (UL)
6) International Code Council (ICC)
   a) International Plumbing Code (IPC)
   b) ICC Evaluation Service (ES) Evaluation Report No. ESR 1099

7) International Association of Plumbing Officials (IAPMO)
   a) Uniform Plumbing Code (UPC)

8) National Association of Plumbing, Heating and Cooling Contractors (NAPHCC)
   a) National Standard Plumbing Code (NSPC)

9) U.S. Department of Housing and Urban Development (HUD)
   a) HUD Material Release No. 1269

10) Plastics Pipe Institute (PPI)
    a) PPI Technical Report TR-4/06

1.3 SYSTEM DESCRIPTION

1) PEX tubing hot and cold potable water distribution system manufactured, fabricated and
   installed to comply with regulatory agencies and to maintain performance criteria stated by
   the PEX tubing manufacturer without defects, damage or failure.
   b) Comply with ANSI/NSF Standard 61.
   c) Comply with ASTM E119 and ANSI/UL 263 through certification listings with
      Underwriters Laboratories, Inc. (UL).
      I. UL Design No. U372 — 1 hour wood stud/gypsum wallboard wall assemblies

1.4 SUBMITTALS

1) Product Data: Submit manufacturer’s product submittal data and installation instructions.
2) Samples: Submit selection and verification samples of tubing.
3) Quality Assurance/Control Submittals: Submit the following:
   a) Test Reports: Upon request, submit test reports from recognized testing laboratories.
   b) Certificates: Submit the following:
      I. Manufacturer’s certificate that products comply with specified requirements.
      II. Certificate indicating that the installer is authorized to install the
          manufacturer’s products
4) Closeout Submittals: Submit the following:
   a) Warranty documents specified herein
   b) Operation and maintenance data

1.5 QUALITY ASSURANCE

1) Installer Qualifications: Demonstrated experience on projects of similar size and complexity
   and possessing documentation proving successful completion of PEX plumbing installation
   training by the PEX tubing manufacturer.

2) Regulatory Requirements and Approvals: Provide domestic potable system that
   complies with requirements of the following:
   a) International Code Conference (ICC) – International Plumbing Code (IPC)
   b) Uniform Plumbing Code (UPC)
      I. IAPMO Files 3558, 3946 and 3960
   c) National Standard Plumbing Code (NSPC)
d) HUD Material Release No. 1269

e) All state and local approval authority Code Amendments

3) Certifications: Provide letters of certification as follows:
   a) Installer is trained by the PEX tubing manufacturer to install the PEX potable water distribution system.
   b) Installer will use skilled workers holding a trade qualification license or equivalent, or apprentices under the supervision of a licensed trade professional.

4) Pre-installation Meetings: Upon award of the Contract and prior to foundation trenching, verify project timeline requirements, manufacturer’s installation instructions and manufacturer’s warranty requirements.

1.6 DELIVERY, STORAGE & HANDLING

1) Comply with manufacturer’s ordering instructions and lead-time requirements to avoid construction delays.

2) Delivery: Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.

3) Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
   a) Store PEX tubing in cartons or under cover to avoid dirt or foreign material from being introduced into the tubing.
   b) Do not expose PEX tubing to direct sunlight for more than 30 days. If construction delays are encountered, provide cover to portions of tubing exposed to direct sunlight.

1.7 WARRANTY

1) Manufacturer’s Warranty: PEX-a manufacturer system warranty shall cover piping and fittings for a duration of 25 years from the date of installation. Piping system warranty shall apply to potable water distribution and water service systems constructed of pipe and fitting products sourced from the same manufacturer.

PART 2 - PRODUCTS

1) Hot and Cold Potable Water Distribution System
   a) Manufacturer: Uponor, JM Eagle, Viega, ProPex or approved equal.

2) Product Substitutions
   a) Substitutions: Requests for substitutions will be considered, subject to Owner approval.

3) Materials
   a) PEX Pipe & Fittings:
      I. Material Standard: Manufactured in accordance with ASTM F876 and ASTM F877 and tested for compliance by an independent third party agency
      II. Standard grade hydrostatic design and pressure ratings from PPI
      III. Fire-rated assembly listings in accordance with ANSI/UL 263
         a) UL Design No. U372 — 1-hour wood stud/gypsum wallboard wall assemblies
      IV. Minimum Bend Radius (cold bending): No less than six times the outside diameter. Use a bend support as supplied by the PEX tubing manufacturer for tubing with a bend radius less than stated.
VI. PEX-a Fittings: elbows, adapters, couplings, plugs, tees and multi-port tees (1/2 inch through 2 inch nominal pipe size): ASTM F1960 cold-expansion fitting manufactured from the following material types:
   a) UNS No. C69300 Lead-free (LF) Brass.
   b) 20% glass-filled polysulfone as specified in ASTM D 6394.
   c) Unreinforced polysulfone (group 01, class 1, grade 2) as specified in ASTM D 6394.
   d) Polyphenylsulfone (group 03, class 1, grade 2) as specified in ASTM D 6394.
   e) Blend of polyphenylsulfone (55-80%) and unreinforced polysulfone (rem.) as specified in ASTM D 6394.
   f) Reinforcing cold-expansion rings shall be manufactured from the same source as PEX-a piping manufacturer and marked "F1960".

VII. Pre-Sleeved Piping: PEX-a piping, with a high-density polyethylene (HDPE) corrugated sleeve.

VIII. Multi-Port Tees: Multiple-outlet fitting complying with ASTM F 877; with ASTM F 1960 inlets and outlets.
   a) Engineered polymer branch multi-port tee.
   b) Engineered polymer flow-through multi-port tee.
   c) Engineered polymer commercial branch multi-port tee.
   d) Engineered polymer commercial branch multi-port elbow.
   e) Engineered polymer commercial flow-through multi-port tee.

IX. Manifolds: Multiple-outlet assembly complying with ASTM F 877; with ASTM F 1960 outlets.
   a) Engineered polymer valved manifold.
   b) Engineered polymer valveless manifold.
   c) Lead-free copper branch manifold.
   d) Lead-free copper valved manifold.

X. Assemblies consists of the appropriate insert with corresponding ring.

XI. Transition Fittings
   a) PEX-to-Metal Transition Fittings:
      1. Manufacturers: Provide fittings from the same manufacturer of the piping.
      2. Threaded Brass to PEX-a Transition: one-piece brass fitting with male or female threaded adapter and ASTM F 1960 cold-expansion end, with PEX-a reinforcing cold-expansion ring.
      3. Brass Sweat to PEX-a Transition: one-piece brass fitting with sweat adapter and ASTM F 1960 cold-expansion end, with PEX-a reinforcing cold-expansion ring.

XII. PEX-to-Thermoplastic Transition Fittings: CPVC or PP-R to PEX-a Transition: one-piece thermoplastic fitting with male or female threaded adapter and ASTM F 1960 cold-expansion end, with PEX-a reinforcing cold-expansion ring.

XIII. Valves
   a) PEX-to-PEX, Lead Free (LF) Brass Ball Valves (1/2 inch through 2 inch nominal pipe size)
      1. Manufacturers: Provide ball valve(s) from the same manufacturer as the piping system.
3. LF brass valve with a positive stop shoulder manufactured from C69300 brass.

XIV. Accessories
   a) Angle stops and straight stops that are compatible with PEX tubing are supplied by the PEX tubing manufacturer.
   b) Bend supports designed for maintaining tight radius bends are supplied by the PEX tubing manufacturer.
   c) Expander tool to install the ASTM F1960 compatible fittings are supplied by the PEX tubing manufacturer.
   d) The tubing manufacturer provides clips and/or PEX rails for supporting tubing runs.
   e) All horizontal tubing hangers and riser clamps are epoxy-coated material.

PART 3 - EXECUTION

1) Manufacturer’s Instructions
   a) Comply with manufacturer's product data, including product technical bulletins, installation instructions, design drawings and Professional Installation Guide.

2) Examination
   a) Site Verification of Conditions:
      I. Verify that site conditions are acceptable for installation of the PEX potable water system.
      II. Do not proceed with installation of the PEX potable water system until unacceptable conditions are corrected.

3) Installation
   a) PEX Tubing

4) Install plumbing system according to approved shop drawings and coordination drawings.

5) Comply with manufacturer's product data, including product technical bulletins, installation instructions and design drawings, including the following.

6) Piping Installation:
   a) Install PEX-a Pipe Support, expansion loops, arms and offsets in compliance with Chapter 5 - "System Design and Layout" in the Uponor Plumbing Design Assistance Manual (PDAM).
   b) PEX shall not be installed in areas within five feet of UV light.
   c) Install piping in compliance with manufacturer's Plumbing Installation Guide.

7) Hangers and Supports:
   a) Horizontal PEX-a Piping Hangers: Install CTS hangers suitable for PEX-a piping in compliance with Chapter 6 - "Installation Methods" and local codes, with the following maximum spacing:
      I. 1 inch and below: Maximum span, 32 inches.
      II. 1-1/4 inch and above: Maximum span, 48 inches.
   b) Vertical PEX-a Piping: Support PEX-a piping with minimum spacing of 5 feet.
   c) Horizontal PEX-a Piping with PEX-a Pipe Channel: Install hangers for PEX-a piping with horizontal support channel in accordance with local jurisdiction and manufacturer's recommendations, with the following maximum spacing:
      I. 3/4 inch and below: Maximum span, 6 feet.
      II. 1 inch and above: Maximum span, 8 feet.
   d) PEX-a Riser Supports: Install CTS riser clamps at the base of each floor and at the top of
every other floor for domestic hot-water systems. Install mid-story guides between each floor. Install CTS riser clamps at the base of each floor and at the top of every fourth floor for domestic cold-water systems. Install mid-story guides.

8) Piping Schedule:
   a) Underground / under-building slab, domestic water piping (3 inch and below) shall be the following:
      I. 1/2 inch through 2 inch - PEX-a piping with engineered polymer (EP) or lead-free brass F1960 cold-expansion fittings. Insulate in compliance with Section 9 "Plumbing Piping Insulation." Use the fewest possible joints and install per manufacturer's recommendations.
      II. 3/4 inch through 2 inch - PEX-a piping with multi-layer, closed-closed cell PEX-foam insulation and a corrugated HDPE jacket with engineered polymer (EP) or lead-free brass ASTM F 1960 cold-expansion fittings. Use the fewest possible joints and install per manufacturer's recommendations.

9) In-slab, domestic water piping (2 inch and below) shall be the following: Bare PEX-a piping, pre-sleeved PEX-a piping, or pre-insulated PEX-a piping with engineered polymer (EP) or lead-free brass F1960 cold-expansion fittings. Use the fewest possible joints and install per manufacturer's recommendations.

10) Aboveground domestic water piping (3 inch and below) shall be the following: PEX-a piping, with engineered polymer (EP) or lead-free brass F1960 cold-expansion fittings, or lead-free brass compression fittings complying with ASTM F 877.


12) Do not install PEX tubing within 6 inches [152 mm] of gas appliance vents or within 12 inches [305 mm] of any recessed light fixtures.

13) Do not solder within 18 inches [457 mm] of PEX tubing in the same waterline. Make sweat connections prior to making PEX connections.

14) Do not expose PEX tubing to direct sunlight for more than 30 days.

15) Ensure no glues, solvents, sealants or chemicals come in contact with the tubing without prior permission from the tubing manufacturer.

16) Use grommets or sleeves at the penetration for PEX tubing passing through metal studs.

17) Protect PEX tubing with sleeves where abrasion may occur.

18) Use strike protectors where PEX tubing penetrates a stud or joist and has the potential for being struck with a screw or nail.

19) Use tubing manufacturer-supplied bend supports where bends are less than six times the outside tubing diameter.

20) Minimum horizontal supports are installed not less than 32 inches between hangers in
accordance with model plumbing codes and the installation handbook.

21) PEX riser installations require epoxy-coated riser clamps installed at the base of the ceiling per floor.

22) A mid-story support is required for riser applications.

23) Through-penetration Firestop
   a) Ensure compliance of one- and two-hour rated through penetration assemblies in accordance with ASTM E814.

24) Field Quality Control
   a) Site Tests
      I. Pressurize tubing with air in accordance with applicable codes or in the absence of applicable codes to a pressure of 25 psi (173 kPa) above normal working pressure of the system.
      II. Comply with safety precautions when pressure testing, including use of compressed air, where applicable. Do not use water to pressurize the system if ambient air temperature has the possibility of dropping below 32°F (0°C).

25) Cleaning
   a) Remove temporary coverings and protection of adjacent work areas.
   b) Repair or replace damaged installed products.
   c) Clean installed products in accordance with manufacturer’s instructions prior to owner’s acceptance.
   d) Remove construction debris from project site and legally dispose of debris.

26) Protection
   a) Protect installed work from damage due to subsequent construction activity on the site.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 22 13 16
SANITARY WASTE & VENT PIPING

PART 1 – GENERAL

1.1 SUMMARY

1) Section includes: Sanitary Sewer, drainage and venting distribution system, using Schedule 40 Acrylonitrile-Butadiene-Styrene (ABS) pipe and fittings.

1.2 REFERENCES

1) General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to the extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

2) ASTM International

3) American National Standards Institute (ANSI)/Underwriters Laboratories, Inc. (UL)

4) International Code Council (ICC)
   a) International Plumbing Code (IPC)

5) International Association of Plumbing Officials (IAPMO)
   a) Uniform Plumbing Code (UPC)

6) National Association of Plumbing, Heating and Cooling Contractors (NAPHCC)
   a) National Standard Plumbing Code (NSPC)

7) U.S. Department of Housing and Urban Development (HUD)
   a) HUD Material Release No. 1269

8) Plastics Pipe Institute (PPI)

9) All state and local approval authority Code Amendments

1.3 SYSTEM PERFORMANCE REQUIREMENTS

1) Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:
1.4 SUBMITTALS

1) Product Data: Submit manufacturer’s product submittal data and installation instructions.
2) Samples: Submit selection and verification samples of tubing.
3) Quality Assurance/Control Submittals: Submit the following:
   a) Test Reports: Upon request, submit test reports from recognized testing laboratories.
   b) Certificates: Submit the following:
      i. Manufacturer’s certificate that products comply with specified requirements.
      ii. Certificate indicating that the installer is authorized to install the manufacturer’s products
4) Closeout Submittals: Submit the following:
   a) Warranty documents specified herein
   b) Operation and maintenance data

1.5 QUALITY ASSURANCE

1) Provide listing/approval stamp, label, or other marking on piping made to specified standards.
2) Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping; "NSF-drain" for plastic drain piping; "NSF-tubular" for plastic continuous waste piping; and "NSF-sewer" for plastic sewer piping.
3) Pre-installation Meetings: Upon award of the Contract and prior to foundation trenching, verify project timeline requirements, manufacturer’s installation instructions and manufacturer’s warranty requirements.

PART 2 – PRODUCTS

2.1 PIPE MATERIALS

1) General: Schedule 40 Acrylonitrile-Butadiene-Styrene (ABS) pipe.

2.2 JOINING MATERIALS

1) General: Applications of the following piping joining materials are indicated in Part 3 "Piping Applications".
2) Transition Couplings: Schedule 40 Acrylonitrile-Butadiene-Styrene (ABS) fittings.
3) Flexible, Transition Couplings for Underground, Nonpressure Piping: ASTM C1173 with elastomeric sleeve. Include ends same sizes as piping to be joined and include corrosion-resistant metal band on each end.
   a) Sleeves for Plastic Piping: ASTM F477 elastomeric seal.
   b) Sleeves for Dissimilar Piping: Compatible with piping materials to be joined.
   c) Gaskets for Plastic Piping: ASTM F477 elastomeric seal.
   d) Gaskets for Dissimilar Piping: Compatible with piping materials to be joined.

2.3 PIPE AND TUBE FITTINGS

1) General: Applications of the following pipe and tube fitting materials are indicated in Part 3 "Piping Applications" Article.
2) Socket Fittings: ASTM D2665, made to ASTM D3311 drain, waste, and vent pipe patterns.
3) Tubular Fittings: ASTM F409 drainage pattern, with ends as required for application.

PART 3 – EXECUTION

3.1 PIPING APPLICATIONS

1) Transition and special fittings with pressure ratings at least equal to piping pressure rating may be used in applications below, unless otherwise indicated.
2) Flanges may be used on aboveground piping, unless otherwise indicated.

3) Underground, Soil, Waste, and Vent Piping: Use the following:
   a) 2- to 4-Inch NPS (DN50 to DN100): ABS plastic pipe, ABS socket fittings, and
      solvent- cemented joints.

3.2 SERVICE ENTRANCE PIPING INSTALLATION
1) Extend sanitary drain piping and connect to sanitary sewer piping in sizes and
   locations indicated on the approved plan. Install cleanout and extension to grade at
   connections of sanitary drains.

3.3 DRAINAGE AND VENT PIPING INSTALLATION
1) Make changes in direction for 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 2 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 make change in direction of flow greater than 90 degrees.
   Use proper size of standard increasers and reducers if different sizes of piping are
   connected. Reducing size of drainage piping in direction of flow is prohibited.
2) Lay buried drain piping beginning at low point of each system. Install true to grades and
   alignment indicated, with unbroken continuity of invert. Place hub ends of piping
   upstream. Install required gaskets according to manufacturer's written instructions for use
   of lubricants, cements, and other installation requirements. Maintain swab in piping and
   pull past each joint as completed.
3) Install drainage and vent piping at the following minimum slopes, unless otherwise indicated:
   a) Sanitary Building Drain: 2 percent downward in direction of flow for piping 3-inch
      NPS (DN80) and smaller; 1 percent downward in direction of flow for piping 4-
      inch NPS (DN100) and larger.
   b) Horizontal, Sanitary Drainage Piping: 2 percent downward in direction of flow.
   c) Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
4) Install underground, ABS plastic drainage piping according to ASTM D2321.

3.4 JOINT CONSTRUCTION
1) Piping Joints: Join drainage piping according to ASTM D2665.
2) Handling of Solvent Cements, Primers, and Cleaners: Comply with procedures in ASTM
   F402 for safe handling during joining of plastic pipe and fittings.

3.5 HANGER AND SUPPORT INSTALLATION
1) Support vertical piping and tubing at base and at each floor.
2) Install hangers for ABS plastic piping as follows:
   a) 1-1/2- and 2-Inch NPS (DN40 and DN50): Maximum horizontal spacing, 48 inches
      with 3/8-inch minimum rod diameter; maximum vertical spacing, 48 inches.
   b) 4- and 5-Inch NPS (DN100 and DN125): Maximum horizontal spacing, 48 inches
      with 5/8-inch minimum rod diameter; maximum vertical spacing, 48 inches.
3) Support piping and tubing not listed above according to MSS SP-69 and
   manufacturer's written instructions.

3.6 CONNECTIONS
1) Connect service entrance piping to exterior sewerage and drainage piping. Use
   transition fitting to join dissimilar piping materials.
2) Connect drainage piping to service entrance piping, and extend to and connect to
   the following:
   a) Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller
      than required by plumbing code.
b) Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections 2-1/2-inch NPS (DN65) and larger.

3.7 FIELD QUALITY CONTROL

1) Inspect drainage and vent piping as follows:
   a) Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
   b) 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.
      I. Roughing-In Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
      II. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

2) Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

3) Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

4) Test drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedure, as follows:
   a) 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.
   b) Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved.
   c) 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 feet of head. Water level must not drop from 15 minutes before inspection starts through completion of inspection. Inspect joints for leaks.
   d) 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 using new materials and retest piping or portion thereof until satisfactory results are obtained.

6) Prepare reports for tests and required corrective action.

3.8 CLEANING AND PROTECTING

1) Clean interior of piping system. Remove dirt and debris as work progresses.
2) Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
3) Place plugs in ends of uncompleted piping at end of day and when work stops.
4) Exposed ABS Piping: Protect plumbing vents exposed to sunlight with 2 coats of water-based latex paint.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 08 17 23
PREHUNG WOOD DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Prehung wood doors.

1.2 RELATED SECTIONS
A. Section 08 17 23 – Prehung Metal Doors.
B. Section 08 20 0 – Wood Doors.
C. Section 08 71 0 – Door Hardware.
D. Section 06 10 00 - Rough Carpentry.
E. Section 09 20 00 – Plaster and Gypsum Board.

1.3 REFERENCES
B. WDMA Window and Door Manufacturers Association Industry Standard I.S. I-A

1.4 SUBMITTALS
A. Materials List: Submit complete lists of materials proposed for use, giving the manufacturer’s name and catalog or model number.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Delivery and Care.
   1. Protect during transit, storage, and handling to prevent damage, soiling and deterioration.
   2. Comply with manufacturer's instructions and AWI requirements for care and handling of doors.
   3. Deliver to site after wet construction operations are completed and dry and building has reached prevailing relative humidity.
   4. Deliver components in manufacturer’s original unopened protective covering or container, clearly marked with manufacturer’s name, brand name, and identifying door opening number on covering.

B. Storage: Store in clean, dry, well ventilated area protected from sunlight.
   1. Avoid extreme heat, cold, dryness or humidity.
   2. Store flat over level surface above floor on wood blocking.
   3. Under bottom door and over top of stack; furnish plywood or corrugated cardboard for protection.

C. Handling: Do not drag doors across one another or across other surfaces.

1.6 QUALITY ASSURANCE
A. Installer: Shall be experienced in the carpentry industry and shall have a minimum of five (5) years’ experience in the installation of wood products.

1.7 ENVIRONMENTAL REQUIREMENTS
A. Comply with manufacturers written requirements under which products can be installed.
   1. Condition doors to average prevailing humidity of not less than 25% and not greater than 55%, typically, in installation area.

PART 2 PRODUCTS

2.1 MANUFACTURERS
A. TM Cobb, ReliaBilt Doors, or approved equal.
B. Equivalent products by other manufactures are acceptable. The Owner or owner’s representative will be the sole judge of the basis of what is equivalent.

2.2 PRODUCTS
A. Size, style and colors per the scope and drawings.
B. Equivalent products by other manufactures are acceptable. The Owner or owner’s representative will be the sole judge of the basis of what is equivalent.
C. Composite core, lumber core, and solid wood jambs: ANSI A208.1, Grade I-LD-2.
D. Wood Face Veneer: AWI Quality Standard, AWI Grade A.
E. Wood Species: As selected by Owner or owner’s representative.
F. Styles and sizes determined per the scope and drawings.
G. Profiles: As selected by scope and approved by the Owner or owner’s representative.

2.1 SUBSTRATE PROPERTIES A
A. Apply a clear sealer to all exposed edges of composite woods to prevent out-gassing, prior to installation.
B. Sealer - Safecoat Safe Seal - Interior multipurpose clear low-gloss primer/sealer (www.afmsafecoat.com), or approved equal.

2.2 SUBSTRATE PROPERTIES B
A. Particleboard and MDF products certified as complainant with formaldehyde emissions requirements of ANSI/HPVA HP-1-2009 and US HUD Title 24, part 3280.
B. Standard Particleboard
   1. M3 industrial grade 47 lb. density particle board.
   2. 100% pre-consumer recycled wood fiber particle board certified by Scientific Certification Systems (SCS). Particleboard is at least 90% wood fiber by weight.
   4. Forest Stewardship Council (FSC); mixed credit available (optional).
   5. Meets California Air Resources Board (CARB) Regulation 93120.2, Phase 1 emissions limits
C. No Added Urea-Formaldehyde (NAUF) Particleboard
   1. M3 industrial grade 47 lb. density particle board
   2. 100% pre-consumer recycled wood fiber particle board certified by Scientific Certification Systems (SCS) Particleboard is at least 90% wood fiber by weight
   4. Forest Stewardship Council (FSC) Mixed Credit Available (optional)
   5. Meets California Air Resources Board (CARB) Regulation 93120.2, Phase 1 emissions limits
   6. No added urea-formaldehyde (NAUF); SCS certified.
   7. Collaborative for High Performance Schools (CHPS) Section 01350 Compliant

2.3 INSTALLATION MATERIALS
A. Screws: Select material, type, size and finish required for each use. Comply with ASME B18.6.1 for applicable requirements.
B. Nails: Select material, type, size and finish required for each use. Comply with FSFF-N-105 for applicable requirements.
C. Anchors: Select material, type, size and finish required for each substrate for secure anchorage. Provide nonferrous metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed steel or lead expansion bolt devices for drilled in place anchors.
D. Installation of woodwork under this Standard shall include labor, tools, equipment, adhesives, fasteners, common external blocking, furring and hanging devices for the support or attachment of the woodwork.

PART 3 EXECUTION

3.1 EXAMINATION
A. Examine surfaces before beginning installation.
B. Work of other trades that has been left or installed in a condition not suitable to receive prehung doors shall be repaired or corrected by the applicable trade before installation
C. Report conditions detrimental to performance of the Work to the owner or owner’s representative.
D. Commencement of work will constitute acceptance of existing conditions and surfaces to receive the work.

3.2 INSTALLATION
   A. Install in accordance with Section 01600, AWI Section 01700, approved shop drawings and manufacturer's written instructions.
   B. Installation shall be by the woodwork fabricator or a company specializing in the installation of architectural woodwork and casework.
   C. Install woodwork plumb, level, true and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8th inch in 96 inches for plumb and level.
   D. Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.
   E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork and matching final finish where transparent finish is indicated.
   F. On prefinished woodwork, all the filling of nail holes and touch up on the prefinished woodwork after installation to achieve best color blend.

3.3 ADJUSTING
   A. After installation of hardware, adjust and check each door to ensure proper operation and function.
   B. Installed prehung doors shall be level and plumb within specified tolerances; and clean/remove adhesives of any type remaining on Exposed or Semi-exposed surfaces.

3.4 CLEANING AND PROTECTION
   A. Cleaning: Clean as recommended by manufacturer. Do not use materials or methods which may damage finish.
   B. Protect finish work in accordance with Section 01500. Protect installed products and finish surfaces from damage during remainder of construction period.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 06 42 00
ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Architectural Woodwork
   1. Wood Trim
   2. Baseboards
   3. Door casing
   4. Closet shelving and accessories

1.2 RELATED SECTIONS
A. Section 06 10 00 - Rough Carpentry.
B. Section 09 20 00 – Plaster and Gypsum Board.
C. Section 09 91 00 – Paint.

1.3 SUBMITTALS
A. Submit sample boards of wood products.
B. Materials List: Submit complete lists of materials proposed for use, giving the manufacturer's name and catalog or model number.

1.4 QUALITY ASSURANCE
A. Installer: Shall be experienced in the carpentry industry and shall have a minimum of five (5) years' experience in the installation of wood products.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Protect woodwork during transit, delivery, storage, and handling to prevent damage, soilage and deterioration.
B. Deliver to site after wet construction operations are completed and dry and building has reached prevailing relative humidity.
C. Deliver components in manufacturer’s original unopened protective covering or container, clearly marked with manufacturer’s name, brand name, and identifying door opening number on covering.
D. Storage: Store in clean, dry, well ventilated area protected from sunlight. Avoid extreme heat, cold, dryness or humidity.
E. Store flat over level surface above floor on wood blocking. Furnish plywood or corrugated cardboard for protection.
F. Handling: Do not drag casework across one another or across other surfaces.

1.6 ENVIRONMENTAL REQUIREMENTS
A. Do not deliver or install woodwork until building is enclosed, wet-work is completed and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.
B. Prior to delivery and installation of architectural woodwork, casework and related woodwork, to the job site, the building environment shall be stabilized to provide condition that will maintain a relative humidity of not less than 25%, nor more than 55%.

PART 2 PRODUCTS

2.1 MANUFACTURERS
A. OrePac, Mouldings and Millworks or approved equal.
B. See scope for specific species and products for;
   1. Baseboards
   2. Closet shelves
2.2 PRODUCTS
A. Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade indicated.
B. Pre-primed products are recommended.
C. Premium Grade. The Grade specified when the highest degree of control over the quality of workmanship, materials, installation and execution of the design intent is required. Usually reserved for special projects, or feature areas within a project.
D. Custom Grade. The Grade specified for most conventional architectural woodwork. This Grade provides a well-defined degree of control over the quality of workmanship, materials and installation of a project. The vast majority of all work produced is Custom Grade.
E. Economy Grade. The Grade which defines the minimum expectation of quality, workmanship, materials, and installation within the scope of these standards.

2.3 SUBSTRATE PROPERTIES A
C. Apply a clear sealer to all exposed edges of composite woods to prevent out-gassing, prior to installation.
D. Sealer - Safecoat Safe Seal - Interior multipurpose clear low-gloss primer/sealer (www.afmsafecoat.com), or approved equal.

2.4 SUBSTRATE PROPERTIES B
D. Particleboard and MDF products certified as complainant with formaldehyde emissions requirements of ANSI/HPVA HP-1-2009 and US HUD Title 24, part 3280.
E. Standard Particleboard
   7. 100% pre-consumer recycled wood fiber particle board certified by Scientific Certification Systems (SCS). Particleboard is at least 90% wood fiber by weight.
   9. Forest Stewardship Council (FSC); mixed credit available (optional).
   10. Meets California Air Resources Board (CARB) Reg. 93120.2, Phase1 emissions limits
F. No Added Urea-Formaldehyde (NAUF) Particleboard
   9. M3 industrial grade 47 lb. density particle board
   10. 100% pre-consumer recycled wood fiber particle board certified by Scientific Certification Systems (SCS) Particleboard is at least 90% wood fiber by weight
   12. Forest Stewardship Council (FSC) Mixed Credit Available (optional)
   13. Meets California Air Resources Board (CARB) Reg. 93120.2, Phase1 emissions limits
   14. No added urea-formaldehyde (NAUF); SCS certified.
   15. Collaborative for High Performance Schools (CHPS) Section 01350 Compliant

2.3 INSTALLATION MATERIALS
E. Screws: Select material, type, size and finish required for each use. Comply with ASME B18.6.1 for applicable requirements.
F. Nails: Select material, type, size and finish required for each use. Comply with FSFF-N-105 for applicable requirements.
G. Anchors: Select material, type, size and finish required for each substrate for secure anchorage. Provide nonferrous metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed steel or lead expansion bolt devices for drilled in place anchors.
H. Installation of woodwork under this Standard shall include labor, tools, equipment, adhesives, fasteners, common external blocking, furring and hanging devices for the support or attachment of the woodwork.

PART 3 EXECUTION
3.1 EXAMINATION
A. Examine surfaces before beginning wood work.
B. Work of other trades that has been left or installed in a condition not suitable to receive architectural woodwork shall be repaired or corrected by the applicable trade before installation.
C. Notify owner or owner’s representative of conditions that would adversely affect installation or subsequent use.
D. Commencement of work will constitute acceptance of existing conditions and surfaces to receive the work.

3.2 INSTALLATION
A. Quality Standard: Install woodwork to comply with AWI Section 1700.
B. Installation shall be by the woodwork fabricator or a company specializing in the installation of architectural woodwork and casework.
C. Install woodwork plumb, level, true and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8th inch in 96 inches for plumb and level.
D. Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.
E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork and matching final finish where transparent finish is indicated.
F. On prefinished woodwork, all the filling of nail holes and touch up on the prefinished woodwork after installation to achieve best color blend.

3.3 FIELD QUALITY CONTROL
A. Review manufacturer’s shop drawings and coordinate with architectural drawings and job site conditions; Prior to cutting standing and running trim, inspect all material for its compatibility to meet the specified standards for grain and color;
B. Provide all cutouts through woodwork necessary to neatly accommodate electrical, telephone, mechanical, or plumbing equipment (beyond wire chases);
C. Fasten and anchor all items as specified; (All nails on exposed and Semi-exposed surfaces must be countersunk. On all prefinished woodwork installations, do all filling of nail holes and touch-up on prefinished woodwork with blending filler. Job-finished woodwork to be filled by paint finisher.)
D. Avoid open joints, visible machine marks, tears, nicks, chips, scratches and/or sanding cross-scratches greater than tolerances allowed by this standard.
E. Cut and fit so that natural characteristics shall not exceed those allowed for the Grade of work specified;
F. Installed woodwork shall be level and plumb within specified tolerances; and Clean/remove adhesives of any type remaining on exposed or Semi-exposed surfaces.

3.5 CLEANING AND PROTECTION
A. Clean installed woodwork according to manufacturer’s printed care and maintenance instructions.
B. Protect installed products and finish surfaces from damage during remainder of construction period.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 09 9100
PAINT

PART 1 - GENERAL

1.1 SECTION INCLUDES
   A. Painting and finishing of all interior and exterior items and surfaces, unless otherwise indicated or listed under exclusions below:
      1. Paint interior per scope.
      2. Paint architectural woodwork per scope.
      3. Paint exterior stucco per scope of work.

1.2 SUBMITTALS
   A. Product Data: Submit complete manufacturer’s descriptive literature and specifications.
      1. Materials List: Submit complete lists of materials proposed for use, giving the manufacturer's name, catalog number, and catalog cut for each item when applicable.
   B. Samples: On 8-1/2 inch by 11 inch hardboard, samples of each color, gloss, texture and material selected by the owner or owner's representative from standard colors available for the coatings required.
      1. For natural and stained finishes, provide sample on each type and quality of wood used on the project.
   C. Manufacturer’s Instructions: Submit the manufacturer's current recommended methods of installation, including relevant limitations, safety and environmental cautions, application rates, and composition analysis.

1.3 QUALITY ASSURANCE
   A. Regulatory Requirements: Comply with applicable codes and regulations of governmental agencies having jurisdiction including those having jurisdiction over airborne emissions and industrial waste disposal. Where those requirements conflict with this Specification, comply with the more stringent provisions. Regulatory changes may affect the formulation, availability, or use of specified coatings. Confirm availability of coatings to be used prior to job going out to bid and before start of painting project.
      1. Comply with the current applicable regulations of the Environmental Protection Agency (EPA).
   B. Field Sample: When and as directed by the Owner or owner's representative, apply one complete coating system for each color, gloss and texture required. When approved, the sample panel areas will be deemed incorporated into the Work and will serve as the standards by which the subsequent Work will be judged.
   C. Installer Qualifications: Company specializing in performing the work of this section with minimum two years' experience.

1.4 DELIVERY, STORAGE, AND HANDLING
   A. Deliver materials to job site in new, original, and unopened containers bearing manufacturer's name and trade name. Store where directed in accordance with manufacturer's instructions.
   B. Use all means necessary to protect the materials of this Section before, during, and after installation.
   C. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 degrees F (7 degrees C).
   D. Maintain containers in clean condition, free of foreign materials and residue.
E. Remove rags and waste from storage areas daily.

1.5 ENVIRONMENTAL REQUIREMENTS
A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 105 degrees F (10 and 41 degrees C).
B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F (3 degrees C) above the dew point; or to damp or wet surfaces.
C. Painting contractor should follow proper painting practices and exercise judgment based on his or her experience and project specific conditions as to when to proceed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Paint types manufactured or distributed by the Dunn-Edwards Corporation or an approved equal.
B. Equivalent products by other manufacturers are acceptable. The Owner or owner’s representative will be the sole judge of the basis of what is equivalent.
C. The quantity of titanium dioxide, the use of clays, aluminum silicate, talc and the purity of acrylic materials are a few of the criteria which will be used by the Owner or owner’s representative in determining equivalency of materials.
D. Product Requirements. When submitting request for substitution, provide complete product data specified above under Submittals, for each substitute product.

2.2 PRODUCTS
A. Paints: Provide ready-mixed, except field catalyzed coatings. Pigments shall be fully ground maintaining soft paste consistency, capable of being readily and uniformly dispersed to complete homogeneous mixture. Paints shall have good flowing and brushing properties and be capable of drying or curing free of streaks and sags.
B. Accessory Materials: Linseed oil, shellac, solvents, and other materials not specified but required to achieve required finishes shall be of high quality and approved by manufacturer.
C. Colors shall be selected from color chip samples provided by manufacturer of paint system approved for use. Match approved samples for color, texture and coverage.
D. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
E. Restricted Components: Paints and coatings shall not contain any of the following.
   1. Acrolein.
   2. Acrylonitrile.
   3. Antimony.
   4. Benzene.
   5. Butyl benzyl phthalate.
   7. Di (2-ethylhexyl) phthalate.
   8. Di-n-butyl phthalate.
   9. Di-n-octyl phthalate.
  10. 1,2-dichlorobenzene.
  11. Diethyl phthalate.
  12. Dimethyl phthalate.
  15. Formaldehyde.
  17. Isophorone.
  18. Lead.
  19. Mercury.
  20. Methyl ethyl ketone.
22. Methylene chloride.
23. Naphthalene.
24. Toluene (methylbenzene).
25. 1,1,1-trichloroethane.

2.4 MIXES
A. Mix, prepare, and store painting and finishing materials in accordance with manufacturer's directions.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine surfaces to be painted before beginning painting work.
B. Work of other trades that has been left or installed in a condition not suitable to receive paint, stain other specified finish shall be repaired or corrected by the applicable trade before painting.
C. Notify owner or owner's representative of conditions that would adversely affect installation or subsequent use.
D. Painting of defective or unsuitable surface implies acceptance of the surfaces.
E. Beware of a condition known as critical lighting. This condition causes shadows that accentuate even the slightest surface variations. A pigmented sealer will provide tooth for succeeding decorative coating, but "does not" equalize smoothness or surface texture. Any corrective action to drywall must be done by the drywall contractor prior to decorating.

3.2 PREPARATION
A. Perform preparation and cleaning procedures in strict accordance with coating manufacturer's instructions for each substrate condition.
B. Concrete and Masonry: Surfaces shall be dry, clean, and free of dirt, efflorescence, encrustation, and other foreign matter. Glazed surfaces on concrete shall be roughened or etched to uniform texture.
C. Ferrous Metal: Clean oil, grease, and foreign matter with solvent. Surface shall be primed within 3 hours after preparation.
D. Sand and scrape metal to remove loose primer and rust.
E. Non-Ferrous Metal: Chemically or solvent clean and then treat with an etching-type solution if recommended by the finish manufacturer. Cleaned and retreated Non-Ferrous Metal shall be primed the same day that cleaning has been performed.
F. Wood Surfaces: Remove dust, grit and foreign matter. Sand surfaces and dust clean. Spot coat knots, pitch streaks, and sappy section with pigmented stain sealer when surfaces are to be painted. Fill nail holes, cracks and other defects after priming and spot prime repairs when fully cured.
G. Remove hardware and accessories, machined surfaces, plates, lighting fixtures and similar items in place and not-to-be-finish painted, or provide surface-applied protection. Reinstall removed items upon completion of work in each area.
H. Existing surfaces to be recoated shall be thoroughly cleaned and deglossed by sanding or other means prior to painting. Patched and bare areas shall be spot primed with same primer as specified for new work.
I. Thoroughly back-paint all surfaces of exterior and interior finish lumber and millwork, including doors and window frames, trim, cabinetwork, etc., which will be concealed after installation. Back-paint items to be painted or enameled with the priming coat. Use a clear sealer for back-priming where transparent finish is required.
J. Preparation of other surfaces shall be performed following specific recommendations of the coatings manufacturer.
K. Bond breakers and curing agents shall be removed and the surface cleaned before primers, sealers or finish paints can be applied.
L. All drywall surfaces shall be completely dry and dust free before painting. Skim coated
drywall shall be sealed with a sealer recommended by the paint manufacturer for this surface. Use the appropriate light or medium tack masking tape.

3.4 INSTALLATION
A. Apply painting and finishing materials in accordance with the manufacturer's recommendations.
   1. The number of coats specified in the scope is the minimum that shall be applied. Apply additional coats when undercoats, stains or other conditions show through final paint coat, until paint film is of uniform finish, color and appearance.
B. Apply each material at not less than the manufacturer's recommended spreading rate:
C. Apply prime coat to surface which is required to be painted or finished.
D. Finish exterior doors on tops, bottoms, and edges same as exterior faces, after fitting.
E. Sand lightly and dust clean between succeeding coats.

3.5 PROTECTION
I. Protect previously installed work and materials.
   1. Protect prefinished surfaces, lawns, shrubbery and adjacent surfaces against paint and damage.
   2. Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or splatter from fouling surfaces not being painted.
   3. Protect surfaces, equipment, and fixtures from damage resulting from use of fixed, movable and hanging scaffolding, planking, and staging.
J. Provide wet paint signs, barricades, and other devices required to protect newly finished surfaces. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

3.6 CLEANING, TOUCH-UP AND REFINISHING
A. Carefully remove all spattering, spots and blemishes caused by work under this section from surfaces throughout the project.
B. Upon completion of painting work remove all rubbish, paint cans, and accumulated materials resulting from work in each space or room. All areas shall be left in a clean, orderly condition.
C. Runs, sags, misses, holidays, stains, scratches and other defects in the painted surfaces, including inadequate coverage and mil thickness shall be satisfactorily touched up, or refinished, or repainted as necessary.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 12 35 30
RESIDENTIAL CASEWORK - CABINETRY

PART 1 - GENERAL

3.4 RELATED DOCUMENTS
   B. Drawings and scope of work.

3.5 DEFINITIONS
   A. Casework refers to all levels of cabinetry products;
      1. Base cabinets
      2. Wall cabinets
      3. Scribe and trim
      4. Vanity cabinets
      5. Accessories

1.2 RELATED SECTIONS
   A. Section 06 10 00 - Rough Carpentry.
   B. Section 09 20 00 – Plaster and Gypsum Board.
   C. Section 06 05 60 – Plastic Laminates.

3.6 SECTION INCLUDES
   A. This specification covers the furnishing and installation of materials for unit kitchens. Products
      shall be as follows or as directed by the Owner.
   B. Section includes factory-fabricated and -assembled unit kitchens with laminate-clad and wood
      cabinets and accessories.
      1. Kitchen manufactured casework
      2. Vanity manufactured casework.
      3. Casework consists of: closed door wall casework, closed door and drawer base
         casework, and closed door full height casework, without glass panels.
   C. Related Sections include the following:
      1. Rough Carpentry; for wood blocking and nailers built into wall before installation of
         Casework.
      2. Interior Architectural Woodwork; for countertops installed to base casework.
      3. Residential Appliances; for appliances.
      4. Interior Architectural Woodwork; for countertops installed to base casework.

3.7 SUBMITTALS
   A. Product Data: Include construction details, material descriptions, dimensions of individual
      components and profiles, finishes, furnished specialties, and accessories. For the following:
      1. Casework cabinetry.
      2. Casework hardware.
      3. Casework accessories.
   B. Shop Drawings: For casework, include plans, elevations, details, and attachments to other
      work. Show materials, finishes, filler panels, and hardware.
   C. Samples for Verification:
      1. Wood-veneered plywood panels, for each species.
      2. Solid wood, for each species.
   D. For adhesives and composite wood products, documentation indicating that product contains
      no added urea formaldehyde. Retain subparagraph and associated clauses below for recycled
      content.
   E. Product Certificates: Manufacturers’ certifying that products furnished comply with ANSI
      Standards.

1.8 DELIVERY, STORAGE, AND HANDLING
   B. Protect during transit, storage, and handling to prevent damage, soiling and deterioration.
C. Deliver to site after wet construction operations are completed and dry and building has reached prevailing relative humidity.
   5. Deliver components in manufacturer's original unopened protective covering or container, clearly marked with manufacturer's name, brand name, and identifying door opening number on covering.
C. Storage: Store in clean, dry, well ventilated area protected from sunlight.
   4. Avoid extreme heat, cold, dryness or humidity.
   5. Store flat over level surface above floor on wood blocking.
   6. Under bottom door and over top of stack; furnish plywood or corrugated cardboard for protection.
D. Handling: Do not drag casework across one another or across other surfaces.

3.8 QUALITY ASSURANCE
   A. Manufacturer Qualifications: Provide all casework by a qualified manufacturer.
   B. Obtain casework from single source manufacturer.
   C. Installer: Shall be experienced in the carpentry industry and shall have a minimum of five (5) years' experience in the installation of wood products.
   D. Field Measurements: Where casework is indicated to fit to existing construction, verify dimensions of existing construction by field measurements before fabrication and indicate measurements on Shop Drawings. Provide fillers and scribes, matching finish can composition of casework being installed, to allow for trimming and fitting.

3.9 ENVIRONMENTAL REQUIREMENTS
   A. Environmental Limitations: Do not deliver or install casework until spaces are enclosed and weathertight, wet work in spaces is complete and dry space under stable ambient temperature and humidity conditions during the construction period.
   B. Established Dimensions: Where casework is indicated to fit to other construction, establish dimensions for areas where casework is to fit. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Provide fillers and scribes to allow for trimming and fitting.

PART 2 - PRODUCTS

2.4 MANUFACTURERS
   A. Quality Cabinetry, WoodStar Series (www.qualitycabinets.com) or approved equal.
   B. Equivalent products by other manufacturers are acceptable. The Owner or owner's representative will be the sole judge of the basis of what is equivalent.

2.5 PRODUCTS
   A. Wood Materials: Casework in the Quality Cabinetry WoodStar Series, or equal are manufactured to meet ANSI Standards A208.1 and A208.2.
   B. Size, style and colors per the scope and drawings.
   C. Casework Styles;
      1. 1243 Plan – Birch Seacrest 2, Mirage Mocha glaze
      2. 1337 Plan – Maple Kittery, Café glaze
      3. 1740 Plan – White Oak, Seacrest 2, Sunrise glaze
   D. Adhesives: Do not use adhesives that contain urea formaldehyde.
   E. Hardwood Lumber: Kiln-dried to 7 percent moisture content, used for exposed materials. Select materials for compatible color and grain. Do not use two adjacent exposed surfaces that are noticeably dissimilar in color, grain, figure, or natural character markings. Use clear hardwood lumber of species indicated, free of defects. The term "plywood" in the subparagraph below refers to a wood-based panel with veneers applied to both faces; the core may be made up of veneers or glued-up lumber. Low-emitting materials are required while the product specified below prohibits use of added urea formaldehyde.
   F. Hardwood Plywood: HPVA HP-1, made with bonding adhesive containing no added urea formaldehyde (NAF). Hardwood plywood with Grade A face veneer of species matching hardwood lumber, with Grade A natural birch for semi-exposed or concealed surfaces.
   G. Hinges: Concealed European-style self-closing clip-on hinges, minimum 107 degree opening, six-way adjustable.
   H. Standard drawer guides;
   I. Exposed End Finish (Wall and Base): 3/4-inch thick.
J. Back Panels: 1/4-inch-thick plywood, machine-fitted into top, bottom, and side panels, reinforced with glue and mechanical fasteners. Back panel shall be recessed 3/4-inch into case construction to allow for job site scribing of end panels due to wall irregularities.

K. Standard Drawer Boxes.

L. Shelves: Fully adjustable in base, wall, and tall casework. 3/4-inch thick plywood with Grade A face on top surface and PVC edge banding on front edge. Shelves are fully adjustable using 0.19 inch metal post shelf slips fitted into holes bored at 1-1/4-inch intervals.

2.5 SUBSTRATE PROPERTIES A

E. Apply a clear sealer to all exposed edges of composite woods to prevent out-gassing, prior to installation.

F. Sealer - Safecoat Safe Seal - Interior multipurpose clear low-gloss primer/sealer (www.afmsafecoat.com), or approved equal.

2.6 SUBSTRATE PROPERTIES B

G. Particleboard and MDF products certified as compliant with formaldehyde emissions requirements of ANSI/HPVA HP-1-2009 and US HUD Title 24, part 3280.

H. Standard Particleboard
   11. M3 industrial grade 47 lb. density particle board.
   12. 100% pre-consumer recycled wood fiber particle board certified by Scientific Certification Systems (SCS). Particleboard is at least 90% wood fiber by weight.
   13. Forest Stewardship Council (FSC); mixed credit available (optional).
   14. Meets California Air Resources Board (CARB) Regulation 93120.2, Phase 1 emissions limits

I. No Added Urea-Formaldehyde (NAUF) Particleboard
   17. M3 industrial grade 47 lb. density particle board
   18. 100% pre-consumer recycled wood fiber particle board certified by Scientific Certification Systems (SCS)
   19. Forest Stewardship Council (FSC) Mixed Credit Available (optional)
   20. Meets California Air Resources Board (CARB) Regulation 93120.2, Phase 1 emissions limits
   21. No added urea-formaldehyde (NAUF); SCS certified.
   22. Collaborative for High Performance Schools (CHPS) Section 01350 Compliant

2.6 INSTALLATION MATERIALS

I. Screws: Select material, type, size and finish required for each use. Comply with ASME B18.6.1 for applicable requirements.

J. Nails: Select material, type, size and finish required for each use. Comply with FSFF-N-105 for applicable requirements.

K. Anchors: Select material, type, size and finish required for each substrate for secure anchorage. Provide nonferrous metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed steel or lead expansion bolt devices for drilled in place anchors.

L. Installation of woodwork under this Standard shall include labor, tools, equipment, adhesives, fasteners, common external blocking, furring and hanging devices for the support or attachment of the woodwork.

M. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no ureaformaldehyde resin.

N. Particleboard: ANSI A208.1, Grade M-2 OR Grade M-2-Exterior Glue OR Grade M-2, made with binder containing no urea-formaldehyde resin, as directed.

O. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, Type I, made with adhesive containing no urea formaldehyde.

P. Solid Wood: Clear hardwood lumber of species indicated, free of defects, selected for compatible grain and color, and kiln dried to 7 percent moisture content.

Q. Melamine or vinyl lined interiors or approved equal
3.5 EXAMINATION
   E. Designer, with installer to examine walls and floors for compliance with requirements for
      installation tolerances and other conditions affecting performance of the Work during framing,
      and before delivery.
   F. Examine walls and partitions for proper backing for casework.
   G. Examine roughing-in for electrical power plumbing and mechanical system(s) to verify actual
      locations of connections before installation of casework.
   H. Work of other trades that has been left or installed in a condition not suitable to receive
      casework shall be repaired or corrected by the applicable trade before installation.
   I. Report conditions detrimental to performance of the Work to the owner or owner’s
      representative.
   J. Commencement of work will constitute acceptance of existing conditions and surfaces to
      receive the work.

3.1 INSTALLATION
   A. General: Install level, plumb, and true; shim as required, using concealed shims. Provide
      fasteners, clips, backing materials, brackets, anchors, fillers, scribes, trim, and accessories
      necessary for complete installation.
   B. Install casework with no variation in flushness of adjoining surfaces; use concealed shims.
      Where casework abuts other finished work, scribe and cut for accurate fit. Provide filler strips,
      scribe strips, and moldings in finish to match face of casework.
   C. Install casework without distortion so doors and drawers fit openings and are aligned.
      Complete installation of hardware and accessories as indicated by manufacturer.
   D. Install casework level and plumb to a tolerance of 1/8-inch in 8-feet.
   E. Fasten casework to adjacent units and to backing.
      1. Fasten wall casework through back, through hanging rails not less than 24-inches on
         center with No. 10 wafer-head screws sized for 1-inch penetration into wood framing or
         blocking.
   F. Comply with requirements specified for connecting casework to plumbing and mechanical
      system(s).
   G. Comply with requirements specified for connecting casework to electrical power system.

3.2 ADJUSTING
   A. Adjust casework and hardware so doors and drawers are centered in openings and operate
      smoothly without warp or bind. Lubricate operating hardware as recommended by
      manufacturer.
   B. Test, adjust, and verify operation of each appliance, plumbing fixture, and component of
      casework. Repair or replace items found to be defective or operating below rated capacity.
   C. Verify that operating parts work freely and fit neatly and that clearances are adequate to
      properly and freely operate appliances.

3.3 PROTECTION
   A. Protect installed products and finish surfaces from damage during remainder of construction
      period.
   B. Do not use installed casework as work surfaces or for storage during construction.
   C. Cover casework and protect from dirt and residue from other trades.

3.4 CLEANING
   A. Clean casework on exposed and semi-exposed surfaces. Touch-up factory-applied finishes,
      using material recommended by casework manufacturer, to restore damaged or soiled areas.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 06 0560
PLASTIC LAMINATES

PART 1 – GENERAL
1.1. SECTION INCLUDES
   A. Standard Plastic Laminates.
   B. Accessory Materials.

1.2. RELATED REQUIREMENTS
   A. Section 12 3623.13 - Plastic-Laminate-Clad Countertops.
   B. Section 12 3530.00 – Casework; Cabinetry.

1.3. REFERENCES
   A. Reference Standards:
      1. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building
         Materials.
         Heat Energy Source.
      3. ASTM E 662: Standard Test Method for Specific Optical Density of Smoke Generated by
         Solid Materials.
      5. AWS: Architectural Woodwork Standards.
     15. UL 723: Test for Surface Burning Characteristics of Building Materials.
     16. UL 2818: GREENGUARD Certification Program for Chemical Emissions for Building
         Materials, Finishes and Furnishings.

1.4. SUBMITTALS
   A. Product Data: Submit the following:
      1. Product data for each specified product. Include manufacturer’s technical data sheets and
         published instruction instructions.
      2. Material Safety Data Sheets (MSDS).
   B. Shop Drawings: Fully dimensioned shop drawings and cut-sheets showing layouts and
      components, including edge conditions, joinery, terminating conditions, substrate construction,
      and cutouts and holes. Include elevations, section details, and large scale details. Indicate
      color, pattern, and finish selections.
   C. Samples: Selection and verification samples for each color, pattern, and finish required.
   D. Quality Assurance Submittals:
      1. Test Reports: Certified test reports showing compliance with specified performance
         characteristics and physical properties, if required.
   E. Maintenance Data: Manufacturer’s published maintenance manual with closeout submittals.

1.5. REGULATORY REQUIREMENTS
   A. Adhesives, Sealants, and Sealant Primers:

1.6. QUALITY ASSURANCE
   A. Qualifications:
1. Manufacturer Qualifications: Manufacturer producing products in an ISO 9001, ISO 14001, and OHSAS 18001 certified facility.
2. Fabricator Qualifications: Minimum of three years documented experience in fabricating decorative plastic laminates similar in scope and complexity of this Project.
3. Installer Qualifications: Minimum of three years documented installation experience for projects similar in scope and complexity to this Project.

B. Field Measurements: Verify actual measurements and openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays

1.7. DELIVERY, STORAGE AND HANDLING
A. Protect during transit, storage, and handling to prevent damage, soiling and deterioration.
B. Store plastic laminate materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer. Store sheet materials flat on pallets or similar rack-type storage to preclude damage.
C. Handle as to not damage cabinetry or other installed products.

1.8. ENVIRONMENTAL REQUIREMENTS
A. Ensure appropriate acclimatization between plastic laminate and substrate prior to fabrication. Condition plastic laminate and substrate surfaces in the same environment for 48 hours prior to fabrication. Condition at approximately 75 degrees F (24 degrees C) and 45 percent to 55 percent relative humidity.
1. Adhesive: For best results, apply adhesives at temperatures at or above 65 degrees F (18 degrees F).

PART 2 – PRODUCTS

2.7 MANUFACTURER
A. Basis of Design: Formica or APPROVED equal.
B. U.S.: 1-800-FORMICA™ (select option 1) Canada: 1-800-363-1405 for ZIP-CHIP service
C. Equivalent products by other manufactures are acceptable. The Owner or owner’s representative will be the sole judge of the basis of what is equivalent.

2.8 LAMINATE PROPERTIES
A. Size, style and colors per the scope and drawings.
B. Equivalent products by other manufactures are acceptable. The Owner or owner’s representative will be the sole judge of the basis of what is equivalent.
C. Laminate Composition: Decorative surface papers impregnated with melamine resins and pressed over kraft paper core sheets impregnated with phenolic resin. Sheets then bonded together under pressures greater than 1,000 lbs. per sq. in. and high temperatures approaching 300 degrees F (149 degrees C). Finished sheets trimmed and backs sanded to facilitate bonding to substrate.
D. Colors and finishes from standard quality color palate TBD.

2.9 SUBSTRATE PROPERTIES A
G. Apply a clear sealer to all exposed edges of composite woods to prevent out-gassing, prior to installation.
H. Sealer - Safecoat Safe Seal - Interior multipurpose clear low-gloss primer/sealer (www.afmsafecoat.com), or approved equal.

2.10 SUBSTRATE PROPERTIES B
J. Particleboard and MDF products certified as complainant with formaldehyde emissions requirements of ANSI/HPVA HP-1-2009 and US HUD Title 24, part 3280.
K. Standard Particleboard
17. 100% pre-consumer recycled wood fiber particle board certified by Scientific Certification Systems (SCS). Particleboard is at least 90% wood fiber by weight.
18. Forest Stewardship Council (FSC); mixed credit available (optional).
19. Meets California Air Resources Board (CARB) Regulation 93120.2, Phase 1 emissions limits
L. No Added Urea-Formaldehyde (NAUF) Particleboard
25. M3 industrial grade 47 lb. density particle board
26. 100% pre-consumer recycled wood fiber particle board certified by Scientific Certification Systems (SCS)
27. Particleboard is at least 90% wood fiber by weight
28. Forest Stewardship Council (FSC) Mixed Credit Available (optional)
29. Meets California Air Resources Board (CARB) Regulation 93120.2, Phase 1 emissions limits
30. No added urea-formaldehyde (NAUF); SCS certified.
31. Collaborative for High Performance Schools (CHPS) Section 01350 Compliant

PART 3 – EXECUTION

3.1 EXAMINATION
A. Examine surfaces for conditions that could adversely affect the performance of the decorative plastic laminate installation, including edge performance.
B. Surfaces to be adhesively bonded shall be clean, dry and free of any dust, loose paint, wax, moisture, dirt, grease, oil, rust, or other contaminants.
C. Commencement of work will constitute acceptance of existing conditions and surfaces to receive the work.

3.2 INSTALLATION
A. Review manufacturer’s shop drawings and coordinate with cabinetry drawings and job site conditions.
B. Fasten and anchor all items as specified.
C. Avoid open joints, visible machine marks, tears, nicks, chips, scratches and/or sanding cross-scratches greater than tolerances allowed by this standard.
D. Installed plastic laminates shall be level and plumb within specified tolerances; and
E. Clean/remove adhesives of any type remaining on Exposed or Semi-exposed surfaces.
F. Install materials according to referenced Specification Sections and the following conformance standards as applicable for AWI AWS and KCMA A161.1.
G. To avoid stress cracking, do not use square-cut inside corners. All inside corners to have a minimum 1/8 inch radius and all edges routed smooth.
H. Drill oversized holes for screws, bolts, and similar fasteners. Slightly countersink fasteners into face side of laminate-clad substrate.
I. Use carbide-tipped saw and router blades for cutting, with high tool speed and low feed speed. Keep cutting blades sharp.

3.3 ADHESIVE SPRAY APPLICATIONS
A. Comply with adhesive manufacturer’s printed installation instructions.
B. Apply contact adhesive uniformly to both surfaces and with a minimum 80 percent coverage for each surface. Apply PVA adhesive to one side with a minimum 80 percent coverage.
C. Apply two coats of adhesive to porous surfaces. Provide 100 percent coverage for edges.
D. Apply uniform downward pressure (30 to 40 psi minimum) across the entire bonded surface.

3.4 ADHESIVE BRUSH APPLICATIONS
A. Comply with adhesive manufacturer’s printed installation instructions.
B. Apply contact adhesive uniformly to both surfaces with a brush or solvent-resistant medium nap roller; cover each surface 100 percent. Apply PVA adhesive to one side, for 100 percent coverage.
C. Provide two coats of adhesive on porous surfaces. Double coat edges.
D. Apply uniform downward pressure (30 to 40 psi minimum) across the entire bonded surface.

3.5 CLEANING AND PROTECTION
A. Clean decorative plastic laminate according to manufacturer’s printed care and maintenance instructions.
B. Protect installed products and finish surfaces from damage during remainder of construction period.
C. Do not use installed solid surfacing fabrications as work surfaces during construction.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 12 06.61.20
CAST MARBLE VANITY TOPS

PART 1 GENERAL

1.1 SUMMARY
A. Section includes
   1. Cast marble countertops with integral bowls.
   2. Cast marble windowsills, thresholds, and other flat products.
B. Related Sections
   1. Section 06 10 00 (06100) - Rough Carpentry
   2. Section 06 20 00 (06200) – Finish Carpentry
   3. Section 12 30 33 (06400) – Architectural Woodworks
   4. Section 22 00 00 (Div. 15) – Plumbing

1.2 REFERENCES

1.3 SUBMITTALS
A. Product Data:
   1. Manufacturer's printed product data indicating compliance with specified requirements.
   2. Manufacturer's cleaning and maintenance data.
B. Shop Drawings:
   1. Submit plans, elevations, and detail sections. Indicate overall dimensions, material thickness, location and size of cutouts, anchorage provisions and attachment methods. Indicate coordination requirements for adjacent and interfacing work.
C. Selection Samples: For each product specified, provide color chips or color booklet representing manufacturer's full range of available colors and patterns.
D. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, represent actual product, color, and patterns.

1.4 QUALITY ASSURANCE
A. Manufacturer Qualifications: Not less than five years of experience in manufacturing products similar to those required for this project.
B. Installer Qualifications: Not less than five installations of comparable scope within the past three years.
   1. Provide list of contacts for recently completed projects.
   2. Architect may inspect installations and reject proposed installer on the basis of references or quality of work.
C. Do not proceed with remaining work until workmanship, color, and finish have been approved by Owner.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Packing and Shipping: Take proper precautions for transfers of the materials.
B. Check for shipping damage during unloading at site and notify manufacturer immediately of any obvious damage.
C. Store products under shelter, off the ground, and protected from moisture. Materials must be at room temperature (65+ degrees) prior to installation. Handle products to prevent physical damage. Protect surfaces from staining, scratching, and other damage during handling and installation.

1.6 PROJECT CONDITIONS
A. Field Measurements: Verify shop drawings with field measurements prior to fabrication.
B. Coordination: Coordinate construction activities of this section with construction activities specified in related sections.

1.7 WARRANTY

A. Closeout Submittals, for additional warranty requirements.
B. Vanity Tops with Integral Lavatories: Manufacturer's standard one-year limited warranty on defective materials.

PART 2 PRODUCTS

2.1 CAST MARBLE MATERIAL

A. Manufacturers
   1. Local cast marble fabricator
B. Materials
   1. Provide cast marble fabrications made of proprietary resin and gel coat finish with finished properties as described under specific product types.
C. Vanity Tops and Lavatory Countertops
   1. Material: Manufacturer's standard proprietary cast marble material.
   2. Configuration: Homogeneous with integral backsplash, minimum thickness of 3/4 inch (19 mm); other dimensions as indicated on the drawings. Provide end splashes of matching material, dimensions as indicated.
   3. Integral Lavatory Bowls: Cast elliptical depression or approved equal; comply with ANSI Z124.1.3 and test quarterly on a random basis by accredited laboratory.
   4. Color and Pattern: To be selected from standard color pallett.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.
B. If substrate preparation is the responsibility of another installer, notify Owner of unsatisfactory preparation before proceeding.

3.2 INSTALLATION

A. General: Install in accordance with manufacturer's instructions and approved shop drawings. Install components to be plumb, level, and rigid. Neatly scribe to adjoining surfaces, and field trim as required for snug fit. Replace any component that is cracked, chipped, broken, or otherwise defective.
B. Vanity Tops and Lavatory Countertops: Install on rigid wooden framework, following manufacturer's recommended procedures.
   1. If applicable, attach apron to framework with silicone joint sealer after verifying that apron will extend minimum 1/2 inch (12.7 mm) beyond edge of support.
C. Adhesives and Sealants: As specified in Section 07 90 00, and as follows:
   1. To adhere cast marble panels to gypsum wallboard, use LN-933 Liquid Nails, Nail-No-More, or other product recommended by manufacturer.
   2. For joints between cast marble panels, use a mildew resistant 100 percent silicone joint sealer; siliconized calking compound is not acceptable.
   3. For sealing cast marble panels at adjoining surfaces such as gypsum wallboard, use mildew resistant latex calk joint sealer, such as Acrylic Caulk or other product recommended by cast marble panel manufacturer

3.3 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged components before Substantial Completion.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 06 6510
SOLID SURFACING FABRICATIONS

PART 1 - GENERAL

1.3 SECTION INCLUDES
A. Solid surfacing fabrications for the following applications:
   1. Vanity tops.
   2. Countertops and sinks.

1.4 RELATED SECTIONS
A. Section 06 10 00 - Rough Carpentry.
B. Section 09 20 00 – Plaster and Gypsum Board.
C. Section 12 35 30 – Casework; Cabinetry.

1.5 REFERENCES
A. American with Disabilities Act Accessibility Guidelines (ADAAG).
B. American National Standards Institute (ANSI):
   1. ANSI Z 124.3 - Plastic Lavatories.
   2. ANSI Z 124.6 - Plastic Sinks.
C. ASTM International (ASTM):

1.6 SUBMITTALS
A. Product Data: Manufacturer's complete and current product data for each product required, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Complete installation methods.
   4. Product data for anchors, hardware, fastenings, and accessories.
B. Shop Drawings: Show locations of each item and installation details. Provide plan, section and elevation drawings conditions as necessary to depict correct installation procedures.
C. Shop drawings for fabrication and installation of Partition assemblies that are not fully described by architectural drawings. Provide template layouts and installation instructions for anchorage devices built into other work.
D. Selection Samples: Two color charts, consisting of actual product pieces, demonstrating full range of available colors, for initial color selection.
E. Verification Samples: For each product type specified, minimum of 3 inches (76 mm) square representing product configurations specified herein.

1.7 QUALITY ASSURANCE
A. Manufacturer Qualifications: Primary products specified in this section will be provided by a single manufacturer with a minimum of ten years’ experience.
B. Installer Qualifications: Products listed in this section are to be installed by a single installer with a minimum of five years demonstrated experience in installing products of the same
type and scope as specified.
C. Field Measurements: Take field measurements prior to component fabrication to ensure proper fitting of work.

1.8 DELIVERY, STORAGE, AND HANDLING
A. Protect during transit, storage, and handling to prevent damage, soiling and deterioration.
B. Store products in manufacturer's unopened packaging until ready for installation in an interior climate controlled location away from direct sunlight.
C. Store plastic laminate materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer. Store sheet materials flat on pallets or similar rack-type storage to preclude damage.
D. Handle as to not damage cabinetry or other installed products.

1.9 ENVIRONMENTAL REQUIREMENTS
A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

1.10 MANUFACTURERS
A. LG Hausys America, Inc., Hi-Macs products, or approved equal.
B. LG Hausys America, Inc., 900 Circle 75 Parkway, Suite 1500, Atlanta, GA 30339. (866) 544-4622
C. Equivalent products by other manufactures are acceptable. The Owner or owner's representative will be the sole judge of the basis of what is equivalent.

1.11 VANITY TOPS
A. Acrylic counter top with integral backsplash and full round edge detail.
B. Contractor to submit sample for approval prior to ordering. Owner to select from Standard color/texture collection.
C. Sinks and Mounting:

1.12 FINISHES
A. Colors: Provide surfaces in colors as follows:
   1. As selected from manufacturer's standard palette of colors.
   2. Color TBD.
   3. Finish in semi-gloss.

1.13 FABRICATION
A. Fabricator shall be familiar with the cutting, machining, sanding polishing and seaming of acrylic solid surface products and materials.
B. Produce joints connecting components using manufacturer's joint adhesive.
C. Finish all surfaces uniformly.

1.14 ACCESSORIES
A. Provide appropriate fasteners and accessories as required to properly complete installation.
B. Adhesives: two-component, solid surfacing adhesive.
   1. 100% reactive and translucent.
   2. UV stable
   3. Sandable
   4. Phthalate free
   5. Non-yellowing
   6. Stain resistant
   7. Water penetration resistant, including boiling water
   8. Physical Properties, cured adhesive:
      a) Tensile Strength, ASTM D 638: 3,850 psi
      b) Tensile Elongation: 6.9%
      c) Flexural Strength, ASTM D 790: 5,800 psi
d) Impact Strength, NEMA LD 3: 4.6 foot-pounds  
e) Water Absorption, ASTM D 570: 0.26%  
f) Water Resistance, ICPA SS-1: 250 cycles  
g) Barcol Hardness, ASTM D 2583: 34/42

1.15 SOURCE QUALITY CONTROL  
A. Visual Inspection of Solid Surfacing Fabrications: Do not install solid surfacing fabrications that do not pass visual inspection at Fabricator/Installer’s shop.  
B. Warping: Less than 1/6" per 10' of material  
C. Foreign Particles: Less than 3 visible particles per sheet  
D. Color Match: Same lot  
E. White Spots: Less than 3 visible particles per sheet  
F. Discoloration: None  
G. Particle Distribution: Even distribution  
H. Pit Holes: None  
I. Uneven Sanding: None  
J. Hairline Cracks: None  
K. Concave: None

PART 2 - EXECUTION  
2.1 EXAMINATION  
A. Examine areas to receive solid surfacing fabrications.  
B. Verify surfaces to support solid surfacing fabrications are clean, dry, flat, level, plumb, stable, rigid, and capable of handling the weight.  
C. Notify owner or owner’s representative of conditions that would adversely affect installation or subsequent use.  
D. Do not begin installation until unacceptable conditions are corrected.  
A. Do not begin installation until substrates have been properly prepared.  
B. If substrate preparation is the responsibility of another installer, notify owner or owner’s representative of unsatisfactory preparation before proceeding.  
C. Commencement of work will constitute acceptance of the existing conditions and surfaces to receive the work.

2.2 INSTALLATION  
A. Install solid surfacing fabrications in accordance with manufacturer’s instructions at locations indicated on the drawings.  
B. Acclimate solid surfacing fabrications to room temperature before installation.  
C. Install solid surfacing fabrications level, plumb, square, true to line, and without warp.  
D. Install solid surfacing fabrications securely in place with proper support at perimeter, seams, cutouts, overhangs, and other locations as required.  
E. Install solid surfacing fabrications with 1/8" gap for every 10' of material when surface is enclosed between 2 walls or other obstructions.  
F. Ensure seams are inconspicuous.  
G. Sand and polish solid surfacing fabrications in accordance with manufacturer’s instructions to specified finish and to remove scratches.  
H. Ensure solid surfacing fabrication installation is color matched.  
I. Do not install mechanical fasteners directly into solid surfacing fabrications.

2.3 ADJUSTING  
A. Repair minor damages to finish in accordance with manufacturer’s instructions and as approved by architect.  
B. Remove and replace damaged solid surfacing fabrications that cannot be successfully repaired, as determined by owner or owner’s representative.  
C. Verify that surfaces are level, plumb and rigidly secured to substrate; make any adjustments required.

2.4 PROTECTION  
A. Protect installed products until completion of project.  
B. Touch-up, repair or replace damaged products before Substantial Completion.  
C. Do not use installed solid surfacing fabrications as work surfaces during construction.
2.5 ADJUSTING AND CLEANING
   A. Do not use harsh cleaning materials or methods that could damage the finish.
   B. Clean finished surfaces and immediate areas of installation, using materials and methods recommended by manufacturer.
   C. Remove from project site packaging and debris caused by installation.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 09 3000
TILING

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Tile and Accessories:
   1. Ceramic Floor and Wall Tile.
   2. Trim and Accessories.

1.2 RELATED SECTIONS
A. Section: 03 30 00 - Cast-in-place Concrete

1.3 REFERENCES
A. American National Standards Institute (ANSI):
   1. ANSI A108.10 - Specifications for Installation of Grout in Tilework.
   2. ANSI A118.4 - Latex-Portland cement Mortar.
   3. ANSI A118.6 - Standard Ceramic Tile Grouts.
   4. ANSI A137.1 - Specifications for Ceramic Tile.
B. ASTM International (ASTM):
   1. ASTM C 50 - Standard Practice for Sampling, Sample Preparation, Packaging, and Marking of Lime and Limestone Products.

1.4 PERFORMANCE REQUIREMENTS
A. Static Coefficient of Friction: Tile on walkway surfaces shall be provided with the following values as determined by testing in conformance with ASTM C 1028.
   1. Level Surfaces: Minimum of 0.6 (Wet).
   2. Step Treads: Minimum of 0.6 (Wet).
   3. Ramp Surfaces: Minimum of 0.8 (Wet).

1.5 SUBMITTALS
A. Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
B. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, and junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
C. Selection Samples: Color charts illustrating full range of colors and patterns.
D. Selection Samples: Samples of actual tiles for selection.
E. Samples: Mount tile and apply grout on two plywood panels, illustrating pattern, color variations, and grout joint size variations.
F. Manufacturer's Certificate:
   1. Certify that products meet or exceed specified requirements.
   2. For each shipment, type and composition of tile provide a Master Grade Certificate signed by the manufacturer and the installer certifying that products meet or exceed the specified requirements of ANSI A137.1.
G. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.6 QUALITY ASSURANCE
A. Installer Qualifications: Company specializing in performing the work of this section with minimum two years’ experience.
B. Single Source Responsibility: Obtain each type and color of tile from a single source.
Obtain each type and color of mortar, adhesive and grout from the same source.
C. Measure and layout floor prior to installation to ensure a square and symmetrical finished product.

1.7 DELIVERY, STORAGE, AND HANDLING
A. Deliver and store products in manufacturer’s unopened packaging until ready for installation.
B. Protect adhesives and liquid additives from freezing or overheating in accordance with manufacturer’s instructions.
C. Store tile and setting materials on elevated platforms, under cover and in a dry location and protect from contamination, dampness, freezing or overheating.

1.8 ENVIRONMENTAL REQUIREMENTS
A. Do not install adhesives in an unventilated environment.
B. Maintain ambient and substrate temperature of 50 degrees F (10 degrees C) during tiling and for a minimum of 7 days after completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Acceptable Manufacturer: Dal-Tile Corporation or approved equal.
B. Equivalent products by other manufactures are acceptable. The Owner or owner’s representative will be the sole judge of the basis of what is equivalent.

2.2 PRODUCTS
A. General: Provide tile that complies with ANSI A137.1 for types, compositions and other characteristics indicated. Provide tile in the locations and of the colors and pattern indicated on the Drawings and identified in the Scope.
B. Ceramic Floor:
   1. Product: TBD
   2. Size and Shape: 18 inches square, nominal.
   3. 1/8” grout joints.

2.3 TRIM AND ACCESSORIES
A. Non-Ceramic Trim: Brushed nickel natural anodized extruded aluminum, stainless steel, brass, etc, style and dimensions to suit application, for setting using tile mortar or adhesive; use in the following locations:
   1. Open edges of floor tile.
   2. Transition between floor finishes of different heights.
   3. Thresholds at door openings.

2.4 SETTING MATERIALS
A. Modified latex Mortar Bed Materials:
   1. Latex-Portland Cement type: ANSI A118.4.
   2. VersaBond or equal.
B. Standard Grout: Cement grout, sanded or unsanded, as specified in ANSI A118.6; color as selected.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Verify that sub-floor surfaces are dust-free, and free of substances which would impair bonding of setting materials to sub-floor surfaces, and are smooth and flat within tolerances specified in ANSI A137.1.
B. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.
C. Verify that required floor-mounted utilities are in correct location.
D. Notify owner or owner’s representative of conditions that would adversely affect installation or subsequent use.
E. Commencement of work will constitute acceptance of the existing conditions and surfaces to receive the work.

3.2 PREPARATION
   A. Protect surrounding work from damage.
   B. Remove any curing compounds or contaminates, vacuum surfaces and damp clean.
   C. Seal substrate surface cracks or elevation transitions with approved filler. Level existing substrate surfaces to acceptable flatness tolerances.
   D. Install cementious backer board in accordance with ANSI A108.11 and board manufacturer's instructions on wood subfloor applications. Tape joints and corners, cover with skim coat of dry-set mortar to a feather edge.
   E. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.3 INSTALLATION
   A. Install tile and grout in accordance with applicable requirements of ANSI A108.1 through A108.13, manufacturer's instructions, and TCA Handbook recommendations.
   B. Lay tile to approved pattern. Arrange so that a full tile or joint is centered on each wall and that no tile less than 1/2 width is used. Do not interrupt tile pattern through openings.
   C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
   D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
   E. Form internal angles square and external angles bullnose.
   F. Install ceramic accessories rigidly in prepared openings.
   G. Install non-ceramic trim in accordance with manufacturer's instructions.
   H. Sound tile after setting. Replace hollow sounding units.
   I. Keep expansion joints free of adhesive or grout.
   J. Allow tile to set for a minimum of 48 hours prior to grouting.
   K. Grout tile joints. Use standard grout unless otherwise indicated.

3.4 PROTECTION
   A. Do not permit traffic over finished floor surface for 72 hours after installation.
   B. Cover floors with rosin paper and protect from dirt and residue from other trades.

3.5 CLEANING
   A. Clean tile and grout surfaces per manufacturer's specifications

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 09 6270
LAMINATE FLOORING

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Quick Step Classic and Classic Sound laminate flooring.
B. Maintenance materials.

1.2 RELATED SECTIONS
A. Section: 03 30 00 - Cast-in-place Concrete

1.3 REFERENCES
B. UL 410 - Underwriters Laboratories Slip Resistance.

1.4 SUBMITTALS
A. Submit sample boards of the flooring products with a standard range of colors.
B. Materials List: Submit complete lists of materials proposed for use, giving the manufacturer's name, catalog number, and catalog cut for each item when applicable.
C. Submit the manufacturer's current recommended methods of installation, including relevant limitations, safety and environmental cautions, application rates, and composition analysis.

1.5 QUALITY ASSURANCE
A. Installer: Shall be experienced in the wood and/or vinyl tile flooring industry and shall have a minimum of five (5) years' experience in the installation of similar products.
B. Single Source Responsibility: Obtain each type and color of tile from a single source. Obtain each type and color of mortar, adhesive and grout from the same source.
C. Measure and layout floor prior to installation to ensure a square and symmetrical finished product.

1.6 STORAGE, DELIVERY, AND HANDLING
A. Deliver the flooring to a preferred 35-55% relative humidity job site in unopened cartons. Protect flooring from exposure to moisture. Moisture producing activities such as drywall, concrete, masonry, painting and grouting must be complete and cured prior to delivery of wood flooring.
B. Cartons should be delivered to site two (2) day of installation date. Acclimation time is necessary for installing.
C. Cartons of wood should be stored in dry, well ventilated storage areas or warehouses. Never store cartons of flooring outdoors. The ideal storage area environment should be kept at 35-55% relative humidity and 60-75°F. Do not store cartons of flooring directly on concrete floors.

1.7 ENVIRONMENTAL REQUIREMENTS
A. Provide permanent HVAC operation (2 week minimum) and permanent lighting prior to installation.
B. Maintain room temperature between 60°F minimum and 75°F and relative humidity between 35% minimum and 55% maximum, prior, during and after the installation. Keep in mind that if the relative humidity drops below 35% for extended periods, the flooring may shrink causing unsightly splits and gaps.
C. Do not install flooring until all other significant construction work is complete.
D. If 7mm product, allow the laminate flooring to acclimate for 48 hours in its sealed packaging in the middle of the room where it is to be installed. Mix planks from different cartons when installing to maximize the natural look of the floor.

1.8 WARRANTY
A. Unilin Flooring is so confident in the design and durability of our Quick•Step ® Laminate flooring products and accessories, that we back them with a Limited Lifetime Warranty. This Limited Lifetime Warranty covers defects in material and/or workmanship which relate to joint integrity, staining, fading, wear and moisture resistance during normal residential use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Product specified is “Quick Step Classic Laminate Flooring” as manufactured by Unilin Flooring or approved equal.
B. Equivalent products by other manufacturers are acceptable. The Owner or owner’s representative will be the sole judge of the basis of what is equivalent.

2.2 PRODUCTS
A. Items specified are to establish a standard of quality for design, function, materials, and appearance. Installation adhesive, moisture retarder, and applicable maintenance materials shall be specified and manufactured by Unilin Flooring. Transition strips, trim moldings and stair treads/risers manufactured by Unilin Flooring are available.
B. Quick Step Classic and Classic Sound collections, or approved equal.
C. Quick Step Combi Floor, or approved equal.
D. Transition moldings.

PART 3 – EXECUTION

3.1 EXAMINATION
A. Examine surfaces before beginning wood work.
B. Work of other trades that has been left or installed in a condition not suitable to receive architectural woodwork shall be repaired or corrected by the applicable trade before installation.
C. Commencement of work will constitute acceptance of existing conditions and surfaces to receive the work.
D. Concrete Subfloor;
   1. Verify that the substrate is clean and free of laitance, loose material, grease, oil, coatings and other contaminants that will interfere with the bonding of the adhesive. Concrete surface sealers must be removed if present.
   2. Verify that the substrate is flat, smooth, free from cracks, holes, and ridges and other defects impairing performance or appearance.
   3. Verify that new slab cure is a minimum of 30 days, preferably 60 days.
   4. Verify the concrete is visually sound and dry. Calcium Chloride Moisture Tests (ASTM F1869) must be performed for warranty consideration.
   5. A new concrete floor must dry at least 1 week per 1 cm (3/8") thickness up to 4 cm (1-1/2"). Thicknesses over 4 cm (1-1/2") require twice as much drying time. For example, a 6 cm (2-1/2") concrete subfloor must dry for at least 8 weeks. The moisture content must be less than 2.5% (CM method) or less than 5 lbs/24 hour per 1000sqft (Calcium chloride method ASTM 1869).
   6. Concrete Alkalinity: Verify that pH levels of the concrete are 5-10 (ASTM F710).

3.2 INSTALLATION
A. UNDERLAYMENT AND PLANKS
   1. First install the underlayment, per width and gradually as you progress. If the underlayment is pre-mounted on the planks, then only use a damp-proof moisture barrier with water resistant adhesive tape. For Concrete, let the membrane run up the wall a bit before cutting to size. For wood, cut the moisture barrier 1 inch from
the wall. A molding will be attached to this later.

2. Begin the first row with a whole plank. First, saw off the tongue on both the long and the short sides.

3. Put the plank with sawn off sides against the walls. Put spacers from the installation kit between the planks and the wall. This will ensure that your expansion joint is wide enough: 8 to 10 mm (5/16" to 3/8").

4. The diagrams indicate where the Uniclic® planks are clicked together by angling up and down or where they are tapped together flat. Follow the diagrams precisely.

5. In places where it is too difficult to install the Uniclic® planks with the tapping block (e.g. against the wall), you can tap them together using the pull bar and a hammer.

6. There must also be an 8 to 10 mm (5/16" to 3/8") expansion joint between the last row and the wall. Keep this in mind when sawing the last row of planks.

B. WET AREAS

1. Since prolonged water exposure could damage your laminate flooring, the following installation recommendations should be closely followed to validate your residential water warranty. Wet areas would include, but not limited to, bathrooms, powder rooms, kitchens, mud rooms, foyers, and laundry rooms.

2. Neither Quick-Step® flooring planks nor Quick-Step® accessories are recommended for extreme humid applications such as in saunas or swimming pool areas. The water warranty excludes all products thinner than 8mm and does not apply to beveled edge products when used in bathrooms.

3. An expansion area of 8 to 10mm (5/16" - 3/8") must be provided around all vertical obstructions including walls, permanent cabinets, pipes, etc.

4. All perimeter expansion areas must be completely filled in with a water repellent flexible silicone sealant. When applying sealant, it is helpful to first apply a strip of masking tape parallel to and approximately 1mm (1/32") from the edge of the flooring. Then fill the expansion area with sealant, remove any excess with a plastic scraper or putty knife, then remove the tape. Let dry for 24 hours before exposure to water.

C. PIPES

1. In rows where there is a pipe, make sure the pipe falls exactly in line with the short side of two planks. Take a drill bit with the same diameter as the pipe plus 20 mm (3/4") for the expansion. Click the planks together on the short side and drill a hole centered on the joint between the two planks. Now you can install the planks in the floor.

D. UNDER DOORFRAMES

1. When sawing the planks, ensure that the expansion joint under the door is at least 10 mm (3/8"). If you cannot lift the plank, use an adapted tapping block or pull bar and hammer to tap the planks together with the planks flat on the floor.

E. FINISHING

1. Remove all spacers.

2. Install the molding on the plastic membrane that runs up the wall from under the floor. Never attach the molding to the floor. This method allows the floor to expand and contract under the molding.

3. For a perfect finish around pipes, use rosettes or flexible silicone caulking.

4. In places where profiles or skirting cannot be placed, fill expansion gaps with flexible silicone caulking.

3.3 PROTECTION

A. Protect finished floor from abuse by other trades using heavy rosin paper or equivalent. Make sure the floor has been cleaned thoroughly (swept, vacuumed and dust mopped) prior to protecting, so that the flooring surface will not be scratched by debris. Avoid covering the installation with protective paper or equivalent for at least 24 hours. Keep traffic out of spaces and areas where flooring is being installed until adhesive has set. Light foot traffic after 10-12 hours. Normal traffic after 24 hours.

B. Protect furniture and chair legs with proper felt or rubber caps.

C. Avoid bringing dirt, water and sand indoors by providing a suitable solid backed floor mat at the door.

D. Furniture on casters/wheels must use soft, rubber wheels that are suitable for a laminate
floor and/or use a suitable protective mat.
E. Ensure that humidity in the room is always at least 50%. Use a humidifier if you need
F. Cover floors with rosin paper and protect from dirt and residue from other trades.

3.4 CLEANING
A. The smooth surface of your laminate means it is virtually maintenance free.
B. Never use wax, polish, oils, soaps, detergents, shine enhancers, or varnish on the
   floor.
C. For dry maintenance, we recommend a dust mop or vacuum cleaner with soft
   bristle brush only.
D. For slightly damp maintenance, we recommend a laminate cleaner which you spray
   directly and lightly on a duster. Always wipe dry immediately until no more moisture
   is visible on the floor. The use of other cleaning products might damage your floor.
   For bevel edge products, we strongly recommend dry cleaning only.
E. Do not use any type of cleaning machine such as spray mops, steam
   cleaners/mops or power cleaners.
F. Wet maintenance is absolutely forbidden. Remove any water immediately. Uniclic®
   planks are not suitable for use in damp spaces like saunas.
G. Remove stubborn stains carefully with acetone based fingernail polish remover.
H. Never use scouring products!
I. In case your floor needs repair, a tool is available called Unifix which allows the
   damaged floor plank to be easily removed in minutes without replacing the entire
   floor. For Unifix to work properly the required expansion gap must be in place
   around the room’s perimeter and extra flooring should be available for use in the
   repair.

End of Section
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 31 20 00
SITE PREPARATION

PART 1 GENERAL

1.1 SUMMARY
A. Related Sections
   1. Section 31 20 00 (02300) Earth Moving

1.2 UNSUITABLE MATERIALS
A. Fills; Topsoil; frozen materials; construction materials and materials subject to decomposition; clods of clay and stones larger than 75 mm (3 inches); organic material, including silts, which are unstable; and inorganic materials, including silts, too wet to be stable and any material with a liquid limit and plasticity index exceeding 40 and 15 respectively. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
B. Existing Subgrade (Except Footing Subgrade): Material as stated in 1.2 (A) that is not capable of direct support of slabs, pavement, and similar items with possible exception of improvement by compaction, proof rolling, or similar methods.

1.3 GENERAL
A. Uniformly grade the areas within the limits of this section, including adjacent transition areas. Smooth the finished surface within specified tolerance. Provide uniform levels or slopes between points where elevations are indicated, or between such points and existing finished grades. Provide a smooth transition between abrupt changes in slope.
B. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
C. Slope backfill away from building walls for a minimum distance of 1800mm (6 feet).
D. When grading inside building lines finish subgrade to a tolerance of 13mm (1/2 inch) when tested within 3000mm (10 feet).
E. Finish subgrade in a condition acceptable to Owner at least one day in advance of landscape hardscape operations. Maintain finished subgrade in a smooth and compacted condition until succeeding operation has been accomplished. Scarify, compact, and grade subgrade prior to further construction when approved compacted subgrade is disturbed by Contractor's subsequent operations or adverse weather.

1.4 FILLING & BACKFILLING
A. General: Do not fill or backfill until all debris, water, unsatisfactory soil material obstructions and deleterious materials have been removed from excavation. For fill and backfill, use excavated materials and borrow meeting the criteria specified herein, as applicable. Borrow will be supplied at no additional cost to the Owner. Do not use unsuitable excavated materials.
B. Compaction: Compact with approved tamping rollers, sheep foot rollers, pneumatic tired rollers, steel wheeled rollers, vibrator compactors, or other approved equipment (hand or mechanized) well suited to soil being compacted. Do not operate mechanized vibratory compaction equipment within 10 feet of new or existing building walls without prior approval of Resident Engineer. Moisten or aerate material as necessary to provide moisture content that will readily facilitate obtaining specified compaction with equipment used. Backfill adjacent to any and all types of structures shall be placed and compacted to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density.

1.5 DISPOSAL OF UNSUITABLE & EXCESS EXCAVATED MATERIAL
A. Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off site property.
B. Transport surplus satisfactory soil to designated storage areas on site property. Stockpile or spread soil as directed by owner.
1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off site property.

C. Place excess excavated materials suitable for fill and/or backfill on site where directed by owner.

D. Remove from site and dispose of any excess excavated materials after all fill and backfill operations have been completed.

E. Segregate all excavated contaminated soil designated by the Owner from all other excavated soils, and stockpile on site on two 6 mil polyethylene sheets with a polyethylene cover. A designated area shall be selected for this purpose. Dispose of excavated contaminated material in accordance with State and Local requirements.

1.6 CLEAN UP

A. Upon completion of earthwork and Landscape operations, clean areas within contract limits, remove tools, and equipment. Provide site clear, clean, free of debris, and suitable for owner approval. Remove all debris, rubbish, and excess material from site Property.
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 32 80 00
IRRIGATION SYSTEMS

PART 1 GENERAL

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.
   b.Specifications throughout all Divisions of the Project Specifications are directly applicable to
      this Section, and this Section is directly applicable to them.
   c.Section 32 80 00 – Irrigation systems

2.SUMMARY
   a.This Section specifies the requirements for providing the Irrigation System as indicated on
      the Drawings and/or electronic files such as .dwg, pdf, etc.
   b.Contractor shall provide Irrigation System as a complete system including but not limited to:
      heads, valves, valve boxes, drip irrigation, emitters, drip line, control wire splice boxes,
      control wiring, electric controller, piping circuits, and all accessories, including electric
      power source coordination and installation.

3.QUALITY ASSURANCE
   a.Available Manufacturers - Subject to compliance with specified requirements, manufacturers
      offering products which may be incorporated in the work are included in the specifications
      or denoted on the Drawings, and/or electronic files such as .dwg, pdf, etc.
   b.Installation of Irrigation System shall be performed under the direction and supervision of a
      currently licensed State of Arizona Irrigator with not less than 2 years of direct design and
      installation experience in this type of work.
   c.Reference Standards Applicable to this Section:
      1)ANSI: American National Standards Institute
         a)Z55.1: Gray Finishes for Industrial Apparatus and Equipment
      2)ASTM: American Society for Testing and Materials
         a)B88: Specifications for Seamless Copper water tube.
         b)D 1785: Specifications for Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 40,
            80, and 120.
         c)D 2241: Specification for Poly Vinyl Chloride (PVC) Pressure-Rated Pipe (SDR
            Series)
         d)D 2466: Specification for Poly Vinyl Chloride (PVC) Plastic Pipe Fittings,
            Schedule 80
         e)D 2564: Specification for Solvent Cements for Poly Vinyl Chloride (PVC) Plastic
            Pipe and Fittings
         f)F 690: Practice for Underground Installation of Thermoplastic Pressure Piping
            Irrigation Systems
      3)AWWA: American Water Works Association
         a)C 500: Gate Valves, 3 inches through 48 inches NPS, for Water and Sewage
            Systems
         b)C 506: Backflow Prevention Devices, Reduced Pressure Principle and Double
            Check Valve Types
      4)ICC: International Code Council
         a)IBC: International Building Code
         b)IPC: International Plumbing Code
      5)NEMA: National Electrical Manufacturer's Assoc.
         a)250: Enclosures for Electrical Equipment (1000 Volts Maximum)
      6)NFPA: National Fire Protection Association
         a)NFPA 70 (NEC): National Electric Code
      7)NSF: National Sanitation Foundation
         a)No. 14 - Plastic Piping System Components and Related Materials
      8)State of Arizona Code-Regulations governing irrigation
      9)State of Arizona Code-Regulations governing backflow installation and inspections
10) State of Arizona Registrar of Contractors- Regulations governing irrigation licensing

d. The contractor shall maintain an “As Built” file. This record or log shall include all changes and modifications to the original plan on a daily basis. Upon completion of the project, these changes contained in the “as built file” will be incorporated into the design, notes, etc. On all of the designs, documents, etc., and will be provided to the Owner in the form of a completed as built design.
e. This record or log must be maintained on the job site during normal business hours.
f. The Contractor shall provide a completed “As Built” Drawing to the Owner at the completion of the project. This “As Built” Drawing shall be in the form of paper copy as well as a .DWG formatted CD.

4. SUBMITTALS
a. Product Data
   1) Submit manufacturer’s technical data, specifications, installation instructions and all shop drawings of the sprinkler heads, drip line, emitters (with gallon age) automatic valves, controllers, backflow preventers, connections, details, and related items to the Owner. Submit the manufacturer’s operation instructions for all applicable irrigation components.
   2) Submit maintenance instructions on all items requiring manufacturer’s standard detail submittal.
b. Spares and Special Tools
   1) Provide Owner with 2 packs of drip heads of each size and type. In addition, see Section 2.17B.
c. Water Tap Connections
   1) All fees, permits, and costs associated with the installation of the landscape irrigation water meter(s) shall be the responsibility of the Contractor unless otherwise directed by the Owner. The Owner will be responsible for any deposits.
d. Water
   1) Potable water to be supplied by Owner. Contractor shall make provisions for all connections required.

5. PRODUCT DELIVERY AND HANDLING
a. Materials, where appropriate, shall be delivered in manufacturer's unopened packaging labeled to indicate manufacturer's name and product identification. Insure that packaging and labeling remain intact until installation. Materials shall be stored protected from the elements, including direct sunlight.
b. Pipes shall be handled so as to prevent being damaged and to maintain their straightness. Pipe ends shall be wrapped. Pipes shall be stored on beds the full length of the pipes. Damaged or dented pipes or fittings shall not be used.
c. At no time will pipe joints other than swing joints be accepted at lengths that are less than 20 feet in length.

6. DEFINITIONS
a. Irrigation Main - Irrigation main is the piping from the water source(s) to control valves. Irrigation main is that pipe which is on the pressure side of irrigation control valves. This definition shall include looped mains and sub-looped mains.
b. Irrigation Lateral Lines - Irrigation lateral line is the piping from the control valves to the irrigation heads. Lateral line is that pipe which is on the non-pressure side of irrigation control valves.

PART 2 PRODUCTS
1. PIPES
a. Markings - Thermoplastic pipes shall be marked in accordance with ASTM D 1785 and ASTM D 2241 as applicable and shall bear the NSF mark in accordance with NSF 14.
b. Irrigation Main Pipe - ASTM D 2231, PVC, 1120 or 1220, Schedule 40. Or Class 200.
c. Irrigation Lateral Line Pipe
   1) Pipes 3/4 inch diameter and larger: ASTM D 2231, PVC, 1120 or 1220, SDR 21.0, 200 PSI
   2) Pipes 1/2 inch diameter: ASTM D 2241, PVC, 1120 or 1220, SDR 13.5, 315 PSI
d. Copper Tubing - ASTM B 88, Type K

2. FITTINGS FOR SOLVENT WELDED JOINTS
a. Schedule 40: ASTM D 2466
3. SOLVENT CEMENT FOR SOLVENT WELDED JOINTS
   a. IPS Weld-On PVC Cement or approved equal. Weld-On 700 for PVC pipe up to 4” and/or
      Weld-On 710 for PVC pipe up to 2”. In the event PVC pipe is greater than 4” then a Weld-
      On 704 series “medium” body or approved equal shall be used.
   b. IPS Weld-On Primer:
      1) Weld-On P-68 or P-70 primer or approved equal shall be used for surface preparation
         for all PVC pipe and fittings prior to cement applications.

4. FITTINGS FOR THREADED JOINTS
   a. ASTM D 2466, PVC, Schedule 80.

5. SEALANT FOR THREADED JOINTS UNDER CONSTANT PRESSURE
   a. No liquid Teflon or “pipe dope” shall be used on any threaded electric irrigation control valve.
   b. A high quality MIL-SPEC (MIL-T-27730) or approved equal Teflon tape shall be used for
      threaded electric irrigation control valves.
   c. All other types of threaded joints under constant pressure may use RECTOR SEAL LIQUID
      TEFILON or approved equal.

6. SLEEVES UNDER PAVING FOR CONTROL WIRE AND IRRIGATION LINES
   a. ASTM D 2466, PVC, Schedule 40, sized as shown on Drawings.
   b. In the event the sleeve is not shown on plan or an additional sleeve is to be installed, the
      sleeve shall be at a minimum two (2) pipe sizes larger than the pipe that is to be routed
      through the sleeve.
   c. For sleeves that are to be used specifically for control wires only, the sleeve shall be a 1-1/2”
      sleeve
   d. All sleeves shall extend a minimum of 12” beyond the obstacle that was sleeved.
   e. All sleeves shall be marked and located on the “as built plan” by one of the methods listed
      below:
      1) A minimum of two measurements from two known and fixed positions that terminate at
         the end of the sleeve.

7. IRRIGATION SPRINKLER HEADS
   a. All rotor and spray sprinkler heads and all landscape irrigation drip line shall be provided
   b. Spray Heads
      1) Spray heads shall be Rain Bird 1800 series or approved equal sprinkler heads with the
         height as indicated on the design or design legend. Under no conditions will an
         1802 series sprinkler head be installed.
      2) The nozzles shall be from the “MPR” series unless otherwise indicated on the design.
      3) All 1800 series sprinkler heads shall have filters installed.
      4) SAM-PRS (Seal-A-Matic) check valve and in-stem pressure regulation) sprinkler
         heads shall be installed on all projects where the turf area is adjoined by a
         pedestrian walk path. They are not required in areas other than low drainage or
         areas that are specifically called for in the design. All other areas will use the
         standard 1800’s as specified.
   5) If adjustments of radius are required on a specific design that reduces the radius of a
      given nozzle by more than 25%, then a Rain Bird or approved equal PCS (Pressure
      Compensating Screen) with the appropriate color shall be installed.
   6) All sprinklers shall be connected to irrigation lateral lines by “swing joints”. These
      swing joints shall be constructed via flexible PVC with a street elbow on one end and
      a coupler on the other end. These constructed swing joints shall be solvent welded
      with “hot glue” and shall be constructed at least 24 hours prior to installation.
   c. Drip Irrigation
      1) Drip irrigation products shall be from the Rain Bird product line or approved equal.
      2) All use of drip irrigation that is incorporated into the design shall utilize the following
         items:
         a) All drip applications shall utilize “Pressure Compensation” type products and a
            uniform regulated pressure.
         b) All drip applications shall utilize a pressure regulator incorporated into the valve
            configuration.
         c) All drip applications shall have air/vacuum relief valves and flush flow valves
            installed as per manufactures specifications.
d) All drip applications shall incorporate a Rain Bird or approved equal Automatic Filter kit with each section of drip. The drain line from this filter shall be routed to either a drain approved by the Owner, or to an area where it can be discharged via an impact type head with a large nozzle. Under no circumstances shall the drain line be “day lighted”. The stainless steel mesh screen shall be a 150 micron mesh. The valve configuration shall be sized according to the manufacturer’s specifications.

3) When site conditions permit, utilize the Rain Bird Landscape Drip line or approved equal. The spacing standards shall be:
   a) 12” spacing – sandy soil conditions
   b) 18” spacing – loam soil conditions
   c) 24” spacing – clay soil conditions
   d) Design preference is for use of uniform rows, centers fed zones, and maximum spacing not exceeding the manufacturer’s specifications.

4) The drip shall be designed and installed as per the manufacturer’s recommendations.

8. VALVE BOX
   a. Valve boxes shall be heavy duty plastic 17 inch by 11-3/4 inch by 12 inch depth, black with black cover. Valve box shall be non-hinged, bolt type. Provide submittal to owner for approval prior to purchase or installation.

9. CONTROL WIRE SPLICE BOXES
   a. Control wire splice boxes shall be heavy duty plastic 10 inch diameter by 10-1/4 inch deep, black with black cover, No. 910-12B, by Carson Industries, Inc. or approved equal.

10. GRAVEL BACKFILL
    a. Gravel backfill for valve boxes and control wire splice boxes shall be 3/8 inch diameter pea gravel.

11. ELECTRIC CONTROLLER(S)
    a. Controllers shall be Rain Bird Outdoor Controller/Timer or approved equal.
      1) The Controllers shall be housed in wall mounted in areas where a wall mount controller is not feasible a Stainless Steel Pedestal mount controller will be used.
      2) Coordinate with the Owner as to the communication source for the connectivity to where the power is located.

12. IRRIGATION CONTROL WIRE
    a. Wire: Solid copper wire, NEC type UF, UL listed for direct burial in ground. Minimum size: No. 14 AWG. No. 12 UF for runs over 1000 LF.
    b. The wires for all irrigation control valves shall be red in color.
    c. The common wires for all irrigation control valves shall be white in color.
    d. Splicing Material shall be King Wire Connectors or approved equal, Tan in color. A new wire connector shall be used for every electrical connection.
    e. An extra “transient” or spare wire shall be installed. This “transient” wire shall be yellow in color and will be labeled as spare in the controller.

13. BACKFLOW PREVENTER
    a. Backflow Preventers shall be bronze and copper, pressure vacuum breaker (PVB) assembly Febco model 765 or approved equal or reduced pressure device (RPZ) model 825 or approved equal.

14. GATE VALVES
    a. Gate Valves shall comply with AWWA C-500. Valves up to 3 inch size shall be 125 pound, bronze body, and bronze-mounted, non-rising stem with solid wedge gates. The size shall correspond to the main line they are attached to.

PART 3 EXECUTION

1. TRENCHING AND BACKFILLING
   a. General - Contractor shall comply with Division 31 of these Specifications. Excavate straight and true with bottom uniformly sloped to low points. Provide 12 inch minimum cover over top of installed irrigation lateral line piping. Provide 2 inches of earth between parallels and wire. Parallels shall be laid side-by-side, not stacked.
b. Backfill - Backfill with clean material from excavation after obtaining Owners approval. Remove organic material, as well as rocks and debris larger than 1 inch in diameter. Place acceptable backfill in 6 inch lifts and water jet all trenches.
   1) Backfill trench to within 6 inches of finished grade and compact. Continue fill with acceptable topsoil and compact to bring sod even with existing lawn.

2. INSTALLATION
   a. General - Unless otherwise indicated, Contractor shall comply with requirements of the governing International Plumbing Code. Verify all applicable irrigation codes.
   b. Pipes
      1) Piping Mains and Laterals - Lay out sprinkler mainlines and perform line adjustments and site modifications to laterals prior to excavation. Lay pipe on solid subbase, uniformly sloped without humps or depressions.
      2) PVC Pipe Assembly
         a) Cut PVC pipe, square and de-burr. Use PVC pipe cutter when possible. Clean pipe and fittings using primer as recommended by the PVC pipe manufacturer. Use purple tinted primer to aid in visual inspection.
         b) Apply a thin even flow coat of PVC solvent cement to the pipe first, then the inside of the fitting. Utilize the appropriate size applicator and the correct temperature range of solvent weld material for the size of the pipe. Cure joints as recommended by the manufacturer and keep pipe and fitting out of service during curing period. Construct watertight joints equal or greater in strength than the pipe. Do not tap pipe at fittings.
      3) Install plastic pipe in dry weather, when temperature is above 40 degrees F. and in accordance with manufacturer's written instructions. Allow joints to cure at least 24 hours at temperature above 40 degrees F. before testing.
      4) Plastic pipe shall be snaked in the trenches in a manner to provide for expansion and contraction as recommended by pipe manufacturer.
   c. Irrigation Heads
      1) Flush irrigation lines with full head of water and install heads after hydrostatic test is completed.
      2) Install heads at manufacturer's recommended heights. Activate the zone valve and flush out the heads.
      3) Locate part-circle heads to maintain a minimum distance of 4 inches from walls and 4 inches from other boundaries, unless otherwise indicated.
      4) Check for uniformity of coverage and pattern correctness. Adjust for 100% coverage where required.
      5) Adjust arcs and radius at the stated manufacturer's pressure. Adjust the flow control valve until this pressure is obtained at the last head on each zone.
   d. Electric Remote Control Valves
      1) Adjust automatic control valves to provide flow rate at rated operating pressure required for each irrigation section.
      2) Install valves in valve boxes, arranged for easy adjustment and removal. Locate valves to ensure ease of access for maintenance such that no physical interference with other elements of the project exists.
      3) Install a 3' expansion coil at each valve.
   e. Valve Boxes - Install valve boxes to cover electric remote control valves. Top of valve box shall be flush with finished grade. Bury minimum 4 bricks under base of each box as support.
   f. Control Wire Splice Boxes - Install control wire splice box to cover any splice in control wire. Top of valve box shall be flush with finished grade, Granite, Backfill - Backfill valve boxes and control wire splice boxes with gravel, minimum 6 inch depth.
   g. Electric Controller
      1) Controllers shall be fully grounded as per the manufacturer's specifications.
      2) Connect remote control valves to controller in clockwise sequence to correspond with stations 1, 2, 3, successively.
      3) Provide two keys to Owner. Keys to be matched with existing controller key locking mechanisms.
      4) Power to Controller & Locations: Locations shown on plan for controllers is approximate. Final location shall be determined on site by Owner. Contractor shall supply 120 VAC to controller from adjacent existing power sources. Follow local governing codes in electrical work.
h. Irrigation Control Wires
   1) Provide 24 volt system for control of automatic circuit-section valves of underground Irrigation System. Provide unit capacity to suit number of circuits indicated.
   2) Common ground wire shall be white. No other wires shall be white.
   3) Supply one extra wire, for each direction of run, to valve which is located the greatest distance from the controller. Extra wire shall be yellow and labeled as spare in the controller.
   4) Color of wire from controller to control valve shall be consistent to each valve. Red shall be used for the zone valves.
   5) Provide 12 inch long expansion loop within 3 feet of each wire connection and splice on runs of wire 100 feet or longer.

i. Backflow Preventers
   1) Make required connection to water supply according to local codes and manufacturer's written instructions.
   2) Install pressure type backflow devices at required grade in accordance with the local Plumbing Code. Exposed mainline and mainline risers above PVC pipe main elevation shall be copper. Install a brass union in the riser on the upstream and downstream of the device.
      a) A minimum of two measurements from two known and fixed positions that terminate at the end of the sleeve.

j. The Contractor shall provide an “As Built” record. Upon completion of the project, the “As Built” record, documents, etc., will be provided to the Owner in the form of a completed “As Built” design.

3. TESTING
   a. General - Notify Owner 48 hours in advance when testing will be conducted. Conduct tests in presence of Owner. Hydrostatic Test - Test irrigation main line, before backfilling trenches. Remove and repair or replace piping and connections which do not pass hydrostatic testing.
   b. Operational Testing - Perform operational testing after hydrostatic testing is completed, backfill is in place, and irrigation heads are adjusted to final position.
      1) Demonstrate to Owner that system meets coverage requirements, is as specified and indicated, and that automatic controls function properly.
      2) Coverage requirements are based on operation of one circuit at a time.
      3) After completion of grading, sodding, and rolling of grass areas, carefully adjust lawn sprinkler heads so they will be flush with or not more than 1/2 inch above finished grade. Set shrub sprinkler heads not more than 1/2 inch above top of mulch.

4. MAINTENANCE
   a. Contractor shall coordinate with the Owner on the implementation of the initial ET based irrigation schedule.
   b. Contractor shall correctly maintain the Irrigation System during the installation and for a period of two (2) years warranty. Contractor shall provide "As Built" Drawings for new work, showing dimensioned location of valves, meters, vacuum breakers, controllers, and mainline in preparation of "As Built" Drawings.

END OF SECTION
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 32 90 00
PLANTING

1. GENERAL

1.01 RELATED SECTIONS
A. Section 32 90 00 (Section 02900)
B. Section 32 92 23 – Sodding
C. Section 32 92 13 – Hydro mulching
D. Section 32 91 20 – Exterior Landscape Maintenance.
E. ASLA Code of Environmental Ethics and ASLA Public Policies

2. SUMMARY

RELATED DOCUMENTS
Drawings and general provisions of the Contract, including General and Supplementary
Conditions and Division 01 Specification Sections, apply to this Section.
Specifications throughout all Divisions of the Project Manual are directly applicable to this
Section, and this Section is directly applicable to them.

SUMMARY
This Section specifies the requirements for providing planting materials and their installation as
indicated and scheduled. For grass installation refer to Section 32 92 23 – Sodding, and
Section 32 92 13 – Hydro mulching. For maintenance, refer to Section 32 91 20 – Exterior
Landscape Maintenance.

QUALITY ASSURANCE
Installer: Installation of planting work shall be performed by a single firm specializing in
landscape and planting work. Contractor shall be licensed by the Texas Association of
Nurserymen, shall possess an agricultural certificate, shall be a licensed pest applicator,
and shall have not less than 5 years of experience in this type of work.

Quality Control
Trees, Shrubs, and Groundcovers:
Provide plants of quantity, size, genus, species and variety shown and scheduled
for planting work and complying with recommendations and requirements of
ANSI Z60.1 “American Standard for Nursery Stock.” Provide healthy, vigorous
stock, grown in recognized nursery in accordance with good horticultural
practice and free of disease, insects, eggs, larvae and defects such as knots,
sun-scald, injuries, abrasions, or disfigurement.

Compliance: with all applicable local, state, and federal requirements regarding
materials, methods of work, and disposal of excess and waste materials.
Substitutions: Do not make substitutions unless approved in writing by Owner. If
specified planting material is not obtainable, submit proof of non-availability to
Owner together with proposal for use of equivalent material. Contractor shall
submit proposal in a timely manner as to not impact project completion or
installation of other work.
Analysis and Standards: All packaged products shall be delivered in original
manufacturer's sealed containers. For unpackaged materials, submit analysis by
recognized laboratory made in accordance with methods established by the
Association of Official Agriculture Chemists, wherever applicable.
Inspection: Notify Owner at least 1 week prior to installation, of location where materials that have been selected for planting may be inspected, either at place of growth or the site prior to planting. Plant material will be inspected for compliance with requirements for genus, species, variety, size and quality. Owner retains right to further inspect trees for size and conditions of balls and root systems, insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during progress of work. Contractor shall remove rejected trees immediately from site and replace with specified materials. Plant material not installed in accordance with Contract Documents will be rejected.

Reference Standards Applicable to this section:

- ANSI: American National Standards Institute
- Z60.1: Nursery Stock
- Association of Official Agriculture Chemists
- FS: Federal Specifications and Standards
- Q-P-166E: Peat, Moss; Peat, Humus; and Peat, Reed-Sedge
- NBS: National Bureau of Standards
- PS23: Perlite Product Standard

SUBMITTALS

Work Schedule: Contractor shall submit work durations for all planting work prior to purchase and installation of plant material.

Certification:
Submit, for Owner's review and approval, manufacturers or vendor's certified analysis of soil amendments. Submit other data substantiating that materials comply with specified and indicated requirements.

Fertilizer certification and submittal shall be submitted for Owner's review and approval as to the chemical analysis of the fertilizer, a listing of the elements contained therein and their percentages.

Warranty Instructions: Submit typewritten warranty instructions, including manufacturer's recommendations and instructions recommending procedures to be established by Owner for maintenance and warranty of planting work. Submit instructions prior to the start of work.

Submittals: Submit samples of topsoil, mulch and prepared backfill mix.

Prepare an ET (Evapotranspiration) based irrigation schedule for all trees. This irrigation schedule shall include the amount of water to be applied to the trees and when the application is to be applied. This data can be provided in ET, precipitation rates, inches per hour, or inches per month.

Prepare an ET (Evapotranspiration) based irrigation schedule for all shrubs. This irrigation schedule shall include the amount of water to be applied to the shrubs and when the application is to be applied. This data can be provided in ET, precipitation rates, inches per hour, or inches per month.

Prepare an ET (Evapotranspiration) based irrigation schedule for all turf grass. This irrigation schedule shall include the amount of water to be applied to the turf grass and when the application is to be applied. This data can be provided in ET, precipitation rates, inches per hour, or inches per month.

DELIVERY, STORAGE AND HANDLING

Packaged Materials: Deliver packaged materials in fully labeled original containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

Plants
Do not drop stock during delivery.
Materials shall not be pruned prior to installation unless otherwise approved by Owner in writing. Do not bend or bind-tie trees and shrubs in such a manner as to damage bark, break branches or destroy natural shape. Provide protective covering during delivery.

Deliver plants after preparation for planting has been completed and plant immediately. If planting is delayed more than 7 hours after delivery, set plants in shade, protect from weather and mechanical damage. Keep roots moist by covering with mulch, burlap or other acceptable means of retaining moisture, and water as needed.
Do not remove container grown stock from containers before time of planting and water immediately after delivery and prior to planting.

**JOB CONDITIONS**

Work Scheduling: Proceed with and complete planting work in a timely manner, working within seasonal limitations for each kind of planting work required.

Planting Time

Correlate planting with specified maintenance periods to provide maintenance from date of Substantial Completion.

Plant frost-tender trees only after danger of frost are past or sufficiently before frost season to allow for establishment before first frost. Do not plant in frozen ground.

Plant trees, shrubs and groundcover after final grades are established and prior to planting of lawns, unless otherwise directed by Owner in writing. If planting occurs after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

Utilities: Refer to engineering drawings and coordinate with Utility Contractor for location of utilities. Contractor shall be responsible for damage to existing utilities and structures. Contractor shall contact the Arizona 811 call system and shall provide a copy of the transmittal number to the Owner.

Security: The Owner will not assume any responsibility for security of any materials, equipment, etc. during construction of the project until project acceptance.

Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions beyond the scope of this contract, or obstructions, notify Owner of such conditions, immediately and before planting.

Pollution Control: Control dust caused by planting operations. Dampen surfaces as necessary. Comply with pollution control regulations of governing authorities.

**SUBSTANTIAL COMPLETION AND FINAL ACCEPTANCE**

Substantial Completion notice for planting work will be issued by Owner only for entire planting and landscape work.

Substantial Completion notice will be issued only after Owner inspects and approves all required planted materials and grassed areas.

Final acceptance will be determined after the maintenance period and when all plant materials are alive and healthy and grass areas are established.

Final acceptance notice will be issued only after Owner inspects and approves all planting work as in accordance with the Contract Documents.

**SPECIAL PROJECT WARRANTY**

Contractor shall furnish written warranty of trees, shrubs, groundcover and turf for a period of 12 months after date of final acceptance, against defects including death and unsatisfactory growth.

Remove and replace trees, shrubs and groundcover found to be dead or in unhealthy condition during warranty period. Replace trees, shrubs and groundcover which are in doubtful condition at end of warranty period. However, if in the opinion of Owner, such doubtful material may survive, Contractor shall extend the warranty period for a full growing season. Owner will determine which items are in doubtful condition.

Another inspection will be conducted by Owner, at end of extended warranty period to determine acceptance or rejection.

**3. PRODUCTS**

**MATERIALS**

Fertilizer: A fertilizer submittal shall be provided for approval by Owner prior to use.

For Planting areas shall be a commercial all organic, all natural biological fertilizer, which includes hamates, rock minerals, bio-inoculants and bio-stimulants. Fertilizer shall be granular, or pellet, uniform in composition.

Sharp Sand: Sand shall be thoroughly washed, coarse grade sharp, construction or brick sand, free of clay balls, weeds, and grass. So-called cushion sand, blow sand, or creek silt is not acceptable for substitution where sharp sand is specified.
Compost for bed prep/soil backfill mix: Compost must be made from organic materials approved by the State of Arizona as specified in Chapter 332 of the Health & Safety Code. Compost must contain less than 1% by dry weight of inert contaminants such as glass, plastic, rocks, etc. Industrial or hazardous waste cannot be used in the production of the compost (i.e. boiler ash, rice hull ash, etc.). Compost shall be free of fillers such as rice hulls or pine bark. Compost shall not exceed the heavy metal limits as specified in the US EPA Part 503 Regulations.

Prepared Planting Backfill Mix: Shall be 33% topsoil, 33% sharp sand, and 33% organic compost or approved commercially available soil mix.

Topsoil
Provide topsoil which is a fertile, friable, natural loam or sandy loam, surface soil, free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, stones larger than 2 inches in any dimension and other extraneous or toxic matter harmful to plant growth.

Obtain topsoil only from naturally, well-drained sites where topsoil occurs in a depth of not less than 4 inches. Topsoil shall not be collected from sites that are infected with growth of, or the reproductive parts of noxious weeds, especially nut grass. Topsoil shall not be stripped, collected or deposited while wet. Topsoil shall not be excessively acid or alkaline or contain toxic substances which may be harmful to plant growth. Topsoil shall be without admixture of subsoil.

PLANT MATERIALS
Trees, Shrubs and Groundcover: Provide specimen quality plant material as described in Construction Documents. Each individual species of plant material shall be obtained and provided from a single source.

4. EXECUTION

PLANTING

Planting Trees and Large Shrubs
Set stock on layer of compacted planting soil mixture, plumb and in center of pit at same elevation as adjacent finished planting grades. Distribute fertilizer evenly throughout backfill mix in hole at specified rate. Place additional backfill mix around base and sides of ball and work each layer to settle backfill and eliminate voids and air pockets. When excavation is approximately 2/3 full, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Dish top of backfill to allow for mulching.

Prune, thin out, and shape shrubs in accordance with standard horticultural practice. Prune shrubs to retain natural character. Remove and replace excessively pruned or miss-formed stock resulting from improper pruning.

Excavation and Soil Preparation for Shrubs/Groundcovers in Planting Beds
Strip existing vegetation and 1” soil to remove root layer. Excavate entire planting beds 4” below finished grade.

Planting of Trees and Large Shrubs in Beds
Set stock on layer of planting soil mixture, plumb and slightly above adjacent finished planting grades. Place additional backfill mix around base and sides of ball and work each layer to settle backfill and eliminate voids and air pockets. Layer and distribute additional fertilizer in planting hole at specified rate. Water entire bed thoroughly, adjusting plant if settling occurs.

Treat entire areas of planting and tree root balls with:
- Broadcast application of pre-emergent herbicide at manufacturers recommended rate in all planting areas (except seasonal beds) prior to applying mulch.
- Mulching: Immediately after planting has been completed, mulch tree wells and plant beds. Provide not less than 2” thickness of composted hardwood & pine bark mulch in planting beds and 3” thickness at all trees.

CLEANUP AND PROTECTION
During planting work, keep pavements clean and work area in an orderly condition. Sweep site and remove trash at end of each workday as necessary. Protect planting work and materials from damage due to planting operations, operations by other contractors and trades and trespassers. Maintain protection during installation periods. Treat, repair or replace damaged planting work as directed by Owner.
Stockpile, haul from site, and legally dispose of waste materials and debris. Accumulation will not be permitted. Maintain haul and disposal routes clear, clean, and free of debris. On-site burning of combustible cleared materials will not be permitted.

Upon completion of work, clean areas within Contract limits, remove tools, supplies and equipment. Wash down curbs and pavement areas. Scrub curbs and walks as necessary to insure a clean surface. Provide site clean and free of materials and suitable for use as intended.

**INSPECTION AND ACCEPTANCE**

When planting work is completed and at the completion of maintenance period, Owner will make an inspection to determine acceptability.

When inspected planting work does not comply with the Contract Document requirements, contractor must replace rejected work and continue specified maintenance until re-inspected by Owner and found to be acceptable. Contractor shall remove rejected plants and materials promptly from site.

Contractor shall correctly maintain all planting during the installation process and throughout the landscaping maintenance service period.

### 4.04 TOPSOIL

A. Topsoil: Evaluate soil for use as topsoil in accordance with ASTM D 5268.
1. Reuse surface soil stockpiled on the site. Verify suitability of surface soil to produce topsoil meeting requirements and amend as necessary. Clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.
2. Supplement with imported topsoil when quantities of stockpiled soil are insufficient.

### 4.05 FERTILIZER

A. Fertilizer for groundcover, wildflowers and grasses: Not permitted.
B. Fertilizer for trees, plants, shrubs: As recommended by plant supplier and as follows:
   1. No synthetic chemical fertilizers.
   2. Bio based content:
      a. Fertilizers: Products formulated or processed to provide nutrients for plant growth and/or beneficial bacteria to convert nutrients into plant usable forms. Provide minimum 71% bio based content.

**END OF SECTION**
Exhibit A
CONSTRUCTION REQUIREMENTS
SECTION 04 22 00
CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Division 01 Sections, Drawings, General Conditions, Supplementary Conditions, and Special Conditions apply to this section.

1.2 SUMMARY
A. Section Includes:
   1. Concrete masonry units (CMUs).
   2. Mortar and grout.
   3. Reinforcing steel.
   4. Masonry joint reinforcement.
   5. Ties and anchors.
   6. Embedded flashing.
   7. Control joint materials.
B. Products installed, but not furnished, under this Section:
   1. Irrigation, concrete flatwork and planting.

1.3 REFERENCES
B. ASTM International (latest versions):
   2. ASTM A82/A82M Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
   5. ASTM A307 Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
   13. ASTM C90 Standard Specification for Loadbearing Concrete Masonry Units.
18. ASTM C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pezzoli for use in Concrete.
25. ASTM D2000 Classification System for Rubber Products in Automotive Applications.

1.4 SYSTEM DESCRIPTION
A. Provide materials to achieve the net compressive strength of concrete unit masonry equal to or greater than 1500 psi $f_m$.
B. Provide materials to achieve the net compressive strength of concrete unit masonry equal to or greater than the $f_m$.

1.5 SUBMITTALS
A. Provide submittal documents for owner approval for the following:
   1. Submit mix designs and test reports:
      a. Prepended mortar:
         1) Mix design indicating types and proportions of materials according to proportion specification of ASTM C270, or
         2) Mix designs and mortar tests performed in accordance with the property specification of ASTM C270.
      b. Conventional grout:
         1) Mix design indicating types and proportions of materials according to proportion requirements of ASTM C476, or
         2) Mix design and grout strength test performed in accordance with ASTM C476.
      c. Self-consolidating grout:
         1) Compressive strength tests performed in accordance with ASTM C1019, and slump flow and visual stability index (VSI) as determined by ASTM C1611/C1611M.
   2. Submit material certificates for each of the following certifying compliance:
      a. Concrete masonry units.
      b. Steel reinforcing bars.
      c. Anchors, ties, fasteners, and metal accessories.
      d. Preformed control joint gaskets.
B. Samples for Verification: For each type and color of the following:
   1. Exposed concrete masonry units.

1.6 SUSTAINABLE DESIGN SUBMITTALS
A. Environmental Product Declaration (EPD) meeting the following criteria:
   1. Product-specific, Type III third party verified compliance with Geotechnical Engineer and standards set in their Soils Report.
   2. EPD based upon ASTM International PCR005: Product Category Rules for Preparing an Environmental Product Declaration for Manufactured Concrete and Concrete Masonry Products.
B. Recycled Content
   1. Manufacturer’s certification of type and percentages of recycled content.

C. Manufacturing and Material Source Locations: Include in manufacturer’s certification for CMU supplied under this Section:
   1. Location of CMU production plant.
   2. Locations of raw material sources for ingredients.

1.7 QUALITY ASSURANCE
A. Preconstruction Testing.
   1. Owner will select a qualified independent testing agency to perform preconstruction testing indicated below. Payment for these services will be made by Owner.
   2. Determine the compressive strength of masonry by the strength of the unit and type of mortar specified (Unit Strength Method) per CBC Table 2105.2.2.1.2.
      a. Concrete Masonry Units: Test per ASTM C140.
      b. Grout: Test per ASTM C1019.
   3. Determine the compressive strength of masonry by the prism test method in accordance with ASTM C1314. Schedule masonry procurement sufficiently in advance to allow for prism construction and curing.
      a. Prism Test: For each type of construction required, construct and test three prisms per ASTM C1314.

B. Sample Panels: Construct an approximate [12'] wide by [6'] high panel for representation of completed masonry, joint tooling, design details, and workmanship. Comply with requirements in Division 01 Section "General Requirements" for mockups.
   1. Install the following in the sample panel:
      a. [Units To Be Determined (TBD)]
      b. [Details or conditions To Be Determined (TBD)]

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination".

1.8 DELIVERY, STORAGE, AND HANDLING
A. Protect all materials of this section to maintain quality and physical requirements.
B. Store all masonry units on the jobsite so that they are protected from rain, stored off-ground and kept free of contamination.
C. Store SPEC MIX or approved equal, prepended mortar mix in manufacturer’s original, unopened, undamaged containers with identification labels intact, covered and protected from weather, or in a dispensing silo.

1.9 FIELD CONDITIONS
A. Cover top of unfinished masonry work to protect it from the weather.
B. Hot-weather procedures when ambient temperature exceeds 100°F (38°C), or exceeds 90°F(32°C) with a wind velocity greater than 8 mph:
C. Implement hot weather construction procedures in accordance with TMS 602/ACI 530.1/ASCE 6 Article 1.8 D.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS
A. Concrete Masonry Units: ASTM C90.
B. Supply submittal from Block Manufacture for owner approval.
   1. Weight Classification: Medium Weight unless otherwise indicated.
   2. Color(s) and texture(s):
      a. [Grey ] [4" interlock pours]
3. Sustainable Characteristics:
   a. Concrete masonry units shall be included in a current Type III Environmental Product Declaration.
   b. Obtain CMU produced, and with raw materials sourced, within 500 miles of the project site.

2.2 MORTAR AND GROUT MATERIALS
   A. SPEC MIX Masonry Mortar or approved equal, Type [S or M] prepended factory mix: ASTM C270 and ASTM C1714/C1714M.
      1. Natural gray color.
   B. Grout for masonry: ASTM C476.
      1. Fly ash: ASTM C618.
   C. Water: Potable.
   D. Admixtures:
      1. Do not use admixtures except as specified herein, or as approved by owner.
      2. PRE-MIX Products Grout Additive or approved equal. Use per manufacturer's specifications.

2.3 REINFORCEMENT AND METAL ACCESSORIES
   A. Provide metal reinforcement and accessories conforming to TMS 602/ACI 530.1/ASCE 6 Article 2.4.
   B. Steel Reinforcing Bars: ASTM A615/A615M.
   C. Masonry Joint Reinforcement: ASTM A951/A951M. Maximum spacing of cross wires in ladder-type and points of connection of cross wires of truss-type joint reinforcement shall be 16 in.
   D. Anchors, ties, and accessories:
      1. Plate and bent-bar anchors: ASTM A36/A36M.
      2. Sheet-metal anchors and ties: ASTM A1008/A1008M.
      3. Wire mesh ties: ASTM A185/A185M.
      4. Wire ties and anchors: ASTM A82/A82M.
      5. Headed anchor bolts: ASTM A307, Grade A.
   E. Coatings for corrosion protection: Unless otherwise required, protect carbon steel joint reinforcement, ties, and anchors from corrosion by galvanizing or epoxy coating in conformance with the following minimums:
      1. Mill galvanized coatings:
         a. Joint reinforcement: ASTM A641/A641M (0.1 oz./ft2).
         b. Sheet metal anchors and ties: ASTM A653/A653M Coating Designation G60.
      2. Hot-dipped galvanized coatings:
         a. Joint reinforcement, wire ties, and wire anchors: ASTM A153/A153M (1.50 oz./ft2).
         b. Sheet metal anchors and ties: ASTM A153/A153M Class B.
      3. Epoxy coatings:
         a. Joint reinforcement: ASTM A884/A884M Class A Type 1 — ≥7 mils.
         b. Wire ties and anchors: ASTM A899/ Class C — 20 mils.
         c. Sheet metal anchors and ties: 20 mils per manufacturer's specification.

2.4 MASONRY CLEANER
   A. Use potable water and detergents to clean masonry unless otherwise approved.
   B. Do not use acid or caustic solutions unless otherwise approved.

2.5 MIXING
   A. Mortar:
      1. Mix SPEC MIX or approved equal Masonry Mortar prepended factory mix per manufacturer's recommendations.
   B. Conventional grout:
1. Mix grout to a consistency that has a slump between 8 and 11 inches per TMS 602/ACI 530.1/ASCE 6 Article 2.6 B.

C. Self-consolidating grout:
   1. Job-site proportioning of self-consolidating grout is not permitted.
   2. Do not add water at the job site except in accordance with the manufacturer's recommendations.

2.6 FABRICATION
A. Fabricate reinforcement per TMS 602/ACI 530.1/ASCE 6 Article 2.7 A.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Prior to the start of masonry installation, verify all conditions pertinent to the performance of work in this Section are acceptable.
   1. Verify foundations are constructed within a level alignment tolerance of ± 1/2 in.
   2. Verify that reinforcing dowels are positioned in accordance with Project Drawings.
B. Proceed with masonry work only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Clean reinforcement and shanks of anchor bolts by removing mud, oil, or other materials that will adversely affect bond to mortar or grout.
   1. Reinforcement with rust and/or mill scale is acceptable provided attributes of a cleaned sample are in accordance with the applicable ASTM specification.
B. Prior to laying masonry, remove laitance, loose aggregate, and any other material that would prevent mortar from bonding to the foundation.
C. Do not wet units before laying, unless otherwise required. Wet cutting is permitted.
D. Cut units as required to fit; use motor-driven masonry saw. Install cut units with cut surfaces concealed as much as possible.

3.3 INSTALLATION
A. Select and arrange units for exposed masonry to produce a uniform blend of colors and textures.
   1. Mix units from several pallets or cubes as they are placed.
B. Comply with construction tolerances in TMS 602/ACI 530.1/ASCE 6, Article 3.3F.
C. Construct grout spaces free of mortar dropping, debris, and any material deleterious to grouting.
D. Construct cleanouts in the bottom course of masonry for each grout pour when the grout pour height exceeds 5 ft-4 in.
   1. Hollow-unit masonry: create cleanout by cutting off entire face shell of the CMU. Replace face shell after inspection and before grouting.
   2. Solid-unit multi width masonry: create cleanout by leaving out every other unit. Install unit after inspection and before grouting.
   3. Brace cleanout closure to resist grout pressure.
   4. For partially grouted masonry, construct cleanouts at bottom of each cell to be grouted.
   5. For solid grouted masonry, space cleanouts horizontally a maximum 32 in. on center.
E. Lay all masonry true, level, plumb, and in accordance with the drawings.
F. Ensure all vertical cells to be grouted are aligned and unobstructed openings for grout are provided in accordance with Project Drawings.
G. Lay exposed masonry in running bond unless otherwise indicated in Project Drawings.
H. Lay concealed masonry in running bond unless otherwise indicated.
I. Brace masonry during construction to assure stability. Design, provide, and install bracing.
3.4 MORTAR BEDDING AND JOINTING
A. Place mortar in accordance with TMS 602/ACI 530.1/ASCE 6 Article 3.3 B.
B. Initial bed joint shall not be less than 1/4 in. or more than 3/4 in.
C. Lay all head and bed joints, except initial bed joints, a nominal 3/8 in. thick, unless otherwise required.
   1. Do not exceed 5/8 in thickness of bed joints.
D. Lay hollow units with head and bed joints filled with mortar for the thickness of the face shell.
E. Lay solid units with full head and bed joints. Do not fill head joints by slushing with mortar. Do not furrow bed joints deep enough to produce voids.
F. Remove mortar protrusions extending 1/2 in. or more into cells to be grouted.
G. Fully mortar webs in all courses of piers, columns and pilasters, in the starting course on foundations, and when necessary to confine grout.
H. Tool concave mortar joints on exposed walls, unless otherwise indicated, and strike to produce a dense, slightly concave surface well bonded to the surface of the masonry unit.
I. Remove and re-lay in fresh mortar any unit that has been disturbed to the extent the initial bond is broken.

3.5 EMBEDDED ITEMS AND ACCESSORIES
A. Construct control joints as detailed in the drawings as masonry progresses.
   1. Install preformed control-joint gaskets designed to fit standard sash block.
B. Construct chases as masonry units are laid.
C. Install pipes and conduits passing horizontally through nonbearing masonry partitions as indicated.
D. Place pipes and conduits passing horizontally through piers, pilasters, or columns as indicated.
E. Place horizontal pipes and conduits in and parallel to plane of walls.
F. Install and secure connectors, flashing, weep holes, weep vents, nailing blocks, and other accessories as required.

3.6 INSTALLATION OF REINFORCING STEEL, WALL TIES, AND ANCHORS
A. Install reinforcing steel, wall ties, and anchors in accordance with TMS 602/ACI 530.1/ASCE 6 Article 3.4.
B. Place reinforcement as:
   1. Support and fasten reinforcement to prevent displacement beyond specified tolerances during construction and grouting operations.
   2. Maintain clear distances between reinforcement and any interior face of masonry unit or formed surface, but not less than 1/4 in. for fine grout, or 1/2 in. for coarse grout.
   3. Completely embed reinforcing bars in grout.
   4. Place reinforcing bars maintaining minimum cover of:
      a. Where masonry is exposed to weather, 2 in. for bars larger than No. 5, 1 1/2 in. for No. 5 or smaller.
      b. Where masonry is not exposed to weather, 1 1/2 in.
   5. Embed joint reinforcement with minimum 5/8 in. cover to faces exposed to weather or earth, and 1/2 in. elsewhere.
      a. Provide minimum 6-in. lap splices and ensure that all ends of longitudinal wires are embedded in mortar at laps.
   6. Place reinforcing bars in walls and flexural elements to a tolerance of ± 1/2 in. when the distance from the centerline of reinforcing bars to the opposite face of masonry, d, is equal to 8 in. or less, ± 1 in. for equal to 24 in. or less but greater than 8 in., and ± 1 1/4 in. for d greater than 24 in.
   7. Foundation dowels that interfere with unit webs are permitted to be bent to a maximum of 1 in. horizontally for every 6 in. of vertical height.
C. Install wall ties as detailed on the drawings and in accordance with TMS 602/ACI 530.1/ASCE 6 Article 3.4 C.
D. Install anchor bolts as detailed on the drawings and in accordance with TMS 602/ACI 530.1/ASCE 6 Article 3.4 D.
   1. Embed headed and bent-bar anchor bolts in grout. Anchor bolts of 1/4 in. or less may be placed in mortar bed joints at least 1/2 in. in specified thickness.
   2. Maintain clear distance between anchor bolts and any face of masonry unit or formed surface of at least 1/4 in. when using fine grout, and of at least 1/2 in. when using coarse grout.
   3. Maintain a clear distance between parallel anchor bolts not less the diameter of the anchor bolt, nor less than 1 in.

3.7 GROUTING
A. Comply with grout placement requirements in TMS 602/ACI 530.1/ASCE 6 Article 3.5.
B. Place grout within 1 1/2 hr. from introducing water in the mixture and prior to initial set.
   1. Discard field-mixed grout that does not meet specified slump without adding water after initial mixing.
   2. For transit-mixed grout:
      a. Addition of water is permitted at time of initial discharge to adjust consistency to a slump between 8 and 11 in.
      b. Discard transit-mixed grout that does not meet specified slump without adding water, other than as allowed in 3.7 B. 2.a above.
      c. Transit-mixed grout may be used beyond the time limit as long as it meets the specified slump.
C. Grout pour height: do not exceed maximum grout pour height as given in TMS 602/ACI 530.1/ASCE 6 Table 7, or as otherwise specified.
D. Grout space for multi width masonry: build vertical grout barriers of solid masonry across the grout space the entire height of the grout pour to control the flow of grout horizontally. Grout barriers shall not exceed 30 ft. apart.
E. Grout lift height:
   1. Conventional grout:
      a. Limit the grout lift height to the bottom of the lowest bond beam more than 5 ft. 4 in. above the bottom of the lift, but do not exceed a grout lift height of 12 ft. 8 in. when the following conditions are met:
         1) The masonry has cured for a minimum of 4 hours.
         2) Grout slump is maintained between 10 and 11 in.
      b. When 3.7 E.1.a.1) or 2) above are not met, limit grout lift height to 5 ft. 4 in.
   2. Self-consolidating grout:
      a. When placed in masonry that has cured for a minimum 4 hours, place in lifts up to the grout pour height.
      b. When placed in masonry with less than 4 hours of cure, place in lifts not exceeding 5 ft. 4 in.
F. Grout consolidation:
   1. Conventional grout:
      a. Consolidate grout pours 12 in. or less by mechanical vibration or puddling.
      b. Consolidate grout pours exceeding 12 in. by mechanical vibration, and reconsolidate after initial water loss and settlement has occurred.
   2. Self-consolidating grout: consolidation or reconsolidation is not required.
G. Grout keys are required between grout pours, or between lifts when the previous lift is permitted to set prior to placement of the subsequent lift.
   1. Form grout key by terminating the grout a minimum of 11/2 in. below a mortar joint.
   2. Do not form grout keys within beams.
3. At beams or lintels laid with closed bottom units, terminate the grout pour at the bottom of the beam or lintel without forming a grout key.

3.8 FIELD QUALITY CONTROL
A. Inspection tasks and frequency shall be performed in accordance with the Statement of Special Inspections.
B. Tests
1. Unless indicated otherwise, perform one set of tests for each 5000 sq. ft. of wall area or portion thereof.
2. Concrete Masonry Units: test per ASTM C140.
4. Prism Test: For each type of construction indicated, construct and test three prisms per ASTM C1314.

3.9 POINTING, AND CLEANING
A. Point and tool holes in mortar joints to produce a uniform, tight joint.
B. During construction, minimize any mortar or grout stains on the wall. Immediately remove any staining or soiling that occurs.
   1. For precision or textured units, except as noted below, clean masonry by dry brushing before tooling joints.
   2. For burnished, glazed, or pre-finished concrete masonry units, immediately remove any green mortar smears or soiling with a damp sponge.
   3. Always utilize the mildest method possible to clean the masonry. Note that efflorescence is common to products containing cementitious and aggregate materials, and is typical to new construction. The darker the unit color, of course, the more visible it is. Typical cleaning, however, removes it.
C. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry surfaces of stains, efflorescence, mortar or grout droppings, and debris.
   1. Use appropriate masonry cleaner as tested on the sample panel and as approved by the Design Professional, strictly following manufacturer’s recommendations.
   2. Do not use acids.
D. At completion of masonry work, remove all scaffolding and equipment used during construction, and remove all debris, refuse, and surplus masonry material from the site.

3.10 WATER REPELLENT APPLICATION (WHEN APPLIES)
A. Cleaning shall be complete and accepted by the Design Professional, and wall surfaces shall be thoroughly dry.
B. Apply water repellent in strict accordance with manufacturer’s instructions.

END OF SECTION