SECTION 04 22 00

CONCRETE UNIT MASONRY

PART 1 -- GENERAL

1.01 SUMMARY

In the event of conflicts between the information below and any article of the General Conditions, the General Conditions shall always take precedence.

1.02 GENERAL REQUIREMENTS

The requirements of Division 1 apply to all Work of this Section.

1.03 SCOPE

Furnish and install all concrete unit masonry, reinforcement, and all required accessories and materials as shown on the Drawings and specified here.

1. Cooperate with other trades for embedded items, furnished under those sections and installed here.
2. Supervise setting of dowels for masonry furnished and installed under Section 03 20 00, Reinforcing Steel.

1.04 RELATED WORK

A. Reinforcing Steel: Section 03 20 00

B. Cast-in-Place Concrete: Section 03 30 00

C. Mortar and Grout: Section 04 05 13

D. Structural Steel: Section 05 10 00

1.05 SUBSTITUTIONS

Substitutions will be considered per Section 01 25 00.

1.06 QUALITY ASSURANCE

A. Allowable Tolerances: Maximum deviation from indicated line or plane of installed concrete masonry units shall not exceed 1/8 inch in 10 feet in any direction.

B. Standards and References: (Latest Edition unless otherwise noted):

1. 2001 California Building Code (CBC), Volumes 1, 2, 3.
2. ASTM C90 - Hollow and Solid Load Bearing Concrete Masonry Units
3. ASTM C140 - Sampling and Testing of Concrete Masonry Units
4. ASTM C426 - Standard Test Method for Drying Shrinkage Concrete Block.
5. CBC Section 2102.2.
6. Concrete Masonry Design Manual published for the Concrete Masonry Association of California and Nevada, current Edition.

C. Submittals: Provide in accordance with Section 01 33 00.

1. Suppliers certificate indicating units comply with material standards indicated below:
2. See Section 03 20 00 for reinforcing steel submittals.

D. Tests and Inspections:

1. All tests and inspections herein are to be performed by an independent testing laboratory approved by the Building Official.

2. If masonry tests are indicated as required on the structural drawings, three sample units will be tested during construction for each 5,000 square feet of wall area. Test also three sample units prior to construction.

   a. Units will be tested for compressive strength on both the net and gross area per ASTM C140.

   b. Units will be tested for linear drying shrinkage per ASTM C426.

3. If masonry placement and grouting inspection is indicated as required on the structural drawings, a special inspector shall be employed per CBC Section 1701.5.7 to inspect the placement of all units, placement of all reinforcing steel, during all grouting operations and during taking of all test specimens.

4. See Section 03 20 00 for reinforcing steel tests and inspections.

1.07 PRODUCT HANDLING

A. Scaffolding, runways and ladders required for work under this Section shall be provided by masonry contractor, and shall be heavy trades type substantially built and in compliance with State labor laws, safety codes and other regulatory agencies as applicable to this project.

B. Environmental Requirements: Install concrete unit masonry when temperature in area surrounding work is 40° F or above. Maintain temperature of work above 40° F for at least 48 hours after installation. Grout shall not be placed when air temperatures fall below 20° F.

C. Store masonry units off the ground in a dry location, covered and protected from absorbing moisture.

PART 2 - PRODUCTS

2.01 MASONRY UNITS

A. Masonry units shall be hollow load bearing masonry units conforming to ASTM C90 and CBC Section 2102.2.5.

1. Weight: Light weight.

2. Type: I.

3. Maximum lineal shrinkage from saturated to oven dry condition of not more than 0.06 percent.

4. Twenty-eight day compressive strength of 1000 psi on gross area and 1900 psi on net area.

5. Moisture controlled units.

B. Unit Type

1. 8" wide by 8" high x 16" long unless specified otherwise.

C. Provide bond beam units, open end units and other special units as indicated. Use open end units at cells containing vertical reinforcement wherever possible.

2.02 MORTAR AND GROUT

Specified under Section 04 05 13

2.03 ACCESSORY MATERIALS

A. Reinforcing Bars: ASTM A615, Grade 40 or 60, as indicated in Section 03210, deformed bars.

1. Tie Wire: Black annealed steel wire not lighter than 16 gage.

B. Provide spacers to firmly hold reinforcement in place.

C. Anchor Bolts: All anchor bolts cast in masonry shall be headed bolts with cut threads conforming to ASTM A307 or ASTM A36 or ASTM A572.50 as indicated on drawings.

D. Expansion Anchors: All expansion bolts installed in masonry shall be Dynabolt sleeve expansion bolts as manufactured by ITW Ramset Inc. See Structural Drawings for installation requirements and tension testing requirements as applicable. See Drawings for special head requirements as needed. Substitution of other brands or anchors shall proceed only after written approval from the Structural Engineer and the Building Official as been obtained.

2.04 JOINTS

All joints shall be 3/8" thick joints for concrete block, Tool exposed interior and exterior joints and concealed exterior joints to produce a dense slightly concave surface that is well bonded to unit at edges. Tool joints behind room base, switches, and outlet plates to produce a smooth dense joint flush with the face of adjacent masonry units, where occurring on the job. Cut joints flush on concealed interior surfaces and surfaces to be plastered.

2.05 SEALER

Contractor shall provide and install minimum two coats, Thoroseal masonry sealer at all CMU walls. Thoroseal product shall meet all state vapor requirements. Sealer shall be clear and non-gloss product.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas to receive masonry and verify following:

1. That foundation surface is level to permit bed joint with range of 1/4 to 3/4 inch.

2. That edge is true to line to permit projection of masonry to less than 1/4-inch.

3. That projecting dowels are free from loose scale, dirt, concrete, or other bond-inhibiting substances and properly located.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Do not proceed until unsatisfactory conditions are corrected.

D. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

A. Clean concrete surfaces to receive masonry. Remove latence or other foreign material lodged in surfaces by sandblasting or other means as required.

B. Ensure masonry units are clean and free from dust, dirt, or other foreign materials before laying.

C. Establish lines, levels, and coursing. Protect from disturbances.

D. Provide temporary bracing during erection of masonry work. Maintain in place until masonry has set to provide permanent bracing.

3.03 COURSING

A. Erect masonry in accordance with CBC Section 2104.4.

B. Place masonry to lines and levels indicated to the following tolerances:

1. Variation from Unit to Adjacent Unit: 1/32-inch max.
2. Variation from Plane of Wall: 1/4-inch in 10 feet.
3. Variation from Plumb: 1/4-inch.
4. Variation from Level Coursing: 1/8-inch in 3 feet; 1/4-inch in 10 feet; ½-inch maximum.
5. Variation of Joint Thickness: 1/8-inch in 3 feet.

C. Bond: Unless noted otherwise in Drawings, lay concrete masonry units in running bond with vertical joints located over score of unit in course below (and vice versa).

D. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.

E. Preserve the vertical continuity of cells in concrete unit masonry. The minimum clear horizontal dimensions of vertical cores shall be 3 x 3 inches for 8-inch wide block.

3.04 PLACING AND BONDING

A. Do not install cracked, broken or chipped masonry units.

B. Lay only dry concrete masonry units.

C. Lay masonry in full bed of mortar, properly jointed with other work. Buttering corners of joints, and deep or excessive furrowing of mortar joints are not permitted.

1. Block Cap: Lay with full mortar coverage on horizontal and vertical joints.
2. Install grout cap where and as indicated.

D. Fully bond intersections and external and internal corners.

E. Do not shift or tap masonry units after mortar has taken initial set. Where adjustment must be made, remove mortar and replace.

F. Remove excess mortar.

G. Perform job-site cutting with proper tools to provide straight unchipped edges. Take care to prevent breaking masonry unit corners or edges.

H. Step back unfinished work for joining with new work. Do not use toothing.

3.05 JOINTS

Horizontal and vertical joints at masonry units shall be 3/8-inch wide and as follows:

1. Point joint tight in unpurged masonry below ground.
2. All end joints shall be fully filled with mortar and joints squeezed in bed joints shall be held back approximately ½-inch from cell to provide positive bond with grout.
3. Joints shall be struck flush at all areas to receive plaster finish.

3.06 MASONRY REINFORCEMENT

A. Place reinforcement in accordance with ACI 315, to a tolerance of +/- ½-inch from specified location.

B. Reinforcing steel shall not be bent or straightened in a manner that will injure the material. Bars with kinks or bends not shown on the plans shall not be used. Heating of bars for bending will not be permitted.

1. Bars shall conform accurately to the sizes, shapes, lines and dimensions shown on drawings and with hooks and beds made as detailed. Bars shall be placed as indicated on the drawings and centered on grout space.

2. At the time grout is place around it, reinforcing steel shall be clean of mill scale or other coatings that will destroy or reduce bond.

3. All vertical reinforcing steel shall be installed in one piece, full height of wall, and braced throughout its height in a manner that will retain the steel in proper position and provide the proper clearance.

C. Reinforcing steel shall be secured to all foundation dowels and held in place at spacings not to exceed 192 bar diameters.

3.07 GROUTING

A. General Requirements:

1. All cells shall be grouted solid.

2. Use low lift or high lift grouting at Contractor's option.

3. Use grout pump, hopper or bucket to place grout.

4. Place grout in final position within 1-1/2 hours after introduction of mixing water.

5. Place grout and rod with a 3/4-inch flexible cable vibrator sufficiently to case it to flow into all voids between the cells and around the reinforcing steel. Slushing with mortar will not be permitted.

6. Stop grout approximately 1½ inches below top of last course; except at top course bring grout to top of wall.

B. Low Lift Grouting:

1. Do not lay units higher than 48 inches before grouting.

2. If mortar has been allowed to set prior to grouting, remove all fins protruding more than ½-inch into grout space.

3. Conform to requirements of CBC Section 2104.6.

4. Consolidate each lift twice. Once while placing grout and once more after initial absorption of water but before set.

C. High Lift Grouting:

1. Conform to requirements of CBC Section 2104.6.

2. Lay up walls, subject to maximum height limitations of CBC Table 21-C.

3. Provide clean out holes at the bottom of every pour in cells containing vertical reinforcement. Construct clean out courses with open-bottom bond beam units inverted to permit cleaning of all cells by flushing. Cleanouts shall be not less than 3x4inch openings cut from one face shell. Do not plug clean out holes until masonry work, reinforcement, and final cleaning of the grout spaces have been completed and inspected.

4. Clean mortar droppings from the bottom of the grout space and from reinforcing steel. Remove mortar fins protruding more than ½-inch into the grout space by dislodging the projections with a rod or stick as the work progresses or by washing the grout space at least twice a day during erection using a high pressure stream of water.

5. Do not place grout in hollow unit masonry until mortar joints have set for at least 72 hours and clean out plugs have cured 48 hours.

6. Place grout in lifts not to exceed 4 feet in height, with a waiting period between lifts, dependent on weather and absorption rate of the masonry, in order to place the succeeding lift after the preceding lift becomes plastic but prior to initial set. The first lift shall be consolidated using mechanical vibrators. After the required waiting period, place the second lift and consolidate with the vibrator, reconsolidating the lift below to a depth of 12 to 18 inches. Repeat the waiting, placing and consolidating process until the top of the grout pour is reached. Reconsolidate the top lift after the required waiting period. The high-lift grouting of any section of wall between lateral flow barriers shall be completed to the top of a pour in one working day unless a new series of clean out holes is established and the resulting horizontal construction joint cleaned.

3.08 EXPANSION JOINTS

See drawings for type and location of expansion joints.

3.09 BOND BEAMS

Bond beams shall be located where shown and detailed on the drawings, and shall be reinforced as indicated and as herein after specified.

3.010 BUILT-IN WORK

Miscellaneous Embedded Items: All items indicated to be embedded in masonry shall be carefully located and anchored to prevent movement during grouting operations. Avoid cutting and patching.

1. Install all anchor bolts and anchors furnished under other sections for wood nailers, ledgers, etc.

3.011 CUTTING AND FITTING

Obtain approval prior to cutting or fitting any area not indicated or where appearance or strength of masonry work may be impaired.

3.012 REPAIR, POINTING AND CLEANING

A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damage, or if units do not match adjoining units.

B. Pointing: During the tooling of joints, enlarge any voids or holes and completely fill with mortar.

C. Dry brush masonry surface after mortar has set, at each day's work and after final pointing.

D. Leave work and surrounding surface clean and free of mortar spots and droppings.

E. Cleaning: Upon completion of masonry installation, repair all holes. Defective joints shall be cut out and rejointed. Exposed masonry surfaces shall be cleaned free of mortar, green stain and effloresence.

3.013 SEALER

Contractor shall install sealer as directed by the manufacturer. Coverage and installation rates shall be as per manufacturer's recommendations. Install sealer in minimum two coats at the rates required.

3.014 DEFECTIVE MASONRY

A. Materials or workmanship not conforming to appearance or strength specified, will be deemed defective and shall be removed and replaced at no cost to Owner.

B. Defective mortar and grout, as defined under Section 04 05 16; "Mortar and Grout" shall constitute defective masonry.

*****END OF SECTION*****

SECTION 04 73 00

MANUFACTURED STONE VENEER

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 SUMMARY

A. Section Includes:

1. Simulated stone veneers for exterior applications.
2. Reinforcement, anchorages, mortar, and accessories.

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry
2. Section 07 90 00 - Caulking and Sealants
3. Sections 09 20 00 - Lath and Plaster

1.03 SUBMITTALS

A. Submit following in accordance with Section 01 33 00

1. Product Data: Submit for fabricated wire reinforcement and each type of stone specified. Include all applicable physical and performance data.
2. Samples: Submit one 3 feet X 4 feet samples of simulated stone units to illustrate color, texture, and size range of each type of unit.
3. Manufacturer's detailed installation instructions.
4. Certifications listed in Quality Assurance article of Part 1 of this Section.

1.04 FIELD SAMPLES

A. Sample Installation: Construct stone wall at job site 3 feet X 4 feet in size, including mortar, special shapes, bonding, joint work, reinforcement, moisture barrier, grouting, corbelling, mortar color, expansion, control joints, and accessories.

1. Obtain Architect's approval before beginning work. Protect and retain sample as a basis on which the quality of the work will be judged. Do not remove until Substantial Completion.
2. Accepted Field Sample: May not remain as part of completed Work.

1.05 QUALITY ASSURANCE

A. Installer: Minimum 5 years' experience in similar types of work of similar scope and be able to furnish list of previous jobs and references if requested by Architect.

B. Fabricator: Licensee of manufacturer with not less than 5 years' experience manufacturing simulated stone products of size, type, and quantity as required for this project.

C. Certifications

1. Provide written documentation that products have met or exceeded at least one of the following certifications for a minimum of 10 years.

a. ICBO - International Conference of Building Officials

b. SBCCI - Southern Building Code Congress International

c. ICC - International Code Council

2. Provide written documentation that stone products comply with specified minimum criteria when tested in accordance with testing standards specified in Part 2 of this Section.

1.06 PROJECT CONDITIONS

A. Environmental Requirements:

1. Minimum air temperature of 40 degrees F (4 degrees C) prior to, during and for 48 hours after completion of work; and

2. Cold Weather Requirements: IMIAC (International Masonry Industry All-Weather Council) - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, handle and protect materials in accordance with Section 01 66 00.

1. Store mortar materials on pallets in dry place.

2. Protect materials from rain, moisture, and freezing temperatures.

3. Protect reinforcement and accessories from elements.

1.08 WARRANTY

A. Special Warranty: Prepare and submit in accordance with Section 01 78 00.

1. Provide a 40-year warranty against manufacturing defects in manufactured stone products.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Manufacturer: Coronado Stone Products. Address: 11191 Calabash Avenue, Fontana, CA 92337. Phone: 909-357-8295. Website: www.coronado.com.

B. Stone Product: Subject to compliance with requirements, provide the following product:

1. Coronado Product: Coronado Honey Ledge as manufactured by Coronado Stone Products.

2. Color: As indicated in the Drawings.

2.02 STONE MATERIALS

A. Simulated Stone:

1. Precast simulated stone, composed of the following materials:

a. Portland Cement: ASTM C 150, Type 1, 2, or 3 depending upon color to be produced.

b. Course Aggregates: ASTM C 330, lightweight type, color as necessary to obtain final approved color of stone.

c. Sand: ASTM C 144, special color if required to match approved sample.

d. Iron oxide colors.

e. Water: Clean and free from deleterious substances.

B. Stone Accessories

1. Provide accessory and accent stones as indicated in the Drawings.

2.03 MORTAR MATERIALS

A. Pigments: Meeting ASTM C 979, mineral oxide type.

1. Mortar Color as manufactured by Coronado Stone: As indicated in the Drawings.

B. Bonding Agent: As recommended by simulated stone manufacturer for direct bonding of simulated stone to masonry or concrete substrates when not using metal lath.

C. Water: Potable

D. Mixing: Use thinset with acrylic additive in accordance with thinset manufacturer's recommendation.

1. Thoroughly mix mortar and grout ingredients in quantities needed for immediate use. Mix grout to ASTM C 270, Type S proportions and mortar to ASTM C 270, Type S requirements.

2. Do not use anti-free compounds to lower freezing point of mortar.

2.04 RELATED MATERIALS

A. Setting Accessories:

1. Moisture Barrier:

a. Tyvek Stucco Wrap, by E.I. Dupont, or comparable product as approved by Architect. Provide tape to seal joints, seams, and tears, of same permeance as membrane.

2. Joint Sealant: Refer to Section 07 90 00.

3. Fasteners: Coated 1-1/2 inch nails, staples, or screws of type and for spacing as recommended by simulated stone manufacturer.

4. Cleaner: Non-acid cleaner as recommended by simulated stone manufacturer.

5. Sealer: Breathable type, non-film forming, non-yellowing.

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Examination: Examine conditions and proceed with work in accordance with Section 01 40 00.

1. Verify that field conditions are acceptable and are ready to receive work.

2. Verify items provided by other Sections of work are properly sized and located.

3. Verify that built-in items are in proper location and ready for roughing into masonry work.

4. Verify correct product prior to installation.

5. Verify that masonry and concrete substrates do not have residual coatings (paint, bond breaker, curing compounds, etc.) present, which may affect bonding of mortar to substrate.

a. Install metal lath if residual coatings are present on substrate.

6. Consult Owner and manufacturer if deficiencies exist. Correct deficiencies in

accordance with stone manufacturer's recommendations.

B. Protect surrounding area from possible damage during installation work.

C. Initiating installation constitutes Installer's acceptance of existing surfaces and substrate.

3.02 APPLICATION

A. Moisture Barrier:

1. Apply sheets horizontally, starting at the base of the wall, and lapping each successive upper sheet over the previous lower sheet.

2. Lap horizontal and vertical joints 6 inches.

3. Cut and seal joints, penetrations, openings, and projections with manufacturer's recommended tape.

4. Install with corrosion-resistant staples.

B. Lathing: Apply metal lath taut, with long dimension perpendicular to supports.

1. Lap ends minimum 1 inch. Secure end laps with tie wire where they occur between supports.

2. Lap sides of lath minimum 1-1/2 inches.

3. Attach metal lath to framing using nails or screws of type, size and spacing as recommended by system manufacturer.

4. Continuously reinforce internal angles with corner mesh, except where the metal lath return 3 inches from corner to form the angle reinforcement; fasten at perimeter edges only.

5. Place 4 inch wide strips of metal lath centered over junctions of dissimilar backing materials. Secure rigidly in place.

C. Mortar

1. Apply bonding agent to masonry or concrete substrates in accordance with manufacturer's recommendations.

D. Simulated Stone Veneer: Install in accordance with manufacturer's instructions.

1. Coronado Honey Ledge: Do not install stones vertically. Blend the stone on the wall from several different boxes to ensure proper color and size variation.

2. Apply 3/8 to 1/2 inch of mortar covering to back of each stone.

3. Press units firmly into position, wiggle each piece slightly and apply light pressure to unit to ensure firm bonding, causing mortar to extrude slightly around edges of units.

4. Place units with uniform mortar joints in accordance with manufacturer's instructions.

5. Install outside corner return units with short and long lengths alternated.

6. Install accessory pieces (quoins, caps, sills, moldings) as work progresses, using same techniques as units in field of wall.

E. Plan work to minimize jobsite cutting. Perform necessary cutting with proper tools to provide uniform edges; take care to prevent breaking unit corners or edges.

F. Remove excess mortar; do not allow mortar to dry on face of units.

1. Point and tool joints before mortar has set.

2. Clean and finish joints in accordance with architect's and manufacturer's

instructions.

G. Control Joints: Size in accordance with Section 07 90 00 for sealant performance, but in no case larger than adjacent mortar joints in exposed stone units.

H. Expansion Joints: Provide where indicated on Drawings or as recommended by system manufacturer.

I. Built-in Work: As work progresses, build in door and window frames, nailing strips, anchor bolts, plates, and other items specified in various sections.

1. Build in items plumb and level.

2. Bed anchors of metal door and glazed frames in mortar joints. Fill frame voids solid with mortar.

3. Do not build in organic materials subject to deterioration.

3.03 ADJUSTING

A. Cutting and Fitting: Cut and fit for chases, pipes, conduit, sleeves, and grounds. Cooperate with other sections of work to provide correct size, shape and location.

1. Obtain approval prior to cutting or fitting any area not indicated or where appearance or strength of masonry work may be impaired.

3.04 CLEANING AND SEALING

A. Cleaning: Comply with Section 01 74 00.

1. Remove excess mortar and smears using brush or steel wool.

2. Replace defective mortar. Match adjacent work.

3. Clean soiled surfaces with non-acidic solution, acceptable to the stone manufacturer, which will not harm masonry or adjacent materials.

4. Leave surfaces thoroughly clean and free of mortar and other soiling.

5. Use nonmetallic tools in cleaning operations.

B. Sealer: Apply sealer to completed surface in accordance with manufacturer's instructions.

***** END OF SECTION *****

SECTION 05 10 00

SUPPORTING FROM STRUCTURE

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract Requirements and Division 1, General Requirements apply to this section.

1.02 SUMMARY

A. Work Included:

1. This section provides guidelines and limitations for supporting all mechanical, electrical, plumbing or architectural items from the building structure, and for seismic bracing for all such items.
2. Design and install all support and bracing systems except as noted. Provide for attachment to portions of the building structure capable of bearing the loads imposed. Design systems to not overstress the building structure.

B. Work Not Included:

1. The Contractor is not required to design support and bracing for items for which the contract documents provide specific attachment, support, and bracing. Items specifically noted in the CBC as not requiring bracing may be exempt from seismic bracing if all conditions of attachment in the CBC are compliant. Seismic bracing is not typically required for the following items:
    a. Gas piping less than 1 inch inside diameter.
    b. Piping for boilers and mechanical equipment less than 1.25 inches inside diameter.
    c. All other piping less than 2.5 inches inside diameter, unless racked together.
    d. All piping and duct suspended by individual hangers 12 inches or less in length with flexible connections.
    e. All rectangular air handling ducts less than 6 square feet in cross sectional area.
    f. All round air handling ducts less than 28 inches in diameter.
    g. All electrical conduits less than 2.5 inches inside diameter, unless racked together.

1.03 QUALITY ASSURANCE

A. General:

1. Design and install all support systems to comply with the requirements of the Current California Building Code Chapter 16.
2. For seismic bracing design engage the services of a structural engineer licensed in California.
3. For guidelines regarding seismic bracing for mechanical, electrical and plumbing systems, refer to the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA), "Guidelines for Seismic Restraints of Mechanical Systems and Plumbing Piping Systems". Where SMACNA guidelines deviate from CBC requirements, CBC requirements shall govern.

B. Standards and References: (Latest Edition unless specified otherwise)

1. The General Conditions, Supplementary Conditions, and applicable portions of Division 1 apply to the work of this Section as if printed herein.
2. If the year of the adoption or latest revision is omitted from the designation, it shall mean the specification, manual or test designation in effect the date of Notice to Proceed with the Work given.

1.04 SUBSTITUTIONS

A. Substitutions will be considered per Section 01 25 00.

1.05 SUBMITTALS

A. Provide in accordance with Section 01 33 00.

B. Submit the following:

1. Submit shop drawings for all substructures and attachment methods.
2. Submit proposed alternative methods of attachment for review by the Architect, prior to deviating from the requirements given below.
3. For all seismic bracing systems, submit structural calculations and details prepared and signed by the Contractor's licensed engineer which include all resultant forces applied to the building structure. Do not overstress building structure. Calculations will be reviewed for compliance with design criteria, not for arithmetic.

1.06 CLOSE-OUT: also comply with the requirements of Section 01 77 00 – Contract Closeout.

A. Reports: None required.

B. As-Builts: Comply with the requirements of Section 01 77 00 – Contract Closeout.

C. Operation and Maintenance Data: None required.

D. Extra Materials: None required.

E. Extended Warranty: Comply with the requirements of General Conditions.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Furnish all substructures and fasteners required to comply with the limitations given below. Use materials as specified in the various sections and as appropriate to the use.

B. All exterior materials: hot dipped galvanized or stainless steel.

PART 3 – EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Verify that specified items may be installed in accordance with the approved design.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 GUIDELINES AND LIMITATIONS

A. The General Contractor shall coordinate the load requirements from all sub-contractors so that no combination of loads exceeds the limitations given below without written approval.

B. Maximum Loading: Attach no loads greater than the following without specific approval of the Structural Engineer.

1. Metal deck without concrete fill - acoustical tile and gypsum board ceilings only; no piping, ducting or conduit. Maximum ceiling weight - 3.5 psf. Maximum wire hanger load = 60#.
2. Metal deck with concrete fill - ceilings as indicated for metal deck without concrete fill above, plus electrical conduits, gas piping and ducting not exceeding 3.0 psf. Maximum point load from trapeze = 200 lbs. at 8'-0" cc each way. Mechanical units hung from concrete filled deck shall not exceed 500 lbs.
3. Steel beams and girders: water and gas piping, electrical conduits, ducting and trapeze of same not to exceed 3.0 psf. Maximum load on a single span = 600#. Mechanical units hung from beams shall not exceed 1000# unless specifically indicated on structural plans.
4. Cast-In-Place concrete slabs - ceilings, piping, conduit and ducts shall not exceed 10 psf. Maximum hanger load 600#. Mechanical units hung from slabs shall not exceed 800#.
5. Wood sawn joists - loads from ceilings, piping, conduit and ducting shall not exceed 5.0 psf. Maximum concentrated load = 300 lbs. per joist.
6. Steel Joists - Loads from ceiling, piping, conduit and ducting shall not exceed 8 psf. Maximum concentrated load = 500 lbs. per joist.

3.03 SEISMIC BRACING

A. In applying formulas from Chapter 16 of the Current CBC the value for Ip (importance factor) shall be assumed to be no less than 1.0. See structural drawings for other seismic factors.

B. Design and install seismic bracing so as not to ground out vibration and sound isolation items.

*****END OF SECTION*****

SECTION 05 12 00

STRUCTURAL STEEL

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract Requirements and Division 1, General Requirements apply to this Section.

1.02 SUMMARY

Furnish and install all structural steel as shown and specified including, but not necessarily limited to the following:

1. Prime coat painting and touch up.
2. All cast-in-place anchor bolts, nuts, plates, etc.
3. 10 gauge steel or 3/4 inch plywood templates for column anchor bolts.

1.03 QUALITY ASSURANCE

A. General:

1. Comply with the referenced ASTM standards for materials.
2. Perform all welding only with AWS certified welders.
3. Verification of accuracy:
    a. Engage and pay for a registered civil engineer or licensed land surveyor to check the alignment, plumbness, elevation, and overall accuracy of the erected framing at appropriate stages during construction and at completion of erection. Prior to erection, a survey shall be made of the as-built locations of all anchor rods and other embedded items associated with the attachment of structural steel. The party providing the survey shall submit written verification that the entire installation is in accordance with the contract documents and meets the allowable erection tolerances as set forth in the AISC "Code of Standard Practice for Steel Buildings and Bridges".
    b. Columns shall be verified at each lift. Column shim details and procedures shall be submitted for review.
4. Paint:
    a. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use thinners approved by paint manufacturer, and use within recommend limits.
    b. Coordination of Work: Review other Sections in which prime paints are to be provided to ensure compatibility of coatings system for various substrates. Upon request, furnish information or characteristics of finish materials to be used.
    c. Requirements of Regulatory Agencies: Comply with applicable rules and regulations of governing agencies for air quality control.

B. Except where other requirements are specified, comply with the following standards by American Institute of Steel Construction (AISC) and American Welding Association (AWS):

1. AISC 360-05 "Specification for Structural Steel Buildings".
2. 2005 AISC "Code of Standard Practice for Steel Buildings and Bridges".
3. AISC 341-05 "Seismic Provisions for Structural Steel Buildings"

4. AISC 358-05 "Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications"
5. AISC "Specifications for Structural Joints Using A325 or A490 Bolts".
6. 2005 AISC Section 10, Architecturally Exposed Structural Steel, Code of Standard Practice for Steel Buildings and Bridges
7. AWS D1.1 "Structural Welding Code".
8. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use".
9. SSPC-Vis 1 Pictorial Surface Preparation Standards for Painting Steel Structures
10. SSPC-SP2 Hand Tool Cleaning
11. SSPC-SP3 Power Tool Cleaning
12. SSPC-SP6 Commercial Blast Cleaning
13. SSPC-PA2 Measurement of Dry Paint Thickness with Magnetic Gauges
14. 2010 International Building Code (IBC).

1.04 SUBSTITUTIONS

Substitutions will be considered per Section 01 25 00.

1.05 SUBMITTALS:

A. Provide in accordance with Section 01 33 00.

B. Submit the following:

1. Product Data: Include laboratory test reports and other data to show compliance with specifications (include specified standards). Include certified copies of mill reports covering chemical and physical properties of each type of structural steel.
2. Shop Drawings:
    a. Shop drawings shall include complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.
    b. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld.
    c. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed by others.
    d. Dimensions required to locate structural steel for manufactured items such as mechanical equipment, electrical equipment, dock levelers, etc., shall be coordinated and provided by the General Contractor. General Contractor shall also coordinate and provide dimensions to locate structural steel for window washing supports such as davits, tie-backs, etc.
3. Procedures:
    a. Provide weld procedures for both pre-qualified welds and special welds to be submitted to the Owner's Testing Laboratory and the Architect.
    b. Provide installation procedure and inspection for direct tension indicator washers detailed in supplemental specifications provided by the manufacturer for approval.
    c. Procedures shall be submitted for both shop and field welds.

1.06 PRODUCT HANDLING

A. Comply with the requirements of Section 01 66 00.

B. Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.

C. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.07 SEQUENCING/SCHEDULING

Cooperate and coordinate this work with other trades for anchor bolts, and other required inserts, templates, etc. Align this work prior to installation of other materials.

1.08 TESTS AND INSPECTIONS:

1. A testing program is required prior to start of construction. Testing program to be done in Compliance with the Current CBC requirements and in collaboration with Testing Laboratory, Design team, contractor, owner and submitted for review by the agency in charge of building enforcement. Requirements below are minimum requirements; additional requirements may be required in final testing program.
2. Testing Laboratory:
    a. An inspection and testing laboratory will be selected by the Owner for testing and inspection as required by the Contract Documents. The selected laboratory shall conform to the requirements of ASTM E329 (Recommended Practice for Inspection and Testing Agencies used in Construction). Documentary evidence of such conformance shall be submitted to the Owner and the governing agency.
    b. All materials, work, methods and equipment shall be subject to inspection at the mill, fabricating plant and at the building site. Material or workmanship not complying fully with the Contract Documents will not be accepted. The Contractor shall give the Testing Laboratory reasonable notice when ready for inspection and shall supply samples and test pieces and all facilities for inspection without extra charge. The Owner will assume the expense of making the tests and inspection except as otherwise specified in Division 1.
3. Cost of Testing and Inspection: Costs of testing and inspection of structural steel, except as specified hereunder and in Division 1, will be paid for by the Owner.
    a. All transportation costs and per diem living costs for inspection at fabricators' plant further than 75 miles from the job site will be back-charged to the Contractor.
    b. It is assumed that all fabrication will take place in one shop location only. All additional inspection costs will be back-charged to the Contractor.
    c. All mill tests and costs of re-test of plain materials shall be at the expense of the Contractor.
    d. Costs of tests required due to Contractor's failure to provide steel identifiable in accordance with the indicated ASTM designation shall be at the expense of the Contractor.
4. Structural Steel Testing and Inspection:
    a. Structural Steel: If structural steel tests are indicated as required on the structural drawings, one tension and one bend test shall be made for each

size of structural shape, plate and for each tube and pipe size. Tests to be made in accordance with requirements of appropriate ASTM designations.

b. If structural steel tests are not indicated as required on the structural drawings, then for shapes, plates, bars, pipe and tubing, manufacturer's certified mill test reports and analysis for each heat will be acceptable for steel identifiable in accordance with indicated ASTM designation. Mill test reports shall indicate the physical and chemical properties of all structural steel used. Correlate individual heat numbers with each specified structural section.

c. Unidentifiable Steel:

1) For Fy less than or equal to 36.0 ksi : Provide one tension and elongation test and one bend for each 5 tons or fraction thereof for each size.

2) For Fy greater than 36.0 ksi : Provide one tension and elongation test and one bend or flattening for each piece.

d. Costs of retests and additional testing required by the use of unidentifiable steels shall be the Contractor's responsibility. Additional costs of testing incurred by the Owner shall be deducted from the Contract Final Payment.

5. Expansion Anchors: Load test as indicated on drawings.

6. Welding Inspection:

a. For Moment Resisting Frame Welding inspection and testing requirements, see specification Section 05 12 24 - Welding of Moment Resisting Frames.

b. If shop or field welding inspection is indicated on the structural drawings, all shop and field welded operations will be inspected by a qualified welding inspector employed by the Testing Laboratory. Such inspector will be a person trained and thoroughly experienced in inspection of welds. The inspector's ability to distinguish between sound and unsound welding will be reliably established

c. The welding inspector will make a systematic record of all welds. This record shall include:

1) Identification marks of welders.

2) List of defective welds.

3) Manner of correction of defects.

d. The welding inspector will check the material, equipment and procedure, as well as the welds. He will also check the ability of the welder. He will furnish the Architect with a report, duly verified by him that the welding which is required to be inspected is proper, and has been done in conformity with the Contract Documents, and that he has used all means to determine the quality of the welds.

e. All full penetration groove welds will be subject to ultrasonic testing, as per AWS D1.1, Section 6 "Inspection, Part "C", Ultrasonic Testing of Groove Welds. All defective welds shall be repaired and retested with ultrasonic equipment at the Contractor's expense.

f. Column Flanges: An area extending 6 inches above and below point where girder flanges are attached will be inspected. Column flange edges will be inspected visually, and entire area ultrasonically for lamination, plate discontinuities, and non-metallic inclusions.

g. All partial penetration groove welds shall be tested by ultrasonic testing.

h. When ultrasonic indications arising from the weld root be interpreted as either a weld defect or the backing strip itself, the Engineer will be notified. The Engineer may require the removal of backing strip. The backing strip will be removed at the expense of the Contractor, and if no root defect is visible the weld will be retested. If no defect is indicated on this retest, and no significant amount of base and weld metal have been removed, no further repair of welding is necessary. If a defect is indicated, it will be repaired and retested at Contractor's expense.

i. The ultrasonic instrumentation will be calibrated by the technician to evaluate the quality of the welds in accordance with AWS D1.1.

j. Other methods of inspection, for example, X-Ray, gamma ray, magnetic particle, or dye penetrant, may be used on welds if felt necessary by the inspection laboratory, and with the approval of the Engineer.

k. Base metal thicker than 1-1/2 inches, when subjected to through thickness weld shrinkage strains, shall be ultrasonically inspected for discontinuities directly behind such weld before and after joint completion.

l. End-welded studs shall be sampled, tested, and inspected per the requirements of the Structural Welding Code - Steel D1.1 Chapter 7, published by the American Welding Society.

m. At the discretion of the owner's testing agency, the ultrasonic testing frequency may be reduced but may not be less than the following:

n. Initially, all welds requiring ultrasonic testing will be tested at the rate of 100 percent in order to establish the qualifications of each individual welder. If the reject rate is demonstrated to be less than 5 percent of the welds tested for each welder, then the frequency of testing for that welder may be reduced to 25 percent. If the reject rate increases to 5 percent or more, 100 percent testing will be re-established until the rate is reduced to less than 5 percent. The percentage of rejects will be calculated for each welder independently.

o. A sampling of a least 40 completed welds will be made for such reduction evaluation. Reject rate is defined as the number of welds containing rejectable defects divided by the number of welds completed. For evaluating the reject rate of continuous welds over 3' in length, each 12 linear inch increment of welds, 1 inch or less in thickness, will be considered as one weld. For evaluating the reject rate of continuous welds greater than 1 inch thickness, each 6 linear inches will be considered one weld.

7. High Strength Bolting Tests and Inspection:

a. Furnish certified test reports for each lot of bolts in accordance with Section 9 of ASTM A325 and A490. Install bolts under the supervision of a qualified inspector in accordance with Section 9, Research Council "Specifications for Structural Joints using ASTM A325 or A490 Bolts".

b. If high strength bolting inspection is indicated or required on the structural drawings, the testing laboratory will visually inspect all high strength bolts.

c. While the work is in progress, the Inspector shall determine that the requirements of this Specification are met in the work. The Inspector shall observe the calibration procedures and shall monitor the installation of bolts to determine that all plies of connected material have been drawn together and that the selected procedure is properly used to tighten all bolts.

1) In addition to the requirement of the foregoing paragraph, for all connections specified to be slip critical (SC), the Inspector shall assure that the specified procedure was followed to achieve the pretension specified in the AISC. The pretension shall be verified by the inspector for these bolts.

2) Bolts in connections identified as not being slip-critical nor subject to direct tension need not be inspected for bolt tension other than to ensure that the piles of the connected elements have been brought into snug contact.

1.09 CLOSE-OUT: also comply with the requirements of Section 01 77 00 – Contract Closeout.

A. Reports: Final Report related to Item 1.08.

B. As-Builts: Comply with the requirements of Section 01 77 00 – Contract Closeout.

C. Operation and Maintenance Data: None required.

D. Extra Materials: None required.

E. Extended Warranty: Comply with the requirements of the General Conditions.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Structural Steel: Except where indicated on drawings.

1. W shapes: ASTM A572-50 or ASTM A992-50 unless indicated otherwise on drawings.

2. Channels and other rolled shapes: ASTM A36 unless indicated otherwise on drawings.

3. Angles, plates and bars: ASTM A36 unless indicated otherwise on drawings.

B. AISC group 4 and 5 shapes and plates greater than 2 inches thick: ASTM A36 and/or ASTM A572 Grade 50 with supplementary requirements S91 Fine Austenitic Grain Size and S5 Charpy V-Notch Impact Test. For location of Charpy V-Notch test, see ASTM A6 Supplementary Requirement S30. Charpy V-Notch test shall be per ASTM A673, frequency P and shall meet a minimum average value of 20 ft-lbs absorbed energy at 70° F.

C. Cold-Formed Steel Tubing: ASTM A500, Grade B.

D. Steel Pipe: ASTM A53, Type E or S, Grade B.

E. Anchor Bolts: All anchor bolts cast in concrete or masonry shall be headed bolts with cut threads conforming to ASTM F1554 grade 36, 55 or 105 as indicated on drawings.

F. Machine Bolts: ASTM A307.

G. High Strength Bolts, Nuts and Washers: Install in accordance with requirements for A325 and A490 slip critical and snug tight conditions as indicated on drawings. Install high strength bolts with snug tight type connections with threads included in shear plane except as otherwise noted. Install hardened washers in conformance with AISC Specifications.

1. Bolt Specifications: Bolts shall conform to the requirements of the current edition of the Specifications of the American Society for Testing and Materials for High-Strength Bolts for Structural Steel Joints, ASTM A325, Heat Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength, ASTM A490 as indicated on drawings.

2. Bolt Geometry: Bolt dimensions shall conform to the current requirements of the American National Standards Institute for Heavy Hex Structural Bolts, ANSI Standard

B18.2.1. The length of bolts shall be such that the end of the bolt will be flush with or outside the face of the nut when properly installed.

3. Nut Specifications: Nuts shall conform to the current chemical and mechanical requirements of the American Society for Testing and Materials Standard Specification for Carbon and Alloy Steel Nuts, ASTM A563, Appendix Table X1.1. Provide grade A Heavy Hex nuts for grade 36 threaded rods. Use grade C, Heavy Hex nuts for grade 55 and 105 threaded rod.

4. Washers: Flat circular washers and square or rectangular beveled washers shall conform to the current requirements of the American Society for Testing and Materials Standard Specification for Hardened Steel Washers, ASTM F436.

5. Tension Control Fastener System: Bolts shall conform to the requirements of the current edition of the Specifications of the American Society for Testing and Materials for Twist Off Type Tension Control Structural Bolt/Nut/Washer Assemblies, ASTM F1852, providing equivalent properties to ASTM A325 or A490 as indicated on drawings.

H. Headed Stud-Type Shear Connectors: ASTM A108 Grade 1015 or 1020 Cold-finished carbon steel with dimensions complying with AISC Specifications.

1. Tensile strength, 60,000 psi.

2. Elongation in 2 inches, 20 percent

3. Reduction of area, 50 percent.

I. Provide hexagonal heads and nuts for all connections per ASTM A563, Appendix Table X1.1.

J. Electrodes for Welding: Comply with AWS Code, E70 Series minimum. Fabricator to select proper electrodes according to weld procedures as submitted.

K. Shop Primer:

1. Type A Material: Tnemec Company, Inc., 88HS

2. Type B Material: Tnemec Company, Inc., 90-97 Tneme-Zinc.

3. All paints shall meet the California Air Resources Board Standards.

4. Finish paint Material (uno): Tnemec Company, Inc., Series 75- Endura-Shield. Color to be selected by owner.

L. Powder Driven Fasteners: Tempered steel pins with special corrosive resistant plating or coating. Pins shall have guide washers to accurately control penetration. Fastening shall be accomplished by low-velocity piston-driven power activated tool. Pins and tool shall be as manufactured by Hilti Fastening Systems.

M. Expansion Bolts: Hilti Fastening Systems "Kwik-Bolt Concrete Expansion Anchors" to concrete; Ramset "Dynabolt Sleeve Anchors" to masonry or approved equal.

PART 3 – EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Verify that specified items may be installed in accordance with the approved design

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 FABRICATION

A. Shop Fabrication and Assembly: Fabricate and assembly structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated to provide the flattest floor possible. The contractor shall coordinate member tolerances with finishes.

   Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.

   Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

B. Connections: Weld or bolt shop connections, as indicted. Bolt field connections, except where welded connections or other connections are indicated.

C. Unless noted otherwise, make holes 1/16 inches larger than the nominal bolt diameter.

D. Welding, Shop and Field: Weld by shielded arc method, submerged arc method, flux cored arc method, or other method approved by AWS. Perform welding in accordance with AWS Code. All welders, both manual and automatic, shall be certified in accordance with AWS "Standard Qualification Procedure" for the Work to be performed. See paragraph "welding" herein, for detailed requirements. If sizes of fillet welds are not shown on drawings, use AWS minimum weld size but not less than 3/16 inch fillet welds.

E. Bolt Holes for Other Work: Provide holes required for securing other work to structural steel framing.

   Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.

   Cut, drill, or punch holes perpendicular to metal surfaces and remove all burrs. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

F. AISC Group 4 and 5 shapes and built up members shall meet the requirements for joints in AISC Sections J1.7, J1.8, J2.6 and M2.2.

G. High Strength Bolts:

   1. Installation and Tightening:

      a. Handling and Storage of Fasteners: Fasteners shall be protected from dirt and moisture at the job site. Only as many fasteners as are anticipated to be installed and tightened during a work shift shall be taken from protected storage. Fasteners not used shall be returned to protected storage at the end of the shift. Fasteners shall not be cleaned of lubricant that is present in as-delivered condition.

      b. Tension Calibrator: A tension measuring device shall be required at all job sites where bolts in slip-critical joints are being installed and tightened. The tension measuring device shall be used to confirm: (1) the suitability to satisfy the requirements of AISC for the complete fastener assembly, including lubrication if required to be used in the work, (2) calibration of wrenches, if applicable, and (3) the understanding and proper use by the bolting crew of the method to be used. The frequency of confirmation testing, the number of tests to be performed and the test procedure shall be as specified in 1.d. below, as applicable. The accuracy of the tension measuring device shall be confirmed through calibration by an approved testing agency at least annually.

c. Joint Assembly and Tightening of Shear/Bearing Connections: Bolts in connections not within the slip-critical category shall be installed in properly aligned holes, but need only be tightened to the snug tight condition. The snug tight condition is defined as the tightness that exists when all plies in a joint are in firm contact. This may be attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench. If a slotted hole occurs in an outer ply, a flat hardened washer or common plate washer shall be installed over the slot.

d. Joint Assembly and Tightening of Connections Requiring Full Pre-tensioning. Slip-critical connections shall be installed in properly aligned holes and tightened by one of the following methods.

1) Turn-of-nut Tightening: When turn-of-nut tightening is used, hardened washers are not required except as specified in the AISC. A representative sample of not less than three bolts and nuts of each diameter, length and grade to be used in the work shall be checked at the start of work in a device capable of indicating bolt tension. The test shall demonstrate that the method of estimating the snug-tight condition and controlling turns from snug tight to be used by the bolting crews develops a tension not less than five percent greater than the tension required for slip-critical connections.

2) Installation of Alternate Design Bolts: A representative sample of not less than three bolts of each diameter, length and grade shall be checked at the job site in a device capable of indicating bolt tension. The test assembly shall include flat hardened washers, if required in the actual connection, arranged as in the actual connections to be tensioned. The calibration test shall demonstrate that each bolt develops a tension not less than five percent greater than the tension required by AISC. Manufacturer's installation procedure shall be followed for installation of bolts in the calibration device and in all connections. When alternate design features of the fasteners involve an irreversible mechanism such as yield or twist-off of an element, bolts shall be installed in all holes of the connection and initially brought to a snug tight condition. All fasteners shall then be tightened, progressing systematically from the most rigid part of the connection to the free edges in a manner that will minimize relaxation of previously tightened fasteners prior to final twist-off or yielding of the control or indicator element of the individual fasteners. In some cases, proper tensioning of the bolts may require more than a single cycle of systematic tightening.

e. Mark bolts that have been completely tightened with an identifying symbol.

3.03 WELDING

A. General: Quality of materials and design and fabrication of all welded connections shall conform to AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Building," "AWS Code for Welding in Building Construction," and requirements of this section.

Location and type of all welds shall be as shown. Make no other welded splices, except those shown on drawings, without prior approval of the architect.

B. Automatic Welding: Use electrode wire and flux for automatic and semi-automatic welding acceptable to Structural Engineer. All methods, sequences, qualification and procedures, including preheating, and post heating if necessary, shall be detailed in writing and submitted to the Structural Engineer for review.

C. Qualification of Welders:

1. Structural steel welding: Manual and automatic welds for structural steel construction shall be made only by operators who have been previous qualified by tests, as prescribed in AWS D1.1 to perform type of work required.
2. Welders shall be checked by welding inspector. Those not doing satisfactory work may be removed, and may be required to pass qualification tests again. All qualification testing shall be at the Contractor's expense.
3. Only welders whose weld procedures and pre-qualification by testing that have passed shall be considered qualified for such welds.

D. Control cooling process after weld is completed by either step down post heat or thermal blankets as determined by procedures and prequalification.

E. Box columns and built-up members shall have ultrasonic testing before and after welding.

F. Flame cut surfaces shall be ground to remove contaminated steel layer to provide welds proper fusion without impurities.

G. Preparation of surface: Surfaces to be welded shall be free of loose scale, slag, rust, grease, paint, and any other foreign material.

H. Welding equipment: Welding equipment to be used in each case shall be acceptable to welding inspector. Use equipment with suitable devices to regulate speed, and manually adjust operating amperage and voltage. The amperage capacity shall be sufficient to overcome line drop, and to give adequate welding heat.

I. Remove runoff tabs and grind surfaces smooth where the tabs would interfere with fireproofing and architectural finishes.

J. End-welded studs:

1. Automatic end-welded studs: Automatically end-weld in accordance with the manufacturer's recommendations in such a manner as to provide complete fusion between the end of the stud and the plates. There shall be no porosity or evidence of lack of fusion between the welded end of the stud and the plate. The stud shall decrease in length during welding approximately 1/8 inch for 5/8 inch, and 3/16 inch for 3/4 inch diameter. Stud sizes indicated on drawings represent the finish stud height.
2. Fillet-end welded studs: Studs may be welded using prequalified FCAW, GMAW, or SMAW processes provided the requirements of the AWS D1.1 Chapter 7 Section 7.5.5 are met as well as any other pertinent requirements of D1.1.

K. Provide mill camber as shown on the construction documents within AISC tolerance. Place mill tolerance upward for all beams specified no camber.

3.04 ERECTION

A. Structural steel erection: Comply with AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Building", latest edition.

B. Erection Sequence: Erect steel in accordance with special erection sequences where special erection sequences are indicated on the contract documents.

C. Before and during erection, keep all structural steel clean. Ship, handle and store steel in manner to avoid injury to members. Steel members showing evidence to rough handling or injury will be rejected.

D. Mark each member with erection identification corresponding to mark shown on erection drawings. Carefully plan erection of structural steel so that no cutting and removal of material will be necessary. Do not torch burn in the field, unless specifically permitted by Engineer.

E. Provide sufficient bracing, shoring and guys to effect safe and satisfactory erection. Provide bracing and shoring capable of holding steel work plumb and properly aligned while field connections are being made, and until lateral force resisting elements are deemed by Architect capable of bracing structure. Temporary bracing shall be adequate to resist lateral forces from wind or seismic prior to the completion of the lateral resisting system.

F. Set bearing and base plates with extreme care. Bring level, to line and grade with leveling plates or by leveling nuts and bolts. Grout solid under plates with a flowable non-shrink grout per Section 03300 prior to applying vertical load.

G. Field Assembly: Set structural framing accurately to the lines and elevations indicated. Align and adjust the various members forming a part of a complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces which will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

   Shimming or other adjustments not indicated on drawings shall be approved by the Engineer prior to installation. Level and plumb individual members of the structure within specified AISC tolerances except as noted herein. Column shimming shall be 1/4 inch.

H. All welds shall be full and clean, and conform to AISC and AWS specifications.

I. Erection Tolerances: Individual pieces shall be erected so that the deviation from plumb, level and alignment shall not exceed 1 to 500 plus:

   1. The maximum displacement of the center line of columns adjacent to elevator shafts, from the established column line, shall not be more than 1 inch at any point.

   2. In order to provide a true, flat plane for the exterior elevations, install all steel framing at the exterior walls of the building, so that the center lines of such framing does not vary by more than 1 inch for the length of the building. Also install each vertical member on such grids so that its vertical center line does not vary by more than 1/2 inch from a vertical line for each story and 1 inch for its full height.

   3. All columns and beams shall adhere to Section M2.7 of the referenced "Specification for Structural Steel for Buildings" which states that completed members shall be free of twists, bends, and open joints. Take special care that column base plates are parallel and perpendicular to faces of columns and that bolt holes are accurately placed.

J. Temporary Flooring:

   1. Provide planking and scaffolding necessary in connection with erection of structural steel, support of erection machinery, and construction materials. Temporary floors and use of steel shall be as required by applicable regulatory requirements.

   2. If steel decking is used as a working platform, it shall be temporarily tack-welded to supports to extent necessary for such use in accordance with applicable regulatory requirements. The concentrated loading from welding machines and other heavy machinery required for steel erection shall be distributed by planking or other approved means. Metal decking that becomes damaged as the result of being used as a working platform shall be replaced at no additional cost to the Owner.

K. Tower Crane: The design for the support and bracing for a tower crane shall be the responsibility of the General Contractor. The design shall be prepared by a structural engineer licensed in the state of California. Drawings and calculations shall be stamped and signed by the structural engineer. Concentric, torsional, and/or eccentric loading to the main structure shall be resolved by the addition of structural steel for shear tabs, stiffeners, drag ties, bracing struts, etc., such items shall be designed, detailed, furnished and installed by the contractor.

3.05 PAINTING AND CLEANING

A. Prior to prime coat application, clean all loose rust, mill scale, oil, dirt, and all other materials from all steel to be left exposed. Use hand tool, power tool, sandblasting, chemical cleaning, and any other method necessary to provide a smooth, sound surface for painting.

B. Shop prime all steel except the following:

1. Steel encased in concrete.
2. Contact surfaces for slip-critical (sc) high strength bolts.
3. Areas within 4 inches of field welds.
4. Tops of members to receive metal decking.
5. Steel to be fireproofed.
6. Surfaces to be galvanized.

C. Use the following Type A shop painting systems on all normal environment interior steelwork:

1. Surface Preparation: SSPC-SP2 Hand Tool Cleaning or SSPC-SP3 Power Tool Cleaning. Where jobsite exposure is expected to exceed 6 months, SSPC-SP6 Commercial Blast Cleaning is required.
2. Application: Follow coating manufacturer's printed directions.
3. Material: Type A Tnemec Series 88HS Azeron Primer.
4. Number of Coats: One
5. Dry Film Thickness: 2.0 mils minimum.
6. Volume Solids: 60.0 +/- 2.0% minimum
7. Generic Description: Modified Alkyd.

D. Use the following Type B shop painting systems on all exterior steelwork and interior steelwork subjected to wet conditions or fumes:

1. Surface Preparation: SSPC-SP6 Commercial Blast Cleaning
2. Application: Follow coating manufacturer's printed directions.
3. Material: Type B Tnemec 90-97 Tneme-Zinc primer
4. Number of Coats: One
5. Dry Film Thickness: 2.5 mils minimum.
6. Volume Solids: 63% +/- 2%
7. Generic Description: Organic Zinc-Rich Urethane

E. Use the following finish painting systems on all exterior steelwork and interior steel work subjected to wet conditions or fumes:

1. Application: Follow coating manufacturer's printed directions. Apply over Type B primer system above.
2. Material: Tnemec Series 75 Endura-Shield paint.
3. Number of Coats: One
4. Dry Film Thickness: 3 to 5 mils
5. Volume Solids: 72% +/- 2%
6. Generic Description: Aliphatic Polyurethane

F. Apply two shop prime coats to areas which will be inaccessible after erection.

G. Clean contact surfaces of high strength bolts of all burrs and material which might prevent solid seating of the parts. Steel to receive bolts shall be primer painted except beneath the contact area of slip-critical bolts.

H. After erection, field touch up all welded areas, high strength bolts and damaged areas. For all steel to remain exposed, remove all blemishes, paint drips, and touch up prime coat.

3.06 HOISTING AND BRACING

A. Provide all hoisting and erecting equipment and power.

B. Provide and maintain any and all safety railings, toe boards, etc., required for the erection of steel framing and metal decking.

C. Brace the erected frame in a manner which will assure safety and proper alignment to receive the metal decking and until the concrete slabs have been poured and have set.

D. Erect building frame true and level. Erect columns in a manner to allow for movement due to welding shrinkage and thermal expansion and contraction of framing. Check plumbness after erection of each level. Maintain structural stability of frame during erection. Provide temporary bracing where necessary to maintain frame stability and to support required loads, including equipment and its operation.

*****END OF SECTION*****

SECTION 05 50 00

METAL FABRICATIONS

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract Requirements and Division 1, General Requirements apply to this Section.

1.02 SUMMARY

A. Shop fabricated metal items and miscellaneous metal work.

B. Refer to Schedule at end of this Section.

1.03 QUALITY ASSURANCE

A. Standards and References: (Latest Edition unless otherwise noted)

1. Current California Building Code (CBC), with State of California Amendments
2. American Society for Testing and Materials (ASTM) Specifications as listed in the Section.

B. Submittals

1. Shop Drawings: Submit shop drawings indicating profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevation, and details where applicable. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.
2. Manufacturer's descriptive data: Submit for manufacturer's items.

1.04 SUBSTITUTIONS

Substitutions will be considered per Section 01 25 00.

1.05 SUBMITTALS

A. Provide in accordance with Section 01 33 00.

B. Submit Product data on specified products, describing physical and performance characteristics: sizes, patterns, colors available, and method of installation.

1.06 DELIVERY, STORAGE AND HANDLING

A. Adhere to requirements of Section 01 66 00.

B. Deliver all parts ready for erection; store in close proximity to final locations.

1.07 CLOSE-OUT: also comply with the requirements of Section 01 78 00 – Contract Closeout.

A. Reports: None required.

B. As-Builts: Comply with the requirements of Section 01 78 00 – Contract Closeout.

C. Operation and Maintenance Data: None required.

D. Extra Materials: None required.

E. Extended Warranty:

Comply with the requirements of the General Conditions.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Steel Sections: ASTM A36.

B. Steel Tubing: ASTM A500, Grade B.

C. Steel Pipe: ASTM A53, Type E or S, Grade. B.

D. Steel Bolts, Nuts, and Washers: ASTM A307.

E. Welding Materials: AWS D1.1; type required for materials being welded.

F. Galvanizing: Hot-dip process ASTM A123 typical and ASTM A153 for threaded fasteners performed after fabrication into largest practical section. Weight of coating not less than 2 oz. per sq. ft. of surface. Where damaged, repair surface with one coat of hot process galvanizing repair compound, "Galvalloy", Galvweldalloy", or approved equal.

G. Primer: Tnemec Company "Series V10 Red Primer", Sherwin-Williams "Kern Primer"; or approved equal.

H. Dissimilar Materials: Separate dissimilar surfaces in contact with or in close proximity to non-compatible metals, concrete masonry, or plaster with neoprene gasket; or other approved means.

I. Expansion Bolts: Hilti "Kwik Bolt TZ" Expansion Anchor Bolts, galvanized unless otherwise indicated.

J. Non-shrink Grout: Master builders 928 or equal.

2.02 FABRICATION

A. Verify dimensions on site prior to shop fabrication.

B. Fabricate items with joints tightly fitted and secured.

C. Fit and shop assemble in largest practical sections, for delivery to jobsite.

D. Grind exposed welds flush and smooth adjacent finished surfaces. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of structure, except where specifically noted otherwise.

F. Make exposed joints butt tight, flush and hairline.

G. Supply components required for anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication, except where specifically noted otherwise.

2.03 FINISH

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact bond with concrete or where field welding is required.

C. Prime paint interior items with one coat unless scheduled to be galvanized.

D. Galvanize exterior items and scheduled interior items to minimum 2.00 oz/sq ft zinc coating.

PART 3 – EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Verify that specified items may be installed in accordance with the approved design

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

A. Obtain Architect's approval prior to site cutting or making adjustments not scheduled.

B. Clean and strip primed steel items to bare metal where site welding is scheduled.

C. Make provision for erection loads with temporary bracing. Keep work in alignment.

D. Supply items required to be cast into concrete with setting templates, for installation under appropriate Sections.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Perform field welding in accordance with AWS D1.1.

C. After installation, touch-up field welds, scratched or damaged surfaces with primer, except repair exposed galvanized work (not to be painted) with hot process field galvanizing, in accord with manufacturer's published directions.

3.04 SCHEDULE

Provide and install items listed in Schedule and shown on Drawings with anchorage and attachment necessary for installation. The following Schedule lists principal items only. Refer to drawing details for items not specifically scheduled.

1. Miscellaneous plates or angles not attached to structural steel; complete with anchorage for embedment.
2. Exterior mounted ladders.
3. Handrails and guardrails.
4. Bollards.
5. Gates for trash enclosure.

*****END OF SECTION*****

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract Requirements and Division 1, General Conditions apply to this Section.

1.02 SCOPE OF WORK

A. Provide all labor, materials, tools, facilities and equipment required for the fabrication and installation of rough carpentry and associated items (except that which is specified elsewhere) indicated on Drawings and necessary to complete the Work. Items include, but are not necessarily limited to, the following:

1. Blocking, backing, stripping, furring, and nailers.
2. Rough hardware.
3. Wood framing.
4. Wood sheathing.
5. Preservative treatment.
6. Drilling, saw cuts, knock-outs and framing for ventilation.
7. Wood sheathing backing at tile walls.

1.03 RELATED WORK

Section 03 10 00 - Concrete.

1.04 QUALITY ASSURANCE

A. General:

1. Coordinate the work of all trades to ensure proper placement of all materials, anchors, etc., as well as providing for openings and anchors for the installation of surface mounted materials and equipment.
2. Qualifications for Workmen: Provide sufficient skilled workmen and supervisors who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of construction involved and the materials and techniques specified.
3. Rejection: In the acceptance or rejection of rough carpentry, no allowance will be made for lack of skill on the part of the workmen.

B. Standards and References: (Latest Edition unless otherwise noted)

1. Current California Building Code (CBC).
2. Lumber: West Coast Lumber Inspection Bureau (WCLIB); Standard Grading Rules for West Coast Lumber No. 17.
3. Lumber: Western Wood Products Association (WWPA); Western Lumber Grading Rules 05.
4. Redwood: Redwood Inspection Service (RIS); Standard Specifications for Grades of California Redwood Lumber.
5. Wood Sheathing: The Engineered Wood Association; Specifications and Grades.

a. Structural Plywood: United States Product Standard PS1, Group 1 Douglas Fir.

b. APA rated sheathing: United States Product Standard PS2.

6. Wood Preservative: American Wood-Preservers' Association (AWPA):

a. U1, Use Category System: User Specification for Treated Wood.

b. M4, Standard for the Care of Preservative-Treated Wood Products.

7. 2005 National Design Specification for Wood Construction (NDS).

C. Submittals:

1. Certification:

a. Preservative Treated Wood: Certification for waterborne preservative and that moisture content was reduced to 19 percent maximum, after treatment.

D. Tests and Inspections:

1. A testing program is required prior to start of construction. Testing program to be done in Compliance with the Current CBC requirements and in collaboration with Testing Laboratory, Design team, contractor, owner and submitted for review by the agency in charge of building enforcement. Requirements below are minimum requirements; additional requirements may be required in final testing program.

2. If indicated on the Structural Drawings, load test expansion and epoxy anchors as indicated on the drawings.

1.05 SUBSTITUTIONS

Substitutions will be considered per Section 01 25 00.

1.06 SUBMITTALS

Provide in accordance with Section 01 33 00.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protection:

1. After delivery, store all materials off the ground, covered, and in such a manner as to ensure proper ventilation and drainage and to protect against damage and the weather. Maintain wood at the maximum moisture levels indicated in Materials Section.

2. Keep all material clearly identified with all grade marks legible; keep all damaged material clearly identified as damaged, and separately store to prevent its inadvertent use. Do not allow installation of damaged or otherwise non-complying material.

3. Use all means necessary to protect the installed work and materials of all other trades.

4. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Sawn Lumber:

1. Lumber (Wood Framing): Meet requirements of following minimum grades. All grades to WCLIB Grading Rules No. 17. Species shall be Douglas Fir - Larch

Item	Sizes	Grade	Maximum Moisture Content at Initial Use	Notes
All Material	2x	No. 2	19%	Unless Noted Otherwise
All Material	3x,4x	No. 2	30%	Unless Noted Otherwise
All Material	6x	No. 1	30%	Unless Noted Otherwise
Decking	2x	Select Dex	19%	

2. "At initial use" shall be that point at which nails, screws, bolts, split rings, shear plates or other fasteners or the holes for said fasteners are placed in the wood.
3. All sawn lumber is assumed to be enclosed in the dry building envelope in the final service condition, unless noted otherwise, and free to dry to moisture content less than 19%.
4. The Contractor shall use whatever means necessary, including site drying to ensure that the moisture contents above are not exceeded.
5. All studs, plates, joists, rafters and beams 3x and thicker shall be free of heart center in accordance with the specified grading standards.

B. Wood Sheathing:
1. Roof and Wall Structural Sheathing: PS1 and PS2 APA rated sheathing with exterior glue. Thickness type and grade shall be as indicated on Drawings.
2. Where indicated on the Architectural Drawings as interior wall backing behind tile and in all toilet rooms behind sheet rock, to be C-C APA rated sheathing with exterior glue. Thickness shall be 5/8-inch at all locations.
3. Flooring: C-C APA Performance rated tongue and groove with exterior glue. Thickness type and grade shall be as indicated on the Drawings.

C. Building Paper: Fed. Spec. UU-B-790a, Type I, Grade B (15 lb. min. unless noted elsewhere.).

D. Rough Hardware Fastenings and Connections: All types including bolts, lag screws, nails, spikes, screws, washers and other rough hardware, of kinds that may be purchased and that require no further fabrication, shall be furnished and installed for all finish and rough carpentry and shall conform to 2005 NDS Standards and dimensions. All hardware exposed to weather shall be hot-dipped galvanized per ASTM A123 Standards. All nails used into pressure treated lumber shall be hot-dipped galvanized per ASTM A123 or stainless steel.
1. Common wire nails or spikes unless noted otherwise on the Drawings. Box nails and sinker nails are not permitted. Vinyl coating is permitted on nails when not exposed to weather.
2. Bolts: Bolt material shall conform to ASTM A307, Grade A. Bolt dimensions shall conform to ANSI/ASME B18.2.1 with hex head of sizes indicated.
3. Lag Screws: Lag screws shall conform to ASTM 307, Grade A. All lag screws shall have hex heads where exposed.

4. Washers: Standard flat washers shall conform to ANSI B18.22.1, Type A, Wide Pattern. Steel plate washers shall be Simpson BP or BPS or equivalent. Malleable iron washers shall be standard malleable iron washers.

5. Powder Driven Fasteners: Tempered steel pins with special corrosive resistant plating or coating. Pins shall have guide washers to accurately control penetration. Fastening shall be accomplished by low-velocity piston-driven power activated tool. Pins and tool shall be as manufactured by Hilti Fastening Systems or equivalent. See Drawings for size, type and embedment.

6. Expansion Anchors: See Section 03300 for anchors to concrete and Section 04200 for anchors to masonry.

7. Adhesive Anchors: See Section 03300 for anchors to concrete and Section 04200 for anchors to masonry.

8. Fabricated Metal Timber Framing Connectors: Connectors shall be punched for nailing and bolting. Nails and nailing shall conform to the manufacturer's instructions with a nail provided for each punched hole. All connectors must have specific ICC approval. Types as noted on Drawings are Simpson Strong-Tie. Hardware suppliers other than Simpson shall submit a comparative material list itemizing product designation, load rating and supported member size for review by the enforcement agency and the Structural Engineer.

2.02 FABRICATION

A. Lumber:

1. All lumber shall be air or kiln-dried to the maximum moisture content indicated in Materials Section.

2. Furnish S4S unless otherwise noted.

3. Size to conform to rules of governing standard. Sizes shown are nominal unless otherwise noted.

B. Wood Treatment:

1. Preservative Treatment: The treating process and results thereof shall conform to the appropriate AWPA Standards for exterior, above ground use (3B) and as indicated in CBC Section 2303.1.8.

2. After treatment and prior to shipping, air or kiln-dry lumber to maximum 19 percent moisture content.

3. All treated wood shall be identified with a label meeting the requirements of CBC Section 2303.1.8.1.

4. The amount of preservative to be injected into the wood shall be as required by the AWPA standard for each type of installation.

5. All wood in contact with concrete or masonry shall be preservative treated.

6. Cut surfaces and bored holes in pressure treated wood shall be protected in accordance with AWPA Standard M4.

C. Fire Treatment: All fire-retardant-treated wood shall be identified with a label meeting the requirements of CBC Section 2303.2.1. The treating process and results thereof shall meet the requirements of CBC Section 2303.2. Moisture content of fire-retardant-treated wood shall meet CBC Section 2303.2.5. Treater shall submit design and fastener valves for treated wood to Structural Engineer for review. See Drawings for location of fire-retardant-treated wood.

2.03 SOURCE QUALITY CONTROL

A. Grade Mark each piece of lumber. Marking must be done by recognized agency.

1. Douglas Fir shall bear WCLIB or WWPA grade stamp.
2. Pressure treated Douglas Fir shall bear AWPA Quality mark.

B. Wood Sheathing: Each panel shall be legibly identified as to type, grade and specie by APA grade. If plies are spliced, the slope of the scarf shall not be steeper than 1:8. White pockets will not be permitted in face plies.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection:

1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly proceed.
2. Verify that rough carpentry may be performed in strict accordance with the original design and all pertinent codes and regulations.

B. Discrepancies: In the event of discrepancy, immediately notify Architect. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 WORKMANSHIP

A. General: All rough carpentry shall produce joints true, tight, and well nailed with all members assembled in accordance with the Drawings and with all pertinent codes and regulations.

B. Selection of Lumber Pieces: Carefully select all members. Select individual pieces so that knots and obvious defects will not interfere with placing bolts or proper nailing or making proper connections. Cut out and discard all defects which will render a piece unable to serve its intended function.

C. Lumber may be rejected by the Architect, 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.

D. Shimming: do not shim any framing component.

E. Care shall be taken that notching and boring of members is in strict conformance with the Drawings and that there are no over-cuts.

3.03 FASTENING

A. Nailing: Except as otherwise indicated on Drawings or specified, all nailing shall be as required by CBC Table 2304.9.1 - Fastening Schedule.

1. Nails or Spikes shall be common wire unless noted otherwise. Penetration of nails or spikes shall be one-half the length of the nail or spike into the piece receiving the point. However, to connect pieces 2" in thickness, 16d nails shall be used unless noted otherwise.
   a. Bore holes for nails wherever necessary to prevent splitting.
   b. Use finish or casing for finish work.
   c. Use of machine nailing is subject to a satisfactory installation of nails. Minimum edge distances shall be maintained. Nails installed through sheathing with nail guns shall not penetrate into the outer plies deeper than hand nailing. Submittal of guns and nails is required.
   d. All nailing into Pressure-Treated lumber shall utilize hot-dipped zinc coated galvanized nails or stainless steel nails per CBC Section 2304.9.5.

B. Bolts and Lag Screws: Bolts shall be sizes indicated on Drawings. Holes for bolts shall be 1/16-inch larger than the bolt diameter. Malleable, Steel plate or standard flat washers shall be used where heads or nuts would otherwise bear directly on wood surfaces. Malleable or plate washers shall be used on all anchor bolts. Cut washers are not permitted. Lag screws shall be screwed (not driven) into place. For the shank, holes shall be bored the same depth and diameter as shank. For threaded portion, holes shall be pre-drilled as follows:

Lag Screw Size	Thread Portion Pre-Drill
1/2" diameter	1/4" diameter
5/8" diameter	5/16" diameter
3/4 diameter	3/8" diameter
7/8" diameter	1/2" diameter
1" diameter	5/8" diameter

Soap Lag screws prior to installation. Tighten all bolts and screws before closing in.

C. Framing Devices: Install according to the manufacturer's instructions unless otherwise noted.

3.04 FRAMING AND ROUGH CARPENTRY

A. Sills: Shall be in long lengths of sizes shown, fastened with anchor bolts as indicated, a minimum of two anchor bolts per piece. Place steel plate washers (but not standard flat or malleable iron washers) under nuts bearing on wood. Set sills level and true.

B. Studs, Posts and Columns: Shall be full length. Corners shall be as detailed. Partitions or walls containing plumbing, heating or other piping shall be so formed as to give proper clearance for materials. Cut members as required to provide full bearing at ends. Connect to structure as indicated.

C. Plates: Shall be full length of wall segment or 12-foot minimum and spliced as shown.

D. Blocking: Blocking shall be same thickness and width of studs or joists unless shown otherwise. Blocking shall not be spaced over 8'-0" c.c. Install fire blocking in accordance with CBC. Horizontal fire blocking in walls shall be placed at floor lines and ceiling lines unless noted otherwise. Install blocking at all plywood joints where noted on the Drawings. Install wall width full height solid blocking at floor joists beneath all posts in walls. Blocking shall be installed around all wall, floor and roof penetrations.

E. Joists and Beams: Shall be full span length and spliced over bearings unless shown otherwise. Install with crown side up. Beams or headers indicated to be built up of two or more joists shall be fabricated on the job using full length members. For two piece 2x members, stitch nail pieces together with 16d common nails spaced not over 12 inches c.c. and staggered. Clinch nails protruding through members. For three or more piece members, stitch bolt pieces together with ½" bolts spaced not over 12 inches c.c. and staggered.

1. Provide double joists and headers at all openings through roof unless otherwise shown on Drawings.

2. Provide typical headers at all openings through walls where one or more studs are required to be cut. For penetration through walls narrower than stud spacing, provide solid blocking on all sides for fastening finish materials.

F. Wood Sheathing: Install to pattern indicated and provide blocking at joints where noted on the Drawings. Center all joints over bearing supports. Nail to framing as indicated. Install wood sheathing with face plies perpendicular to joists or studs unless indicated otherwise. Wall wood sheathing shall continue uninterrupted by ceilings or soffit from floor to floor or floor to roof unless specifically detailed on the Structural Drawings.

G. Wood Furring, Stripping: Install as shown or required to provide nailing materials or passage of pipes, conduits, etc., not otherwise accommodated including ceiling stripping for gypsum drywall construction.

H. Bridging: Space not over 8'-0" c.c. for spans over 16'-0". Joists 8 inches or less in depth shall not require bridging unless specifically indicated.

I. Solid Wood Backing: Solid wood backing shall be provided for all wall and ceiling finishes and for supporting of mounted items for all trades, including but not limited to metal toilet partitions, toilet room accessories, frames, cabinets, casework, mirrors, trim, applied wall finishes, athletic equipment, food service equipment, piping, conduit, ducts, etc. Contractor shall coordinate placement of backing and supports with Subcontractor supplying mounted items.

J. Building Paper: Install in all locations indicated except where included in other sections of the specifications.

K. Cant Strips and Crickets: Shape to sizes shown. Rigidly fasten to construction. Form neat mitered corners.

L. Wood Sheathing Backing: All toilet rooms, restrooms, single or joint occupancy shall have all walls backed with 5/8-inch thick wood sheathing with no surface voids. Install sheathing between the framing members and wallboard. The same wood sheathing shall also be provided and installed at all tile locations. At tile locations wood sheathing shall be installed between the framing members and the resin-cement backing board.

3.05 MISCELLANEOUS CARPENTRY WORK

A. Install all items under other sections specified to be furnished and installed in other sections which relate to the rough carpentry work.

B. Miscellaneous Carpentry Work not included under other sections but, indicated or required yet not specified elsewhere shall be furnished and installed hereunder, including appropriate fastening devices. Contractor shall provide miscellaneous carpentry work for all sections and divisions of work identified.

C. Wood Curbs for Equipment: Construct all wood curbs for roof mounted equipment as detailed. Provide all miscellaneous blocking, bracing, supports, and other wood items as shown or required to complete the work.

D. Plywood Backing for Electrical, telephone, and similar types of wall mounted equipment shall be provided hereunder where required. Plywood shall be 3/4-inch thick exterior A-C plywood with 'A' face exposed.

E. Fire/Draft Stops: Construct fire and drafts stops in furred attic spaces where indicated or required by CBC code. Unless otherwise indicated on Drawings construct of not less than 5/8-inch Type 'X' gypsum wallboard or ½" wood sheathing, adequately supported by 2x4's at 24 inches c.c., braced diagonally to the roof structure. Draft stop and installation work shall conform to code requirements.

F. Shoring and Bracing: Shore or brace for temporary support of all work as required during the construction period except any shoring and bracing specified and included under other sections of these specifications.

G. Temporary Enclosures: Provide and maintain all barricades and enclosures required to protect the work in progress.

H. Protect all work in progress and all work installed, as well as the work of all other trades. Any work damaged as a result of the work under this section shall be corrected to its original condition or replaced if directed by the Architect at no increase in cost to the Owner.

J. Ventilation: Contractor shall include all labor and materials necessary to provide ventilation requirements of roof overhangs, eaves, attics, and all other components of the building required by codes to be ventilated. Work shall include removing knock-outs in wood I-joists for cross ventilation, drilling of blocking, wood sheathing, and other wooden components of the structure necessary to comply with requirements of the CBC for ventilation of buildings.

*****END OF SECTION*****

SECTION 06 17 00

PREFABRICATED STRUCTURAL WOOD & TRUSSES

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 DESCRIPTION OF WORK

Extent of prefabricated structural wood is indicted on drawings, work includes, but is not necessarily limited to furnishing and installing glued-laminated beams and MICRO=LAM lumber beams as shown on the structural drawings and as specified herein.

1.03 REFERENCES

A. American Institute of Timber Construction (AITC):

1. 117: Manufacturing Standard Specification for Structural Glued-laminated Timber of Softwood Species.

2. 302: Tension Lamination Recommendations

B. American Society of Testing Materials (ASTM):

1. D 2559 - Exterior Wood Adhesives

C. Truss Plate Institute (TPI): Design specifications for light-metal plate connected to wood trusses.

1.04 QUALITY ASSURANCE

A. A current licensee of the American Institute of Timber Construction shall manufacture all glued laminated beams.

B. All MICRO=LAM laminated veneer lumber must be manufactured in a plant and under a process approved by the National Research Board.

C. All wood trusses shall be manufactured in a plant, and under a process licensed by TPI.

1.05 SUBSTITUTIONS

Substitutions will be considered per Section 01 25 00.

1.06 SUBMITTALS

A. In accordance with Section 01 33 00.

A. Shop Drawings: Prior to fabrication or delivery of any glued laminated beams or wood trusses to the job site, submit shop drawings for all work of this section for review and for Building Department approvals.

B. Calculations: Provide structural calculations for review. Calculations shall demonstrate the adequacy of all wood trusses to meet the requirements of the contract drawings and specifications. All calculations shall be prepared by a California-licensed Civil or Structural Engineer and bear his seal and signature. Calculations shall be submitted which are approved by the Local Building Department.

C. Permits: After the architect completes a review with "no exceptions", submit wood truss shop drawings and calculations to the City Department of Building & Safety for approval and issuance of a separate or deferred building permit. Submit a copy of the permit to the architect.

1.07 PRODUCT HANDLING

A. Protection: Use all means necessary to protect prefabricated structural wood before, during and after installation and to protect the installed work and materials of all other trades. Provide water-resistant reinforced kraft paper wrapping, covering all surfaces of each individual prefabricated structural wood member.

B. Replacements: In the event of damage, immediately make all repairs and replacement necessary to the approval of the contracting officer and at no additional cost to the Owner.

PART 2 -- PRODUCTS

2.01 GLUED-LAMINATED BEAMS

A. General: All glued-laminated wood beams shall bear the quality mark of the American Institute of Timber Construction for the grade specified.

B. Grades: All glued-laminated wood beams shall be AITC "Industrial Grade".

C. Lumber: All lumber for glued-laminated wood beams shall be Coast Region Douglas Fir in accordance with AITC 117. Inner and outer core lamination shall be as indicated by the drawings. Fabricated member sizes shall be as indicated.

D. Adhesives: Wet-use adhesive shall conform to ASTM D-2559.

2.02 MICRO-LAMINATED VENEER LUMBER

A. General: The MICRO=LAM laminated veneer lumber is to be identified with a stamp or stamps noting the name and plant number of the manufacturer, the grade, the National Research Board report number and the quality control agency.

B. Materials: The MICRO=LAM lumber beams shall be manufactured from MICRO=LAM brand parallel laminated veneer lumber utilizing 1/10" or 1/8" thickness Douglas Fir veneer glued up in a continuous process with all grain parallel with the length of the member. Laminated veneer lumber shall be a single one-piece length, free of finger joints, scarf joints or mechanical connections in full-length members. Veneers shall be dried as required. After drying, each veneer sheet shall be graded by an ultrasonic or other approved nondestructive test method. Adhesive used to laminate the veneer shall be waterproof, meeting the requirements of ASTM D-2559-76, uniformly applied to the veneer at the required spread rate.

C. Design: MICRO=LAM lumber beams shall be designed to meet the dimensions and loads indicated on the plans. All designs shall be in accordance with standard engineering practice. Complete design calculation showing member forces and stresses and allowable load are to be available upon request for each MICRO=LAM lumber design. The design of the MICRO=LAM lumber beams is to be under the supervision of a registered professional engineer and in accordance with the NRB acceptance, and the provisions of The National Design Specification for Wood, Latest edition.

D. Contractor may substitute an alternate brand of laminated veneer lumber, provided the criteria listed on the drawings and herein are satisfied, and provided he receives prior written approval by the Structural Engineer.

2.03 WOOD TRUSSES

A. General: Design and fabricate all trusses in accordance with the TPI design specification.

B. Lumber: All lumber for wood trusses shall be a Douglas fir with a minimum WWPA "stud" grade.

C. Moisture Content: 19% maximum, 7% minimum.

D. Connector Plates: A pressed-on galvanized steel plate with extruding teeth. Plate steel

shall conform to ASTM A446, Grade A.

2.04 PREFABRICATED ROUGH HARDWARE, BOLTS AND NAILS

Refer to Section 06100.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Do not proceed until unsatisfactory conditions are corrected.

D. Beginning of installation means acceptance of conditions.

3.02 GENERAL

Verify that prefabricated structural wood may be erected in strict accordance with all referenced standards, the original design, and the approved shop drawings. In the event of discrepancy, immediately notify the Contracting Officer. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved. Prior to installation of work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

3.03 ERECTION OF PREFABRICATED BEAMS

Properly and adequately shore and brace all prefabricated structural wood, all shoring and bracing in-place until all work necessary to provide stability for the structure is complete. Holes, cuts, or notches shall not be made.

3.04 TRUSSES

Trusses shall be installed in accordance with TPI specifications. Framing anchors shall be provided at every other truss to fasten truss to plates against uplift and movement of any kind. Anchors shall be 18-gauge steel sheet, punched and formed for nailing so that nails will be stressed in shear only, and zinc-coated after fabrication. A nail shall be driven in each nail hole provided in the anchor.

3.05 INSTALLATION OF ROUGH HARDWARE

Install all fabricated rough hardware as required by the contract drawings. Dap seat plates flush at the tops of all prefabricated structural wood. Dapping shall not introduce vertical over-cuts into the beam lamination. Bolt holes shall be drilled 1/32" to 1/16" larger than bolts and accurately located. Locate bolts in the upper half of slotted bolt holes. Tighten by taking up snug. Retighten prior to closing-in or at the latest practicable time prior to project closeout.

***** END OF SECTION *****

SECTION 06 18 00

GLUED LAMINATED CONSTRUCTION

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

The requirements of Division 1 apply to all Work of this Section.

1.02 SCOPE

Provide all labor, materials, tools, appliances, facilities and equipment required for the fabrication and delivery to job site of all glued laminated wood members.

1.03 QUALITY ASSURANCE

A. General:

1. Qualifications of Manufacturer: The fabricator shall have been engaged in the continuous manufacturing of glued laminated timbers for a minimum of at least two years and shall have the authority to use the AITC "Quality Inspected Stamp". Each timber member shall be stamped and placed in such a position not to be visible on finished erected members.

B. Submittals:

1. Shop drawings showing full dimensions of each member and layout of entire structural system.
2. Show large scale details of connections, connectors and other accessories.
3. Indicate species and laminating combination, adhesive type, and other variables in required work.

C. Tests and Inspections:

1. A testing program is required prior to start of construction. Testing program to be done in Compliance with the Current CBC requirements and in collaboration with Testing Laboratory, Design team, contractor, owner and submitted for review by the agency in charge of building enforcement. Requirements below are minimum requirements; additional requirements may be required in final testing program.
2. Each structural glued-laminated member shall be stamped with an identifying mark. Mark shall include all pertinent data, such as grade and species of lumber, type of glue, extremes of moisture content and other such information as may be required.
3. Certificate of compliance with the above data.

D. Standards and References: (Latest Edition unless specified otherwise)

1. Current California Building Code (CBC).
2. 2012 National Design Specification for Wood Construction (NDS).
3. American Institute of Timber Construction, "Standard Specifications for Structural Glued Laminated Timber of Softwood Species, AITC 117.
4. ANSI/AITC Standard A190.1
5. ASTM D3737 "Design and Manufacture of Structural Glued Laminated Timber".

1.04 MOCK-UP

A. Provide a mock-up for evaluation of wood stain color.

1. Locate mock-ups on site in locations and size directed by Architect.

2. Do not proceed with remaining work until workmanship, color and sheen are approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.
4. Retain and maintain mock-ups during construction in undisturbed condition as a standard for judging competed unit of Work.
5. Obtain Architect's acceptance of mock-ups before start of final unit of Work.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to site in manufacturer's protective wrappings with legends intact. Store on site secure from weather, soil and physical damage.

B. Transport, handle and store in strict accordance with the manufacturer's recommendations. Use padded, non-marring slings.

C. Architectural Appearance Grade members shall be shipped, handled and stored with complete weather and damage protection wrapping. Maintain wrappings in place until immediately prior to deck installation.

D. Industrial Appearance Grade glued laminated timber members shall be wrapped in a water resistant covering during transit. Contractor shall be responsible for protection during hauling and unloading at job site.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Lumber:

1. Lumber used for laminating structural members shall be well manufactured and shall conform to requirements of Standard Grading and Dressing Rules No. 17, West Coast Lumber Inspection Bureau. Such lumber shall be inspected, identified by individual piece, and certified as meeting requirements of said standard specifications by an approved lumber grading agency. It is assumed that each lamination is graded on basis of requirement for nominal size of individual lamination. When lumber is resawn, it shall be regraded on basis of new size.

B. Type: Glued Laminated Timber Protected from Weather

1. Species: Douglas Fir or Western Larch
2. Stress Grade: AITC Combination 24F-V4 for simple beams, 24F-V8 for cantilever or continuous beams.
3. Extreme fiber bending - F_b = 2400 psi
4. Adhesives: Wet use
5. Appearance Grade: AITC Industrial for concealed uses, Architectural appearance at exposed uses.
6. Preservative Treatment: Portions of beams exposed to weather shall be preservative treated.
7. Laminations: Provide outer tension laminations or proof load testing as required by ANSI/AITC A190.1.
8. Sealing: Shop seal all surfaces with 2 coats of clear penetrating sealer.

C. Type: Glued Laminated Timber Exposed to Weather

1. Species: Alaskan Yellow Cedar

2. Stress Grade: AITC Combination 20F-V12 for simple beams, 20F-V13 for cantilever or continuous beams.
3. Extreme fiber bending - F_b = 2000 psi
4. Adhesives: Wet use
5. Appearance Grade: Architectural
6. Laminations: Provide outer tension laminations or proof load testing as required by ANSI/AITC A190.1.
7. Sealing: Shop seal all surfaces with 2 coats of clear penetrating sealer.

2.02 FABRICATION

A. Fabrication shall be in compliance with the above standards and references.

1. Fabrication shall be in accordance with best practices with adequate plant and equipment and under supervision of properly qualified personnel.
2. Laminations shall be machine finished to a smooth surface, but not sanded, and to a uniform thickness with a maximum allowable variation of 1/64 inch. Warp, twist, or other characteristics which will prevent intimate contact of adjacent glued faces or interfere with uniform bending to a required curvature when under clamping pressure shall not be permitted. Surfaces to be glued shall be clean and free from oil, dust and other foreign material which would be detrimental to satisfactory gluing.
3. Moisture content of lumber at time of gluing shall be not less than 7 percent nor more than 12 percent.
4. Slips, misses, and wane are not permitted.
5. Boring of holes in members shall be in strict conformance with the Drawings. Notching is prohibited except where specifically detailed.
6. Field cuts and holes in preservative treated members shall be preservative treated and sealed.

PART 3 - EXECUTION

3.01 INSPECTION

A. Prior to installation of the work of this Section, carefully inspect and verify that the installed work of all other trades is complete to the point where this installation may properly commence.

B. Verify that specified items may be installed in accordance with the approved design.

C. In the event of a discrepancy, immediately notify Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.02 PROTECTION

A. Protect work and materials of this Section prior to and during installation, and protect the installed work and materials of other trades.

B. In the event of damage, make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

3.03 HANDLING

Use equipment and methods that avoid scarring corners and faces or otherwise injuring members. Sharp instruments and unprotected wire rope, chain slings and the like shall not be permitted.

3.04 INSTALLATION

Glued Laminated members are to be erected and installed in accordance with the Drawings and manufacturer's recommendations.

3.05 CLEANUP

A. Keep premises free from accumulated waste materials, rubbish and debris resulting from this Work. Upon completion, remove tools, appliances, surplus materials, waste materials, rubbish, debris and accessory items used in or resulting from said Work, and legally dispose of off the site.

***** END OF SECTION *****

SECTION 06 20 00

FINISH CARPENTRY

PART 1 -- GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 SCOPE OF WORK

Supply and install complete Finish Carpentry Work as shown on Drawings and as specified herein. Provide hardware and attachment accessories as required for a complete and proper installation.

1.03 MEASUREMENTS

Verify all dimensions shown on Drawings by taking field measurements; proper fit and attachment of all parts is required.

1.04 QUALITY CONTROL

Following standards apply to Work of this Section except where more stringent requirements are specified herein:

A. Architectural Woodwork Institute "Quality Standards".

B. Western Wood Products Association Manual.

C. American Wood Preservers Association Specifications.

1.05 SUBSTITUTIONS

Substitutions will be considered per Section 01 25 00.

1.06 SUBMITTALS

A. In accordance with Section 01 33 00.

B. Submit shop drawings of millwork at full size or large scale showing sizes, materials, grain run, methods of construction, connection to adjacent members and installation. Indicate all backing members for installations and all hardware

PART 2 -- PRODUCTS

2.01 MATERIALS

A. Douglas Fir: West Coast Lumber Inspection Bureau "Standard Grading and Dressing Rules" and Western Wood Products Association, graded "C" and better, flat grain grade marked by WCLIB or WWPA.

B. Douglas Fir Plywood: U.S. Product Standard PS-1, American Plywood Association, grade trademarked "C-D", plugged, exterior glue, sanded.

C. Blocking, Furring, etc.: Standard Grade Western White Pine, Construction grade Douglas Fir or other equally sound softwood, as graded by WCLIB or WWPA.

D. Softwood Lumber: PS 20; custom grade in accordance with AWI maximum moisture content of 6%; of quality capable of transparent finish.

E. Hardwood Lumber: FS MM-L-736; custom grade in accordance with AWI; maximum moisture content of 6% of quality capable of transparent finish.

2.02 ACCESSORIES

A. Nails, bolts, nuts, washers, blind fasteners, lags and screws, size and type to suit application.

B. Wood Filler: oil base, tinted to match surface finish color.

C. Shelf Standards and Rests: Knape and Vogt #255 & #256 for recessed application. Provide two hold down clips for each shelf in the slot above

D. Closet Hanger Bars and Supports: Knape and Vogt #770, #660, #734, #735, and #1195. Provide intermediate support of spans over 6'-0".

2.03 SHOP TREATMENT OF WOOD MATERIALS

A. Shop pressure treat wood materials requiring UL fire rating or preservations.

Provide UL approved identification on fire retardant treated material.

B. Wood Preservative (PT type) Wolmanized, Pressure Treated Lumber, manufactured by Osmose Wood Products or approved equal.

C. Fire Retardant (FR-S Type) chemically treated, and pressure impregnated, capable of providing a maximum rating of 25; manufactured by Demose Wood Products. Dricon FRT or approved equal.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Do not proceed until unsatisfactory conditions are corrected.

D. Beginning of installation means acceptance of conditions.

E. Verify that surfaces and openings are ready to receive work and field measurements are as shown on Shop Drawings and instructed by the fabricator.

F. Verify that mechanical, electrical, and building items affecting work of this Section are placed and ready to receive this work.

3.02 PRIMING

Back paint all wood surfaces inaccessible and unexposed after installation before delivery with an approved linseed oil and aluminum primer.

A. Prime coat all unfinished metal parts.

B. Prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.03 FINISH CARPENTRY INSTALLATION

A. Use only hot dip galvanized or aluminum finish or casting nails. Set nails for putty stopping in surface members. Hammer marks not acceptable on any exposed finished surface and may be cause rejection of Work by Architect.

B. Make all end splices exposed in finished members bevel splices and not square butted. Install members in as long lengths as possible.

C. Install Work to details shown, plumb, level and to line and securely anchored per AWI custom quality standard. Make scribes where required accurate. Miter corners of trim.

D. Provide and install other miscellaneous millwork items and related Work required to complete Work of this Section.

E. Prepare all woodwork installed hereunder by cleaning and sanding as required to receive finishes specified in Section "Painting and Finishing".

F. Install all doors and frames; finish hardware and bathroom accessories per manufacturer's recommendation.

G. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth and site finish.

***** END OF SECTION *****

SECTION 06 40 00

CUSTOM CASEWORK

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 SCOPE OF WORK

A. Furnish all: labor, materials, equipment and services necessary and/or reasonably incidental to the proper execution of cabinetwork, including hardware as shown on Drawings and specified herein.

B. Work includes counters, shelving, countertops and cabinetry.

1.03 STANDARDS OF WORKMANSHIP

Quality of millwork and fabrication shall conform to:

1. Woodwork Institute of California (WIC)
2. National Kitchen Cabinet Association (NKCA)
3. American Woodworkers Institute (AWI)

1.04 SUBSTITUTIONS

Substitutions will be considered per Section 01 25 00.

1.05 SUBMITTALS

A. In accordance with Section 01 33 00.

B. Submit:

1. Submit shop drawings, include materials, component profiles, fastening methods and schedule of finishes.
2. Submit samples of finishes.

1.06 WARRANTY

Contractor Guarantee: Contractor guarantees the work covered by the specification against all defects in material and workmanship for a period of not less than two (2) years from the date the Owner records Notice of Completion.

PART 2 -- PRODUCTS

2.01 MATERIALS

A. Softwood plywood: PS-1 graded per AWI. Application: 3/4" for cabinets -- plastic laminated.

B. Plastic Laminate: high pressure laminated plastic conforming to NEMA LP-3, 0.50" thickness for tops, and 0.028" thickness for vertical surfaces.

1. All splashes shall be 4" high; provide end splashes with sq. bottom joints.
2. Interiors: Low Pressure Melamine.
3. Backing Sheet: LD-3-BK 20 backing grade undecorated plastic laminate.

C. Wood particleboard: Per AWI standard, composed of wood chips, made with waterproof resin binders, sanded faces, application 3/4" for countertops.

D. Hardboard: PS-58: pressed wood fiber with resin binder, tempered grade, smooth two sides for drawer bottoms.

E. Hardwood Lumber: Grade in accordance with AWI; maximum moisture content of 6%; application.

F. Plastic Edge Trim: Same as face finish -- plastic laminate.

G. Adhesive - Type II adhesive -- an approved thermosetting-on-contact adhesive.

H. Doors and drawer fronts shall be 3/4" plywood with edges veneered or plastic laminate finish.

I. Hardware: Cabinet hardware shall be concealed self-closing hinges, drawer slide, shelf-standards and clips as manufactured by Blum, Knape & Voigt or equal.

J. Drawer Slides for Drawers 24" wide or less: 100 pound load rated, full extension, ball bearing. Accuride 3832.

Drawer Slides for File, Paper Storage and Heavy Duty Drawers 42" wide or less: 150 pound load rated, over travel extension, ball bearing. Accuride 4034.

2.02 FABRICATION

A. Assemble casework in Shop for delivery to site in units easily handled and to permit passage through building openings.

B. Apply plastic laminate finish in full-uninterrupted sheets consistent with manufactured sizes. Make corners and joints hairline. Locate counter butt joints minimum 2' from sink cutouts.

C. Mechanically fasten splash backs to countertops with steel brackets 16" o.c.

D. Countertop edges and splashes to have radius corners.

E. Outside corners of force standing desks to be radiused per plans.

F. Apply laminated backing sheet to reverse side of plastic laminate finish surfaces.

G. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal contact surface cut edges.

H. On items to receive transparent finishes, use wood filler that match surrounding surfaces. Apply wood filler in exposed nail and screw indentations. Sand work smooth.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Do not proceed until unsatisfactory conditions are corrected.

D. Beginning of installation means acceptance of conditions.

E. Verify that surfaces and openings are ready to receive work and field measurements are as shown on Shop Drawings and instructed by the fabricator. Verify dimensions for work of other trades incorporated into the casework.

F. Verify that mechanical, electrical, and other building items affecting work of this Section are placed and ready to receive this work.

3.02 INSTALLATION

A. All parts shall be precision machined to close tolerances, accurately fitted and assembled with appropriate fastening and adhesives required to produce first quality fixtures, square, true, plumb and level.

B. Carefully scribe casework that is against other building materials, leaving gaps of 1/32" maximum. Do not use additional overlay trim for this purpose.

C. Anchor securely to wall and floor with all anchorage devices required. Coordinate to allow anchorage devices to be set with other work as applicable. Provide temporary protection over finish work as required during construction to protect the work from damage.

D. Installation shall be complete including continuous bases. All work shall be installed by skilled workmen under the control and supervision of personnel trained in the handling and installation of this cabinetwork and equipment.

E. Install and adjust cabinet hardware to correct operations.

***** END OF SECTION *****

SECTION 06 60 00

PLASTIC SURFACING MATERIALS

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract Requirements and Division 1, General Requirements apply to this Section.

1.02 SUMMARY

Provide factory-finished Surface Materials, and similar items where shown on the drawings, as specified herein, and as needed for a complete and proper installation. Work may include, but is not limited to:

1. Standard Decorative Laminates.
2. Solid Surfacing.

1.03 REFERENCES

A. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.

B. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

C. ISO 4586-2 - High Pressure Decorative Laminates; International Organization for Standardization.

1.04 SUBSTITUTIONS

Substitutions will be considered per Section 01 25 00.

1.05 SUBMITTALS

A. Provide in accordance with Section 01 33 00.

B. Samples:

1. Selection Samples: Submit actual samples of surfacing materials to illustrate full range of colors, patterns, and finishes available.
2. Verification Samples: Submit two samples, each 12 inches square, illustrating each selected surfacing material in specified color, pattern, and finish.

C. Manufacturer's Instructions:

1. Submit manufacturer's printed installation instructions for each product.
2. Submit manufacturer's Safety Data Sheets (M.S.D.S.) for each adhesive.

1.06 PRODUCT HANDLING

Comply with the requirements of Section 01620.

1.07 CLOSE-OUT: also comply with the requirements of Section 01 78 00 – Contract Closeout.

A. Reports: None required.

B. As-Builts: Not required

C. Operation and Maintenance Data: None required.

D. Extra Materials: None required.

E. Extended Warranty: Comply with the requirements of General Condition Article 3.5.

PART 2 – PRODUCTS

2.01 STANDARD DECORATIVE LAMINATES

A. Acceptable Products: As indicated on the Drawings and in the Finish Schedule.

B. Product Description: Decorative surface papers, impregnated with melamine resins, bonded under heat and pressure to kraft papers impregnated with phenolic resins.

C. Standard Decorative Laminate – General Purpose Type: having the following physical characteristics:

1. Sheet thickness: 0.048-inch (1.219 mm) plus/minus 0.005-inch (0.127 mm).
2. Exceeding performance requirements of NEMA LD 3-1995 Grade HGS.
3. Surface burning characteristics in accordance with ASTM E 84; unbonded: Flame spread 55; Smoke developed 30.
4. Patterns and Finishes: Selected from manufacturer's full range of available selections, as selected and approved by Architect.

2.02 SOLID SURFACING MATERIAL

A. Acceptable Product: As indicated on the Drawings and in the Finish Schedule.

B. Product Description: Homogenous sheet material composed of acrylic resins, fire-retardant filler materials, and coloring agents.

1. Nominal sheet thickness: 0.50 inch (13 mm).
2. Surface burning characteristics in accordance with ASTM E 84: Flame spread less than 25; Smoke developed less than 25.
3. Liquid Absorption, ISO 4586-2, for 1/2-inch material thickness: 0.4 percent after 2 hours boiling water.

C. Izod Impact, ASTM D 256, Method A: 0.2 foot pounds per inch.

1. Tensile Modulus, ASTM D 638 Nominal: 1.7 million pounds per square inch.
2. Thermal Expansion, ASTM D 696: 0.000019-inch per inch per degree F, maximum.
3. Hardness, ASTM D 2583, Barcol Impressor: 59.
4. Flexural Modulus, ASTM D 790: 1.6 million pounds per square inch.
5. Deflection Temperature under load, ASTM D 648: 90 degrees C.
6. Stain Resistance: ANSI Z124.6 modified, Method 3.4: No effect.
7. Boiling Water Resistance, NEMA LD 3-1995, Method 3.5: No effect.
8. High Temperature Resistance: NEMA LD 3-1995, Method 3.6: No effect.
9. Radiant Heat Resistance: NEMA LD 3-1995, Method 3.10: No effect.
10. Light Resistance: NEMA LD 3-1995, Method 3.3: No effect.
11. Ball Impact Resistance, NEMA LD 3-1995, Method 3.8, one half pound ball, unsupported: 125 inches.
12. Specific Gravity: 0.977 ounces per cubic inch (1.69 grams per cubic centimeter).
13. Approximate weight: 4.2 pounds per square foot (20.5 kg/square m).
14. Weatherability: ASTM D 2565: Pass.
15. Fungus Resistance, ASTM G 21: Pass.
16. Bacterial Resistance, ASTM G 22: Pass.

17. Pittsburgh Protocol Toxicity: 66.9 grams.
18. Patterns and Finishes: Selected from manufacturer's full range of available selections, selected and approved by Architect.
19. Impact Resistance NEMA LD3-1995 (1/2 lb. Ball) SSV bonded to substrate*** Method 3.08 modified. 125" (No Failure)
20. Tensile Toughness ASTM D 638. 21 (in. – lb./in. ^{3})
21. Tensile Modulus ASTM D 638 Nominal. 1.7 x 10^{-5} lb./in.^{3}
22. Density 1.60 gram/cm^3
23. Approximate weight 4.2 lbs./ft^2
24. Pittsburgh Protocol Toxicity = 30 grams range

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Verify that specified items may be installed in accordance with the approved design.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

Surface preparation: Precondition surfacing materials and surfaces to receive surfacing materials in accordance with manufacturer's printed installation instructions.

3.03 APPLICATION

Install materials in accordance with manufacturer's printed instructions.

***** END OF SECTION *****

SECTION 06 64 00

FIBERGLASS REINFORCED PANELS (FRP)

PART 1 -- GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract Requirements and Division 1, General Conditions apply to this Section.

1.02 SCOPE OF WORK

A. Work included: Provide sanitary wall and ceiling panels and trim where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Related Work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Special Conditions, and Sections in Division 1 of these Specifications.

1.03 QUALITY ASSURANCE

Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods for proper performance of the work of this Section.

1.04 SUBSTITUTIONS

Substitutions will be considered per Section 01 25 00.

1.05 SUBMITTALS

A. In accordance with Section 01 33 00.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Manufacturer's Specifications and other data needed to prove compliance with the specified requirements;

2. Samples of the full range of colors and patterns available from the proposed manufacturer in the specified range; if substituting product / color selected.

3. Manufacturer's recommended installation procedures which, when accepted by the Architect, will become the basis for accepting or rejecting actual installation procedures for the Work.

C. Mock-ups:

1. At an area on the site where accepted by the Architect, provide a mock-up panel of the Work of this Section.

a. Make the mock-up panel approximately 4'-0" high by 4'-0" wide and consisting of a minimum of two 2'-0" x 2'-0" panels butted together.

b. Provide one mock-up panel for each color and pattern of vinyl-coated fabric wall covering used on the Work.

c. The mock-ups may be part of the Work, and may be incorporated into the finish work when so accepted by the Architect.

d. Revise as necessary to secure Architect's acceptance.

2. The mock-up panels, when accepted by the Architect, will be used as datum points for comparison with the remainder of the work of this Section for the purpose of

acceptance or rejection.

3. If the mock-up panels are not permitted to be part of the finished work, completely demolish and remove them from the job site upon completion and acceptance of the work of this Section.

D. Maintenance Instructions:

1. Furnish a copy of the vinyl-coated fabric manufacturer's maintenance instructions at project's Final Completion.

2. Include recommended cleaning materials and methods of application therefor together with precautions in cleaning materials' use if such are improperly applied.

1.06 PRODUCT HANDLING

A. Deliver pre-finished panels in undamaged condition as packaged by the manufacturer, in sealed, labeled containers.

B. Store panels in a cool, clean, and dry storage area off the ground. Maintain storage area temperature above 45° F with normal humidity.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Temperatures:

1. Install pre-finished panels only when normal temperatures and humidity conditions approximate the same conditions that will exist when building is occupied.

2. Maintain areas to receive pre-finished panels at a minimum temperature of 65° F measured at floor level.

3. Maintain minimum temperature for 72 hours before, during, and 48 hours after applications of wall coverings.

B. Ventilation:

1. Provide adequate continuous ventilation as required for the various wall coverings, sealers and adhesives used in the spaces scheduled, but in no case, for a time less than that recommended by the manufacturer for full drying or curing.

PART 2 -- PRODUCTS

2.01 FIBERGLASS REINFORCED PANELS (FRP)

A. Provide fiberglass reinforced plastic panels complying with ASTM D5319.

B. Basis of Design: Nudo Products, Fiber-Lite Liner Panel, Class A, Pebbled finish or approved equal.

C. Colors as indicated on the drawings or will be selected by the Architect.

D. Performance Criteria:

1. Scratch Resistance: ASTM d2583

2. Abrasion Resistance: Taber Abrasion Test using CS-17 abrasive wheels with 1000g weight. Panels shall exhibit weight loss after 25 cycles of no more than 0.038%.

3. Impact Strength: ASTM D5420 showing no visible damage on finish side.

E. Accessories:

1. Moldings, Trim and Caps: One-piece extruded polypropylene or PVC, configured to

cover panel edges and corners. Color as selected by Architect from manufacturer's full product range.

2. Adhesive: As recommended by panel manufacturer for the required substrates.

3. Sealants: A single-component, mildew-resistant silicone as recommended by panel manufacturer.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Ascertain that substrates are straight within a maximum tolerance of 1/8 inch in 10 feet, and not greater than 1/16 inch in one foot.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Coordinate work with other trades as needed to assure that proper substrate are provided to receive work of this Section.

F. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

A. Clean substrates to remove substances that could impair bond of adhesive, including oil, grease, dirt, dust or other contamination.

B. Condition panels by unpacking and placing in installation space no less than 24 hours before installation.

C. Lay out paneling before beginning installation. Locate panel joints to provide equal panel widths at ends of walls and so that trimmed panels at corners are not less than 12 inches wide.

3.03 INSTALLATION

A. General: Comply with panel manufacturer's Installation Guide #6876.

B. Cut and drill panels with carbide tipped saw blades or drill bits, or cut with snips.

C. Install panels with manufacturer's recommended gap for panel field and corner joints. Pre-drill fastener holes in panels, 1/8" greater in diameter than fastener. Install panels in a full spread of adhesive. For trowel type and application of adhesive, follow adhesive manufacturer's recommendations.

D. Install trim accessories with adhesive and nails or staples. Do not fasten through panels.

E. Sealant: Fill grooves in trim accessories with sealant before installing panels and be inside corner trim in a bead of sealant. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths.

3.04 CLEANING

A. Remove temporary coverings and protection of adjacent work areas.

B. Repair or replace any installed products that have been damaged.

C. Clean installed panels in accordance with manufacturer's instructions prior to Owner's acceptance.

D. Remove and lawfully dispose of construction debris from project site.

***** END OF SECTION *****

SECTION 06 65 00

RESILIENT FLOORING

PART 1 -- GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract Requirements and Division 1, General Conditions apply to this Section.

1.02 SCOPE OF WORK

Furnish all materials and perform labor required to execute this work as indicated on the drawings, as specified and as necessary to comply with the Contract Documents, including, but not limited to these major items:

1. Resilient tile flooring.
2. Floor substrate surface.
3. Rubber base.

1.03 REGULATORY REQUIREMENTS

Conform to applicable code for flame rating requirements of 75 or less in accordance with ASTM E84.

1.04 SUBMITTALS

A. Provide product data on specified products, describing physical and performance characteristics.

B. Submit two samples, illustrating color and pattern for each floor material or base, substituted for those indicated in the Drawings.

C. Submit manufacturer's installation instructions. When approved by the Architect, will become the basis for accepting or rejecting actual installation procedure used on the Work.

1.05 OPERATION AND MAINTENANCE DATA

Submit cleaning and maintenance data maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Store materials for three days prior to installation in area of installation to achieve temperature stability.

B. Maintain ambient temperature required by adhesive manufacturer three days prior to, during, and 24 hours after installation of materials.

1.07 EXTRA MATERIALS

Provide 5% of each pattern and color of flooring and of base specified.

PART 2 -- PRODUCTS

2.01 VINYL COMPOSITION TILE

Manufacturer(s), Type(s), Location(s), Color(s), and Pattern(s) as indicated on drawings.

2.02 RESILIENT SHEET

Manufacturer(s), Type(s), Location(s), Color(s), and Pattern(s) as indicated on drawings.

2.03 RESILIENT PLANK/TILE

Manufacturer(s), Type(s), Location(s), Color(s), and Pattern(s) as indicated on drawings.

2.04 BASE MATERIALS

Manufacturer(s), Type(s), Location(s), Color(s), and Pattern(s) as indicated on drawings.

2.05 ACCESSORIES

A. Subfloor Filler: Latex cement underlayment as recommended by flooring material manufacturer.

B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.

C. Sealer and Wax: Types recommended by flooring manufacturer.

D. Welding rod: Use same manufacturer as flooring manufacturer and install per manufacturer's instructions. Colors to be selected from standard colors. All flooring in medical procedure rooms and in restrooms shall be heat welded.

E. Provide other materials, not specifically described but required for a complete and proper installation as selected by the Contractor subject to the approval of the Architect.

2.06 FLOORING TRANSITIONS

Manufacturer(s), Type(s), Location(s), Color(s), and Pattern(s) as indicated on drawings.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Do not proceed until unsatisfactory conditions are corrected.

D. Verify that surfaces are smooth and flat with maximum variation of 1/8 inch in 10 ft. and are ready to receive work.

E. Verify concrete floors are dry to the maximum moisture content of 2.5% (two and one half percent); and exhibit negative alkalinity, carbonization, or dusting. Provide test results to indicate that the substrate meets moisture requirements prior to starting work. Higher moisture content will be as accepted by manufacturer in their written warranty.

F. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.

B. Apply, trowel, and float filler to leave smooth, flat, hard surface.

C. Prohibit traffic from area until filler is cured.

D. Vacuum clean substrate.

E. Maintain the temperature of the space to receive the flooring and the materials to be installed at a minimum of 65 degrees F and maximum of 100 degrees F for at least 48 hours prior to, during, and 48 hours after installation. Maintain a minimum temperature of 55 degrees F

thereafter.

F. Install flooring after all other trades, including painting, have been completed.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, conventional full-spread system.

B. Spread only enough adhesive to permit installation of materials before initial set.

C. Set flooring in place; press with heavy roller to attain full adhesion.

D. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar.

E. Install edge strips at unprotected or exposed edges, and where flooring terminates.

F. Scribe flooring to walls, columns, permanent cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 INSTALLATION -- BASE MATERIAL

A. Fit joints tight and vertical. Maintain minimum measurement of 18 inches between joints.

B. Miter internal corners. At external corners, "V" cut back of base strip to 2/3 of thickness and fold.

C. Install base on solid backing. Bond tight to wall and floor surfaces.

D. Scribe and fit to doorframes and other interruptions.

3.05 PROTECTION

Prohibit traffic on floor finish for 48 hours after installation.

3.06 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean, seal, and wax floor and base surfaces in accordance with manufacturer's instructions.

***** END OF SECTION *****

SECTION 07 05 00

CONCRETE FLOOR TESTING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract Requirements and Division 1, General Requirements apply to this Section.

1.02 SUMMARY

This Section includes the following:

1. Administrative and procedural requirements for testing interior concrete slabs for moisture vapor emission rate, alkalinity, and temperature and humidity.
2. Testing shall be conducted by the Owner's Testing Agency.

1.03 RELATED DOCUMENTS

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

1.04 REFERENCES

A. ASTM F-1869 Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor using Anhydrous Calcium Chloride.

B. ASTM F-710 Standard Practice for Preparing Concrete Floors and other Monolithic Floors to receive Resilient Flooring.

C. ASTM F-2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

1.05 SUBMITTALS

A. Provide in accordance with Section 01 33 00.

B. Reports: Reports of results of testing shall be submitted by the Owner's Testing Agency. Reports shall include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. For each test provide a record of interior temperature, humidity, moisture vapor emission, in-concrete relative humidity and alkalinity results for testing period.
8. Test and inspection results and an interpretation of test results.
9. Provide on the Architectural Floor Plan(s) as furnished by the Architect a test number identifying each test conducted.
10. Name and signature of laboratory inspector.
11. Recommendations on retesting and reinspecting.

1.06 COORDINATION

A. Owner Responsibilities: Owner will engage a qualified testing agency to perform testing indicated.

1. Owner will furnish Construction Manager with name, address, and telephone number of testing agency.
2. Payment for testing services will be made by the Owner directly to the testing agency.
    a. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be paid by the Owner and charged to Contractor by an adjustment to the Contract Sum through a Change Order.

B. Testing Agency Responsibilities: Cooperate with Architect, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken.
3. Perform tests and submit a certified written report of each test, inspection, and similar quality-control service to Owner, Architect, Construction Manager and Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
5. Do not perform any duties of Contractor.

C. Contractor Responsibilities: Coordinate sequence of activities to accommodate required testing services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities. Notify agency sufficiently in advance of operations to permit assignment of personnel.
2. Acclimate enclosed spaces to the anticipated occupied temperature and humidity as required by the manufacturer of the specified flooring material(s) and in accordance with ASTM testing requirements.
3. Cooperate with agencies performing required tests and inspections, provide reasonable auxiliary services as requested. Provide the following:
    a. Access to the Work.
    b. Incidental labor and facilities necessary to facilitate tests and inspections.
    c. Security and protection for testing and inspecting equipment at Project site.
4. Project Meeting: Schedule and conduct project meeting not less than 30 days prior to flooring installation to discuss testing requirements, specifications and locations prior to testing. Attendees shall include Owner, Architect, Construction Manager, Contractor, Testing Agency, and adhered floor installer representatives.

1.07 CLOSE-OUT: also comply with the requirements of Section 01 77 00 – Contract Closeout.

A. Reports: Final Reports related to Item 1.06.

B. As-Builts: Not required

C. Operation and Maintenance Data: None required.

D. Extra Materials: None required.

E. Extended Warranty: Refer to specific Floor Finish Specification Sections for requirements. Comply with the requirements of the General Condition Article 3.5 and Section 01740.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment to be provided by Testing Agency.

B. American Moisture Test, Inc. www.dometest.com (866) 670-9700

1. ASTM F1869 Moisture Vapor Emission Test kits
2. ASTM F-2170 In-Concrete Relative Humidity Testing System
3. ASTM F-710 Alkalinity-pH wide range 1 – 14pH meter

PART 3 - EXECUTION

3.01 EXAMINATION

Site: Weatherproofed, doors installed and windows secured. Do not start testing process when site has standing water, surface contaminates, exposed to exterior conditions or concrete installation is less than 90 days of age.

3.02 PREPARATION

Contractor Responsibilities:

1. Preparation of Substrates:
    a. Prepare concrete substrates according to ASTM requirements.
    b. Verify that substrates are dry and free of curing compounds, sealers, and hardeners for vapor emission testing per ASTM F-1869.
    c. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
2. Temperature and Humidity: Maintain site at the temperature and humidity conditions to those anticipated during normal occupancy and maintain these conditions 48 hours prior and during testing period. If meeting this criteria is not possible, then minimum conditions should be 75± 10°F and 50± 10% relative humidity.
    a. When a building is not under HVAC control, record temperature and humidity at start and end of testing using a portable data logging system.

3.03 TESTING

Testing: Testing Agency shall perform tests as follows:

1. Water vapor emission testing, ASTM F 1869.
    a. Perform all gram scale weights on site.
    b. Expose dome for 60 to 72 hours.
    c. Report results as pounds of emission per 24 hours per ASTM F-1869.
    d. Perform subfloor moisture testing in accordance with the Manufacturer's requirements for each floor system type. Do not proceed with flooring

installation until results of moisture tests are acceptable. All test results shall be documented and retained

2. In-Concrete Relative humidity testing, ASTM F 2170.
    a. Satisfactory results shall have a maximum 75 percent relative humidity level measurement.
3. Alkalinity Testing:
    a. Apply neutral-pH solution to form a 1-inch diameter circle directly to interior of moisture dome.
    b. Allow to absorb into concrete for 1 minute.
    c. Apply flat tip pH meter to solution and document result as required by manufacturer.
    d. Perform pH tests on concrete floors regardless of their age or grade level in accordance with the Manufacturer's requirements for each floor system type. PH level shall not exceed range of the Manufacturer's requirements for each floor system type. All test results shall be documented and retained

B. Adhered floor coverings shall not be installed in areas where satisfactory test results have not been obtained.

C. Consult Architect on remedial measures to reduce concrete levels prior to installing flooring. Installation of flooring deems acceptance of on-site conditions for a warranted application.

3.04 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

B. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."

C. Protect construction exposed by or for quality-control service activities.

D. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

*****END OF SECTION*****

SECTION 07 10 00

WATERPROOFING AND DAMPROOFING

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 SCOPE OF WORK

Work included: Provide and install membrane waterproofing where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

1.03 QUALITY ASSURANCE

A. This Contractor shall examine all surfaces before commencing work to see that they are in proper condition to receive his work. All surfaces shall be dry, smooth and clean. The Contractor shall immediately notify the Architect, in writing, of any defective work by others that might prevent him from properly performing his work in a first-class manner in accordance with these Specifications. He shall not proceed with any work until such defects are remedied and work approved by the Architect. This Contractor shall apply his work during normal working hours so that the project manager may have the opportunity to oversee the actual operation.

B. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

C. The Contractor shall see that all sleeves, metal work, flashings and counter flashings, to be furnished and/or installed under other divisions of the Specifications, are properly installed and assume full responsibility for the water-tightness of all such work.

D. Guarantee: Written guarantee is required from the applicator, guaranteeing this work against defective workmanship for a period of two years from date which the Owner records the Notice of Completion.

E. Certification: Upon completion, issue to the Architect a Certificate of Inspection and Compliance indicating that the completed work meets all the requirements of these Specifications and the manufacturer's printed instructions.

1.04 SUBSTITUTIONS

Substitutions will be considered per Section 01 25 00.

1.05 SUBMITTALS

A. In accordance with Section 01 33 00.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Materials list of items proposed to be provided under this Section;

2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;

3. Manufacturer's recommended installation procedures which, when accepted by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.

C. Provide approved written guarantee per system specified; refer to Application Specification of manufacturer.

PART 2 -- PRODUCTS

2.01 MATERIALS

A. Membrane or membrane assemblies for concrete walls behind berms shall be such as to provide a watertight condition for the life of the building and shall be a waterproofing Contractor approved by the manufacturer as manufactured by W.R. GRACE & CO. System shall apply Bituthene Waterproofing System 3000.

1. Bituthene 3000 Waterproofing Membrane is a factory-made composite product with a minimum thickness of 60 mils (1.5 mm). It consists of 56 mils (1.4 mm) of rubberized asphalt and 4 mils (0.1 mm) of cross-laminated polyethylene film. Bituthene 3000 is supplied in rolls 36" (0.9m) wide and 60' (18.3 m) long. The rubberized asphalt is covered with release paper that is removed during installation. The membrane is self-adhesive and cold applied. No special adhesive or equipment is necessary to form laps.

2. Physical Properties - Bituthene Liquid Membrane LM-3000:

Property:	Typical Value:	Test Method:
Solids Content	100%	ASTM D-1644
Elongation	250%	ASTM D-412
Peel Adhesion	5 lb./inch width	See footnote 1
Pliability (180° bend over 1" mandrel)	Unaffected at -25°F	ASTM D-146
Hydrostatic head	75 ft. min.	See footnote 2

Footnotes:

1. Liquid Membrane is applied to dry concrete blocks and cured for 7 days. Membrane is then peeled from the concrete blocks at a 90° angle.

2. Hydrostatic head tests are performed by applying liquid membrane on primed concrete, then sealing the waterproofed concrete to a pressure chamber. Water is introduced under pressure equivalent to 75 head feet.

3. Elastomeric membrane 3000 and 3100:

Property:	Typical Value:	Test Method:
Color	Dark gray-black	
Pliability (180° bend over 1" mandrel)	Unaffected at -25°F (-32°C)	ASTM D-146
Tensile strength: membrane	250 (psi) minimum	ASTM D-412
Tensile strength: film	4000 (psi) minimum	ASTM D-412 (Die C) modified
Elongation - ultimate failure of rubberized asphalt (%)	300 minimum	ASTM D-412 (Die C) modified
Cycling over crack	No effect after 100 cycles at 15°F (-26°C)	See footnote 1
Cycle over 1" joint	No effect after 1000 cycles at 15°F (-26°C)	See footnote 1
Puncture resistance-Bituthene Membrane (lb.)(stretched by blunt object)	40 minimum	ASTM E154
Puncture resistance: Polyethylene film	250 minimum (in. oz. tear)	ASTM D781 (Impact from sharp object)
Peel Adhesion	(Lb./in. width)	

Property:	Typical Value:	Test Method:
Resistance to hydrostatic head	150 ft. of water minimum	See footnote 2
Exposure to fungi in soil 16 wks	Unaffected	GSA-PBS 07111
Permeance-perms	0.1 Maximum 0.2 (Grains/sq.ft./in.Hg)	ASTM E-96 Method B
Water Absorption: 72 hrs	0.25 maximum (% By weight)	ASTM D-1228

Footnotes:

1. Membrane is applied across two primed blocks with no separation between blocks. At -15°F. blocks are pulled apart to 1/4", then returned to original position. Cycle is repeated 100 times. For joint cycling, the blocks are double covered with membrane, separated by 1", then cycled at -15°F between 3/4" and 1 1/4" a minimum of 1000 cycles.
2. Hydrostatic head tests are performed by applying membrane on primed concrete, then sealing the waterproofed concrete to a pressure chamber. Water is introduced to 150 head feet.

B. Bituthene Primer P-3000 is a rubber-based primer in solvent specifically formulated to provide good initial adhesion and excellent permanent adhesion of Bituthene Waterproofing Membranes.

C. Bituthene Elastomeric Mastic EM-3000 is rubberized asphalt base mastic.

D. Bituthene Liquid Membrane LM-3000 is a two-component, elastomeric cold-applied mastic grade material.

E. Bituthene Protection Board PB-3000 is lightweight, expanded polystyrene having a nominal density of 1.0 lb./cu. ft.

1. Bituthene PB-3000 shall have the following physical properties:

Property:	Typical Value:	Test Method:
Nominal Density	1.0 lb./cu. ft.	
Thermal Conductivity K factor (BTU/Hr./Sq. Ft./F.In.)	.24 @ 40°F .26 @ 75°F	ASTM C-177
Thermal Resistance (R-Value)	1" thickness = 4 3/4" thickness = 3	ASTM C-177

F. Bituthene Protection Board Adhesive PBA-3000 is a fast drying, rubber-based cement.

G. All materials shall be furnished by the manufacturer whose specification is used to the extent of his standard and/or stock materials. Materials unable to be furnished by the manufacturer shall meet his reference specification requirements.

1. Contractor shall furnish a statement signed by the manufacturer or his authorized representative that the materials to be supplied are proper for the use indicated and that the manufacturer is in agreement with the Contractor's use of these material systems as they are applicable to this installation.
2. All materials shall be delivered to the site in the original unbroken manufacturer's wrapping material with the original labels thereon.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Do not proceed until unsatisfactory conditions are corrected.

D. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

A. Verify that surfaces are solid, free of frozen matter, loose particles, cracks, pits, rough projections, and foreign matter detrimental to adhesion and application of waterproofing.

B. Do not apply waterproofing to damp, frozen, dirty, dusty, or deck surfaces unacceptable to manufacturer.

C. The surface shall be inspected by a representative of the coatings manufacturer and by the waterproofing Contractor. A written notice to the prime Contractor shall be provided to indicate any substrate deficiencies that must be corrected prior to application of the waterproofing coatings. The start of the application work shall not commence until acceptance of the surface by the waterproofing Contractor and the representative of the manufacturer.

D. Surface preparation: A smooth monolithic concrete surface is required. A broom surface is not acceptable. The concrete surface shall be dry, frost free, clean and cured a minimum of seven days prior to the application. The primer and membrane surface shall be free of voids, spalled areas, sharp projections, loose aggregate, and form release agents. Concrete curing compounds containing oil, wax or pigments shall not be used. Form release agents shall be the self-dissipating type that will not transfer to the concrete. Any surface defects such as cracks, holes or cavities shall be filled and finished flush with a Portland cement grout or concrete. Top surfaces of projecting ledges, below grade, except footings, shall be finished to a steep bevel with Portland cement mortar. Smooth concrete block walls shall be protected with membranes by striking off joints flush with surface.

3.03 INSTALLATION

A. Foundation Walls and Vertical Surfaces

1. General: The membrane, when in place, must withstand a minimum static ground water pressure of 150 feet (46 m).

2. Priming: Application of primer shall be limited to what can be covered by Bituthene Waterproofing Membrane in a given workday. Primed areas not covered by membrane during the workday will be re-primed. Apply primer by spray, roller or brush at a rate of 250-350 square feet per gallon. Roller should be a natural material such as lamb's wool, having a nap of approximately one inch. Primer shall be applied to a clean, dry, frost-free and dust-free surface. Sufficient primer must be used on the dry surface to condition it to a dust-free state suitable for the application of Bituthene Waterproofing Membranes. Coverage of primer will vary due to the texture and porosity of the surface to receive the primer.

   a. Bituthene Primer P-3000 should not be applied below 40°F (5°C) on vertical surfaces. At temperatures below 40°F (5°C), Bituthene P-3100 Primer must be used and it may be used up to 90°F (32°C). Allow P-3000 to dry one hour or until tack-free. Allow P-3100 to dry 30 minutes.

3. Membrane Installation: Apply Bituthene Waterproofing Membrane vertically in sections of 8 feet in length or less. On higher walls apply two or more sections with the upper overlapping the lower by at least 2-1/2" (64 mm). Press all membrane in place with heavy hand pressure or rollers during application. Two piles of Bituthene Membrane are recommended for below grade or earth shelter applications on any wood surfaces.

4. Sealing Edges: Bituthene Waterproofing Membrane shall be applied over the edge of the slab or over the top of the foundation or parapet wall. If the membranes are

terminated on the vertical surface, a reglet or counter flashing may be used or the membrane may be terminated directly on the vertical surface by pressing very firmly to the wall. Press the edges with a metal or hardwood tool such as a hammer or knife handle. Apply a troweled bead of Bituthene EM-3000 to all vertical and horizontal terminations. Bituthene Liquid Membrane LM-3000 can be used as an alternative method.

5. Sealing Seams: All edges and seams must be overlapped at least 2-1/2" (64 mm). Apply succeeding sheets with a minimum 2-1/2" (64 mm) overlap and stagger end laps. Roll or press the entire membrane firmly and completely as soon as possible. Patch misaligned or inadequately lapped seams with Bituthene Membrane. Slit any fish mouths, overlap the flaps, and repair with a patch of Bituthene and press or roll in place. The edges of the patch shall be sealed with a troweling of EM-3000. Laps within 12" (300 mm) of all corners shall be sealed with a troweling of EM-3000.

6. Corner Forming: Outside corners must be free of sharp edges. Inside corners should receive a fillet formed with Liquid Membrane LM-3000, latex modified cement mortar (such as Daraweld C mixed with cement mortar) or epoxy mortar. Do not use fiber or wood cants. One of two methods may be used for treating corners:

   a. Apply Bituthene Liquid Membrane LM-3000 six inches (150 mm) in each direction from the corner and form a fillet with a minimum 3/4" (19 mm) face.

   b. Install an 11" (280 mm) minimum strip of Bituthene membrane centered on the corner. Install Bituthene Membrane over the treated inside and outside corners.

7. Protection of Membrane: The Bituthene Protection System shall be used on foundation walls and vertical surfaces subject to damage from other trades.

B. Horizontal Surfaces

1. Priming: Application of primer shall be limited to what can be covered with Bituthene Waterproofing Membrane in a given workday. Primed areas not covered by membrane during the workday shall be re-primed. Apply by spray, roller or brush at a rate of 250 to 350 square feet per gallon. Roller should be a natural material such as lamb's wool, having a nap of approximately one inch (25 mm). Primer shall be applied to a clean, dry, frost-free and dust-free surface. Rollers should be dipped into pans to avoid pouring primer directly on the deck and creating puddles. Sufficient primer must be used to condition the surface to a dry, dust-free stale suitable for the application of Bituthene Waterproofing Membranes. Coverage of primer will vary due to the texture and porosity of the surface to receive the primer.

   a. Bituthene P-3000 Primer should not be applied below 25°F (-4°C) on horizontal surfaces.

2. Membrane Installation: Bituthene Waterproofing Membrane shall be applied to the primed surface starting at the low point. Successive sheets should overlap preceding ones by 2-1/2" (64 mm). Two plies of Bituthene Membrane are recommended for below grade or earth shelter applications on any wood surfaces. All membrane shall be firmly rolled as soon as possible to minimize bubbles. Roller shall be a linoleum roller or standard water filled garden roller less than 30" (760 mm) wide, weighing approximately 75 pounds (34 kg) when filled. Cover the face of the roller with a resilient material such as 1/2" (13 mm) plastic foam or two wraps of indoor-outdoor carpet to allow the membrane to fully contact the primed substrate. Apply a double layer of Bituthene Membrane around posts or projections at least 6" (150 mm) in all directions and seal all terminations with Bituthene EM-3000. At drains, apply a bead of EM-3000 over a double layer of membrane under clamping

rings. Apply EM-3000 at all terminations and at all "T" joints at the end of each workday.

a. An alternate method is to apply Bituthene Liquid Membrane LM-3000 around posts and protrusions, overlapping the sheet membrane a minimum of 2" (50 mm). At drains, apply LM-3000 from the center of the drain out to the sheet membrane overlapping it by a minimum of 2" (50 mm).

3. Sealing Edges: Bituthene Waterproofing Membrane shall be turned up on surrounding walls and terminated into a reglet or under counter flashing, or the membrane may be terminated directly on the vertical surface by pressing very firmly to the wall. Press edges with a metal or hardwood tool such as a hammer or knife handle. Apply a troweled bead of Bituthene Em-003000 to all vertical and horizontal terminations.

4. Sealing Seams: All edges and end seams must be overlapped at least 2-1/2" (64 mm). Apply succeeding sheets with a minimum 2-1/2" (64 mm) overlap and stagger end laps. Roll the entire membrane firmly and completely as soon as possible. Patch misaligned or inadequately lapped seams with Bituthene Waterproofing Membrane. Slit any fishmouths, overlap the flaps, and repair with a patch and press or roll in place. The edges of the patch shall be sealed with a troweling of EM-3000. Laps within 12" (300 mm) of all corners shall be sealed with a troweling of EM-3000.

5. Corner Forming: Outside corners must be free of sharp edges. Inside corners should receive a fillet formed with Liquid Membrane LM-3000, latex modified cement mortar (such as Daraweld C mixed with cement mortar) or epoxy mortar. Do not use fiber or wood cants. One of two methods may be used for treating corners:

a. Apply Bituthene Liquid Membrane LM-3000 6" (150 mm) in each direction from the corner and form a fillet with a minimum 3/4" (19 mm) face.

b. Install an 11" (280 mm) minimum strip of Bituthene Membrane centered on the corner. Install Bituthene waterproofing membrane over the treated inside and outside corners.

6. Testing of horizontal waterproofing shall be by flooding the entire waterproofed area with a minimum 2" (50 mm) head of water for 24 hours. Mark any leaks and repair when the membrane is dry. Before flood testing, ascertain from the structural engineer that the structure will withstand the dead load of the water.

7. Protection of Membrane: After testing the horizontal surfaces and allowing for the membrane to dry, apply the Bituthene Protection System to the entire horizontal surface.

*****END OF SECTION*****

SECTION 07 19 00

WATER REPELLENT COATINGS

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 DESCRIPTION

A. Work included: Provide water repellent coatings on all masonry and masonry veneer, as specified herein, and as needed for a complete and proper installation.

B. Related Work:

1. Documents affecting work of this Section include, but are not necessarily limited to, Special Conditions, and Sections in Division 1 of these Specifications.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Manufacturer's certification: Make required arrangements and pay the costs for a visit to the job site by an authorized representative of the manufacturer of the accepted water repellent coating, who shall inspect and certify that:

1. The surfaces to which the water repellent coating was to be applied were in proper condition to receive that application;

2. The installers were properly trained in the manufacturer's recommended installation procedures and were prepared to use the application equipment recommended by the manufacturer; and

3. The materials delivered to the job site were those accepted by the Architect for the work of this Section.

C. Comply with State of California Volatile Organic requirements in accordance with ASTM D-4457 and ASTM D-3960.

1.04 SUBSTITUTIONS

Substitutions will be considered per Section 01 25 00.

1.05 SUBMITTALS

A. In accordance with Section 01 33 00.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Materials list of items proposed to be provided under this Section;

2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;

3. Manufacturer's recommended installation procedures which, when accepted by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.

4. Samples of masonry veneer unit and concrete unit masonry with water repellent coating applied.

C. Upon completion of the work of this Section, and as a condition of its acceptance, deliver to the Architect two copies of the manufacturer's certificate required under Paragraph 1.02-B above.

1.06 WARRANTY

Upon completion of the work of this Section, and as a condition of its acceptance, deliver to the Architect two copies of a written warranty signed by the Contractor, the water repellent coating application subcontractor, and the water repellent coating manufacturer, under which:

1. The three parties mutually agree to maintain the water repellent coated surface free from the penetration of water for a period of two years following Date of Owner accepted Final Completion; and

2. The water repellent coating manufacturer agrees to provide water repellent coating materials as required for that purpose for a period of five years following Date of Owner accepted Final Completion; and

3. These warranty services will be provided at no additional cost to the Owner.

PART 2 -- PRODUCTS

2.01 MATERIALS

A. At all unit masonry and masonry veneer walls, provide one of the following products or equal accepted in advance by the Architect:

1. "Hydrozo Enviroseal Double 7 for brick" manufactured by Hydrozo Coatings Company, Lincoln, NE (402) 474-6981 or (800) 422-1902.

2. Approved equal, which has been submitted under requirements of Section 01340.

B. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Do not proceed until unsatisfactory conditions are corrected.

D. Beginning of installation means acceptance of conditions.

3.02 INSTALLATION

Apply sufficient coats of the accepted material to achieve a consistent and uniform appearance, free from runs and sags, and with a uniformly resistive surface, which will successfully prevent penetration of water through the walls for the required period of warranty.

3.03 TESTING AND INSPECTING

A. Twenty days after completion of this portion of the Work, and as a condition of its acceptance, demonstrate by running water test that the work of this Section will successfully repel water.

1. Notify the Architect at least 72 hours in advance, and conduct the test in the Architect's presence.

2. By means of an outrigger, or similar acceptable equipment, place the nozzle of a 3/4" garden hose at a point approximately 10'-0" away from the top of the wall where accepted by the Architect, aiming the nozzle at a slight downward angle to direct the full stream of water onto the wall.

3. Run the water onto the wall at full available force for not less than four hours.

4. Upon completion of the four-hour period, inspect the interior surfaces of the wall for evidence of moisture penetration.

B. If evidence of moisture penetration is discovered, apply an additional coat of the accepted water repellent to the exterior surface in areas directed by the Architect, repeating the application and the testing (at no additional cost to the Owner) until no evidence of moisture penetration is found.

***** END OF SECTION *****

SECTION 07 21 00

THERMAL INSULATION

PART 1 -- GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract Requirements and Division 1, General Requirements apply to this Section

1.02 SUMMARY

A. Furnish and install Thermal Insulation indicated on the Drawings and as specified herein.

B. The principal items of work include:

1. Thermal Insulation within roof.
2. Thermal Insulation within exterior walls.
3. Thermal Insulation within interior walls.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Upon completion of this portion of the Work, complete and post a certificate of insulation compliance in accordance with pertinent requirements of governmental agencies having jurisdiction.

1.04 SUBMITTALS

A. Product data:

1. Materials list of items to be provided under this Section.
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
3. Manufacturer's recommended installation procedures which, when accepted by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.

1.05 SUBSTITUTIONS

Substitutions will be considered per Section 01 25 00.

1.06 EXTENDED WARRANTY

A. Extended Warranty:

1. Warranties listed in this Section shall be in addition to, and not a limitation of other rights the owner may have under the contract documents.
2. Contractor Guarantee: Contractor guarantees the work covered by this specification against all defects in material and workmanship for a period of not less than FIVE (5) years from the date the Owner records Notice of Completion.

PART 2 -- PRODUCTS

2.01 MATERIALS

A. Provide thermal insulation as indicated on Drawings.

B. All insulation shall be inorganic glass fiber insulation. Insulation shall comply with ASTM Testing Standards. Fire Hazard Classification, Flame Spread Index, Smoke Developed Index, Combustibility, and Fire Endurance Ratings as required by Code.

C. Insulation shall be as manufactured by Certain-Teed, Johns-Manville, Owens-Corning, or Architect approved equal.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed.

B. Verify that specified items may be installed in accordance with the approved design.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

A. Verify adjacent materials are dry and ready to receive installation.

B. Verify mechanical and electrical services within walls have been installed and tested.

3.03 INSPECTION

A. Before any installation is started, determine that the other work is suitable to receive insulation.

B. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

C. Remove or protect against projections in construction framing that may damage or prevent proper insulation.

3.04 INSTALLATION

A. All work shall be performed by licensed applicators, shall comply with the recommendations of the manufacturer and the National Association of Insulation Manufacturers.

B. Install insulation with factory applied membrane facing warm side of building spaces. Lap ends and side flanges of membrane over and between framing numbers. Secure in place. Tape seal butt ends and lapped side flanges. Tape seal tears or cuts in membrane.

C. Trim insulation neatly to fit spaces. Use batts free of damage. Install batt insulation, in wall spaces without gaps or voids.

D. Install Insulation in all indicated walls from floor to underside of roof. Secure insulation with 19-gage wire or 1" wide, 20 gage steel strips. Architect shall approve all insulation details, including methods of fastening, before commencement of the work.

3.05 CLEAN UP AND DISPOSAL

At frequent intervals during and again upon completion of work, remove from building and working premises tools and equipment, surplus materials, all rubbish and debris of whatever nature not caused by other trades, and leave the work in a clean, orderly and acceptable condition approved by the Architect.

***** END OF SECTION *****

SECTION 07 22 00

ROOF AND DECK INSULATION

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 DESCRIPTION

A. Work included: Provide roof and deck insulation where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Related Work:

1. Documents affecting work of this Section include, but are not necessarily limited to, Special Conditions, and Sections in Division 1 of these Specifications.

2. Roofing.

3. Section 07 60 00: Flashing and Sheet Metal.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. In addition to complying with all pertinent codes and regulations of governmental agencies having jurisdiction, comply with the following:

1. Roof and deck insulation shall be FM approved and U. L. Classified.

2. Conform to Federal Specifications HH-1-1972/Gen, HH-1-1972/1, 2.

3. Meet California Quality Standards Registry Number CA-7006 (UT).

1.04 SUBSTITUTIONS

Substitutions will be considered per Section 01 25 00.

1.05 SUBMITTALS

Provide in accordance with Section 01 33 00.

1.06 PRODUCT HANDLING

Comply with pertinent provisions of Section 01 66 00.

PART 2 -- PRODUCTS

2.01 MATERIALS

A. Insulation System:

1. Provide tapered and non-tapered expanded polystyrene thermal roof insulation in flutes of metal roof decks with the following physical properties:

Property:	ASTM Test Method:	Specification:
- Nom. Density LB/FT^3		2.0
Thermal Resistance/R-Value (1 inch thickness)	C177/C518	4.76 at 40° F 4.35 at 75° F

Property:	ASTM Test Method:	Specification:
Compressive resistance	D1621	25 (minimum psi)
Density	C303/D1622	1.80 (min. lb./ft.^{3})
Flexural strength - Transverse	C203	55-75 (minimum psi)
Water absorption by volume	C272	< 2%
Water vapor permeability	E96	0.60-2.0 Maximum (perm-inch)
Dimensional stability	D2126	< 2% (% Linear change, max.)
Flame spread	E84	< 25

2. Acceptable manufactures - subject to compliance with requirements, provide products of one of the following:

   a. Cello Foam Type IX (800) 241-3634.

   b. Atlas ACFoam-II (800) 477-1476.

   c. NRG Barriers: PSI-25 (800) 343-1285.

B. Fastener System:

1. Provide a roof insulation fastener system for use in fastening insulation to steel decks. System shall be Factory Mutual approved for I-90 rating. Use manufacturer's recommendations as submitted and approved. Fastening shall be similar to:

2. Deck screws for metal deck applications shall be #12 gage and made of case-hardened carbon steel with gimlet point and Perma-Seal coated.

3. Stress plates shall be high-density polyethylene, 3-1/4" diameter, or G-90 galvanized steel, 3" square.

4. Acceptable Products: Rawl Deck Screw, and Rawl Stress Plates as manufactured by Rawlplug Company, Inc., New Rochelle, NY, or equal products of other manufacturers.

2.02 OTHER MATERIALS

Provide other materials not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

PART 3 -- EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed.

B. Correct conditions detrimental to timely and proper completion of the Work.

C. Remove or protect against projections in construction framing which may damage or prevent proper insulation.

D. Before roof insulation application is started, remove trash, debris, oil, water, moisture and contaminates which may affect the attachment of the insulation to the surface. All depressions, holes, deformations, etc. shall be made smooth prior to the roof insulation

application.

E. The deck shall be sufficiently rigid to support the roofers and mechanical equipment without deflection that will strain or rupture any of the roofing components or deform the deck.

F. Treated wood insulation stops, the same thickness as the insulation, shall be mechanically fastened at the edges of the deck and around all projection and openings through the deck.

G. Do not proceed until unsatisfactory conditions are corrected.

H. Beginning of installation means acceptance of conditions.

3.02 INSTALLATION

Install the work of this Section in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as accepted by the Architect, anchoring all components firmly into position.

1. Deck screws shall penetrate metal deck a minimum of 1/2 inch.
2. Provide a minimum of one (1) fastener per 3 linear foot of surface area.
3. Cut insulation to fill flutes of metal deck prior to installation of roofing.

3.03 CLEANING

Remove trash and debris from the roof insulation surface prior to the application of the roofing membrane.

3.04 PROTECTION

A. Installed insulation shall not be left exposed to the weather. It shall be covered and waterproofed at once.

B. All exposed edges left at the end of a day's work shall be temporarily sealed by lapping roofing membrane over the exposed edge of the insulation and sealing it in place. Remove this membrane seal when work resumes. Installed insulation that becomes wet and/or damaged shall be removed and replaced with solid and dry materials.

C. Protect installed insulation and membrane from roof traffic damage and/or abuse by using surface protection such as plywood in areas where heavy and/or repeated traffic is anticipated both during and after installation.

***** END OF SECTION *****

SECTION 07 25 00

WEATHER BARRIER

PART 1 -- GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract Requirements and Division 1, General Requirements apply to this Section.

1.02 SUMMARY

A. Weather barrier membrane.

B. Weather barrier membrane flashing

1.03 QUALITY ASSURANCE

Installation shall be in accordance with weather barrier manufacturer's installation guidelines and recommendations.

1.04 SUBSTITUTIONS

Substitutions will be considered per Section 01 25 00.

1.05 SUBMITTALS

A. Provide in accordance with Section 01 33 00.

B. Submit the following:

1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
2. Submit manufacturer current technical literature for each component.
3. Samples: Weather Barrier Membrane, minimum 8-1/2 inches by 11 inch.

C. Mock-Up

1. Pre-installation Meeting: Hold a pre-installation conference, two weeks prior to start of weather barrier installation. Attendees shall include Contractor, Architect, installer, Owner's Representative, and weather barrier manufacturer's designated representative
2. Install mock-up using approved weather barrier assembly including fasteners, flashing, tape and related accessories per manufacturer's current printed instructions and recommendations.
    a. Mock-up size: [10 feet by 10 feet]
    b. Mock-up Substrate: Match wall assembly construction, including window opening.
    c. Mock-up may remain as part of the work.

1.06 PRODUCT HANDLING

Comply with the requirements of Section 01 66 00.

1.07 CLOSE-OUT: also comply with the requirements of Section 01 78 00 – Contract Closeout.

A. Reports: Provide copy of Reports related to Item 3.08.

B. As-Builts: Not required

C. Operation and Maintenance Data: None required.

D. Extra Materials: None required.

E. Extended Warranty:

1. Comply with the requirements of General Condition Article 3.5 and Section 01 74 00.
2. Warranties listed in this Section shall be in addition to, and not a limitation of other rights the owner may have under the contract documents.
3. Weather barrier manufacturer's warranty for weather barrier for a period of ten years from date of Substantial Completion.

PART 2 -- PRODUCTS

2.01 MANUFACTURER

E.I. du Pont de Nemours and Company ; 4417 Lancaster Pike, Chestnut Run Plaza 721, Wilmington, DE 19805; 1.800.44TYVEK (8-9835); http://construction.tyvek.com

2.02 MATERIALS

Basis of Design: DuPont™ Tyvek® CommercialWrap® D and related assembly components.

2.03 ACCESSORIES

A. Seam Tape: 3" DuPont™ Tyvek® Tape as manufactured by DuPont.

B. Fasteners:

1. Steel Frame Construction DuPont™ Tyvek® Wrap Cap Screws.
2. Wood Frame Construction DuPont™ Tyvek® Wrap Caps.

C. Sealants: DuPont Commercial Tyvek Sealant or equal

D. Adhesives: Loctite Pro Series or equal

E. Primers: Loctite Pro Series or equal

F. Flashing

1. DuPont™ FlexWrap™: Flexible membrane flashing materials for window openings and penetrations.
2. DuPont™ StraightFlash™: Straight flashing membrane materials for flashing windows and doors and sealing penetrations such as masonry ties, etc.
3. DuPont™ StraightFlash™ VF: Dual-sided flashing membrane materials for brick mold and non-flanged windows and doors.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

B. Verify that specified items may be installed in accordance with the approved design.

C. Correct conditions detrimental to timely and proper completion of the Work.

D. Do not proceed until unsatisfactory conditions are corrected.

E. Beginning of installation means acceptance of conditions.

3.02 INSTALLATION

A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendation.

B. Install weather barrier prior to installation of windows and door.

C. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.

D. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level.

E. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacture.

F. Window and Door Openings: Extend weather barrier completely over openings

G. Overlap weather barrier

1. Exterior corners: minimum 12 inches.
2. Seams: minimum 6 inches

H. Weather Barrier Attachment

Wood Frame Construction: Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommend fasteners, space 6 -18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.

3.03 SEAMING

A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.

B. Seal any tears or cuts as recommended by weather barrier manufacturer.

3.04 OPENING PREPARATION for use with non-flanged windows – all cladding types

A. Flush cut weather barrier at edge of sheathing around full perimeter of opening.

B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.05 FLASHING for use with non-flanged windows – all cladding types

A. Use the 7-inch wide FlexWrap™ with 2 by 4 framing and 9-inch wide FlexWrap™ with 2 by 6 framing.

B. Cut DuPont™ FlexWrap™ a minimum of 12 inches longer than width of sill rough opening.

C. Cover horizontal sill by aligning DuPont™ FlexWrap™ edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.

D. Fan DuPont™ FlexWrap™ at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.

E. Apply 9-inch wide strips of DuPont™ StraightFlash™ at jambs. Align flashing with interior edge of jamb framing. Start StraightFlash™ at head of opening and lap sill flashing down to the sill.

F. Spray-apply primer to top 6 inches of jambs and exposed sheathing.

G. Install DuPont™ FlexWrap™ at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.

H. Coordinate flashing with window installation.

I. On exterior, install backer-rod in joint between window frame and flashed rough framing. Apply sealant at jambs and head, leaving sill unsealed. Apply sealants in accordance with sealant manufacturer's instructions and ASTM C 1193.

J. Position weather barrier head flap across head flashing. Adhere using 4-inch wide DuPont™ StraightFlash™ over the 45-degree seams.

K. Tape top of window in accordance with manufacturer recommendation.

L. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.

3.06 OPENING PREPARATION for use with flanged windows

A. Cut weather barrier in a modified "I-cut" pattern.

1. Cut weather barrier horizontally along the bottom of the header.
2. Cut weather barrier vertically 2/3 of the way down from top center of window opening.
3. Cut weather barrier diagonally from bottom of center vertical cut to the left and right corners of the opening.
4. Fold side and bottom weather barrier flaps into window opening and fasten.

B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.07 FLASHING (for use with flanged windows)

A. Use the 7-inch wide DuPont™ FlexWrap™ with 2 by 4 framing and 9-inch wide FlexWrap™ with 2 by 6 framing.

B. Cut DuPont™ FlexWrap™ a minimum of 12 inches longer than width of sill rough opening.

C. Cover horizontal sill by aligning DuPont™ FlexWrap™ edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.

D. On exterior, apply continuous bead of sealant to wall or backside of window mounting flange across jambs and head. Do not apply sealant across sill.

E. Install window according to manufacturer's instructions.

F. Apply 4-inch wide strips of DuPont™ StraightFlash™ at jambs overlapping entire mounting flange. Extend jamb flashing 1-inch above top of rough opening and below bottom edge of sill flashing.

G. Apply 4-inch wide strip of DuPont™ StraightFlash™ as head flashing overlapping the mounting flange. Head flashing should extend beyond outside edges of both jamb flashings.

H. Position weather barrier head flap across head flashing. Adhere using 4-inch wide DuPont™ StraightFlash™ over the 45-degree seams.

I. Tape head flap in accordance with manufacturer recommendations.

J. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.

3.08 FIELD QUALITY CONTROL

Notify manufacturer's designated representative to obtain required periodic observations of weather barrier assembly installation.

3.09 PROTECTION

Protect installed weather barrier from damage.

***** END OF SECTION *****

SECTION 07 27 00

AIR BARRIERS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract Requirements and Division 1, General Requirements apply to this Section.

1.02 SUMMARY

A. Air barrier.

B. Flexible flashing.

1.03 SUBSTITUTIONS

Substitutions will be considered per Section 01 25 00.

1.04 SUBMITTALS

A. Provide in accordance with Section 01 33 00.

B. Product Data: For each type of product.

1.05 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For air barrier from ICC-ES.

B. Verification of compliance with ASTME 2357

C. Product Data: Submit manufacturer current technical literature for each component

D. Samples: Air Barrier Membrane, minimum 8-1/2 inches by 11 inch

1.06 PRE-INSTALLATION CONFERENCE

A. Contractor shall convene one week prior to commencing Work of this section, to ensure all contractors responsible for creating a continuous plane of water tightness are present.

B. Review all related project requirements and submittals, status of substrate work and preparation, areas of potential conflict and interface, availability of air barrier assembly materials and components, installer's training requirements, equipment, facilities and scaffolding, and coordinate methods, procedures and sequencing requirements for full and proper installation, integration and protection

1.07 WARRANTY

A. Provide manufacturer's standard material warranty in which manufacturer agrees to provide replacement material for air barrier sheets installed in accordance with manufacturer's instructions that fails due to material defects within 10 years of the date of Substantial Completion.

B. Provide site reports from authorized field service representative, indicating observation of weather barrier assembly installation.

PRODUCTS

2.01 AIR BARRIER

A. Air Barrier: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.

1. Basis of Design:

a. DuPont (E. I. du Pont de Nemours and Company); Tyvek CommercialWrap. http://www2.dupont.com/Tyvek_Weatherization/en_US/products/commercial/comm_commercialwrap.html?src=partner_comm_commercialwrap

b. DuPont (E. I. du Pont de Nemours and Company); Tyvek CommercialWrapD. http://www2.dupont.com/Tyvek_Weatherization/en_US/products/commercial/comm_commercialwrapd.html

c. Vaproshield LLC; WallShield. http://www.vaproshield.com/products/wallshield

d. Or approved equal

B. Performance Characteristics:

1. Air Penetration: 0.001 cfm/ft^2 at 75 Pa, when tested in accordance with ASTM E2178. Type I per ASTM E1677. ≤0.04 cfm/ft^2 at 75 Pa, when tested in accordance with ASTM E2357

2. Water Vapor Transmission: 12 perms or greater, when tested in accordance with ASTM E96, Method B.

3. Water Penetration Resistance: 280 cm when tested in accordance with AATCC Test Method 127.

4. Basis Weight: 2.7 oz/yd^2, when tested in accordance with TAPPI Test Method T-410.

5. Air Resistance: Air infiltration at >1500 seconds, when tested in accordance with TAPPI Test Method T-460.

6. Tensile Strength: 38/35 lbs/in., when tested in accordance with ASTM D882, Method A.

7. Tear Resistance: 12/10 lbs., when tested in accordance with ASTM D1117.

8. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E 84. Flame Spread: 10, Smoke Developed: 10.

9. Surface abrasion test: Air Barrier must have a water resistance of 280 cm as measured by AATCC 127 after ASTM D 3511has been performed on material for 6 cycles.

C. Air Barrier Seam Tape: Three inch pressure-sensitive plastic tape recommended by air barrier manufacturer for sealing joints and penetrations in air barrier.

2.02 MISCELLANEOUS MATERIALS

A. Window and Door Flashing: Self-adhesive butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

1. Basis of Design:

a. DuPont (E. I. du Pont de Nemours and Company); DuPont Flashing FlexWrap and StraightFlash.

i. Use 7 inch wide FlexWrap with 2 by 4 framing.

ii. Use 9 inch wide FlexWrap with 2 by 6 framing.

b. Vaproshield LLC; VaproFlashing, and Vapro 3D Factory Formed Corner.

c. Or approved equal.

B. Adhesives or Spray Primers

1. DuPont OSI Spray Adhesive 13.5oz

C. Sealants

1. OSI QuadMax
2. Dow Corning 732, or 799
3. Or approved equal

PART 2 - EXECUTION

3.01 EXAMINATION

A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

3.02 INSTALLATION -WEATHER BARRIER

A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations.

B. Install weather barrier prior to installation of windows and doors.

C. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.

D. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers by 6" as well as vertical overlaps. Maintain weather barrier plumb and level.

E. Window and door Openings: Extend weather barrier over jamb openings only when flanged windows are in use.

F. Overlap weather barrier

1. Exterior corners: minimum 12 inches.
2. Seams: minimum 6 inches.

G. Weather Barrier Attachment:

1. Steel or wood frame construction - attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommend fasteners, space 6-18 inches vertically on center along stud line, and 24 inches on center, maximum horizontally.

3.03 SEAMING

A. Seal seams of weather barrier with 3" seam tape at all vertical and horizontal overlapping seams.

B. Seal any tears or cuts as recommended by weather barrier manufacturer.

3.04 OPENING PREPARATION for use with non-flanged windows - all cladding types

A. Flush cut weather barrier at edge of sheathing around full perimeter of opening.

B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.05 FLASHING for use with non-flanged windows - all cladding types

A. Cut DuPont FlexWrap a minimum of 12 inches longer than width of sill rough opening.

B. Cover horizontal sill by aligning DuPont FlexWrap edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corner by working in along the sill before adhering up the jambs.

C. Fan DuPont FlexWrap at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.

D. Apply 9 inch wide stops of DuPont StraightFlass at jambs. Align flashing with interior edge of jamb framing. Start StraightFlash at head of opening and lap sill flashing down to the sill.

E. Spray-apply primer to top 6 inches of jambs and exposed sheathing.

F. Install DuPont FlexWrap at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.

G. Coordinate flashing with window installation.

H. On exterior, install backer rod in joint between window frame and flashed rough framing. Apply sealant at jambs and head, leaving sill unsealed. Apply sealants in accordance with sealants manufacturer's instructions and ASTM C 1193.

I. Position weather barrier head flap across head flashing. Adhere using 4 inch wide DuPont StraightFlash over the 45-degree seams.

J. Tape top of window in accordance with manufacturer recommendations.

K. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealing in accordance with sealant manufacturer's instructions and ASTM C 1193.

3.06 OPENING PREPARATION for use with flanged windows

A. Cut weather barrier in a modified "I-cut" pattern.

1. Cut weather barrier horizontally along the bottom of the header.
2. Cut weather barrier vertically 2/3 of the way down from top center of window opening.
3. Cut weather barrier diagonally from bottom of center vertical cut to the left and right corners of the opening.
4. Fold side and bottom weather barrier flaps into window opening and fasten.

B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.07 FLASHING for use with flanged windows

A. Cut DuPont FlexWrap a minimum of 12 inches longer than width of sill rough opening.

B. Cover horizontal sill by aligning DuPont FlexWrap edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.

C. Fan DuPont FlexWrap at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.

D. On exterior, apply continuous bead of sealant to wall or backside of window mounting flange across jambs and head. Do not apply sealant across sill.

E. Install window according to manufacturer's instructions.

F. Apply 4 inch wide strips of DuPont StraightFlash at jambs overlapping entire mounting flange. Extend jamb flashing 1 inch above top of rough opening and below bottom edge of sill flashing.

G. Apply 4 inch wide strip of DuPont Straightflash as head flashing overlapping the mounting flange. Head flashing should extend beyond outside edges of both jamb flashings.

H. Position weather barrier head flap across head flashing. Adhere using 4 inch wide DuPont StraightFlash over the 45-degree seams.

I. Tape head flap in accordance with manufacturer recommendations.

J. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.

3.08 FIELD QUALITY CONTROL

A. Notify manufacturer's designated representative to obtain required periodic observations of weather barrier assembly installation.

3.09 PROTECTION

A. Protect installed weather barrier from damage.

*****END OF SECTION*****

SECTION 07 41 00

METAL WALL PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. SterraCore aluminum-faced composite panels, attachments and sealants.

1.2 RELATED SECTIONS

A. Section 05 10 00 – Supporting from Structure

B. Section 06 10 00 – Rough Carpentry

C. Section 07 21 00 – Thermal Insulation

D. Section 07 60 00 – Flashing and Sheet Metal

E. Section 07 90 00 – Joint Sealants

F. Section 09 21 16 – Gypsum Board Systems

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM) B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

B. American Society for Testing and Materials (ASTM) C481 - Laboratory Aging of Sandwich Constructions.

C. American Society for Testing and Materials (ASTM) E72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.

D. American Society for Testing and Materials (ASTM) E84 - Surface Burning Characteristics of Building Materials.

E. American Society for Testing and Materials (ASTM) E283 - Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors.

F. American Society for Testing and Materials (ASTM) E289 - Linear Thermal Expansion of Rigid Solids with Interferometry.

G. American Society for Testing and Materials (ASTM) E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors.

H. American Society for Testing and Materials (ASTM) E331 - Water Penetration for Exterior Windows, Curtain Walls, and Doors.

I. American Society for Testing and Materials (ASTM) D1781 - Climbing Drum Peel for Adhesives.

J. American Society for Testing and Materials (ASTM) - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

K. American Architectural Manufacturers Association (AAMA) 501 – Water Penetration using Dynamic Pressure.

L. American Architectural Manufacturers Association (AAMA) 605.2 - Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.

M. American Architectural Manufacturers Association (AAMA) TIR-a11 - Maximum Allowable Deflection of Framing Systems for Building Cladding Components at Design Wind Loads.

1.4 SYSTEM DESCRIPTION

A. Design Requirements:

1. Design system to accommodate movement of components without buckling, failure of joint seals, undue stress on fasteners, or other detrimental effects when subjected to temperature and humidity ranges reasonably anticipated.

2. Design system to accommodate tolerances of structure.

B. Performance Requirements:

1. Submit test data witnessed by an independent testing agency for the following requirements:

a. Structural tests for wind loads by "Chamber Method" in compliance with ASTM E72.

1) Standard test design loading: 20 psf (960 Pa) positive and negative wind load.

2) Design panel system to withstand code imposed design loads and a deflection limit of L/180 shall apply to positive load pressures only.

3) Design panel system to withstand code imposed design loads and a deflection limit of L/175 shall apply to positive load pressures only.

b. Air Infiltration: 0.06 cfm per square foot (32 lps per square meter) air leakage under a static pressure of 1.56 psf (7.65 kg per square meter) when tested in accordance with ASTM E283.

c. Water Penetration: No uncontrolled water penetration through the standard vertical panel and sealed joints at a static pressure of 6.24 psf (30.5 kg per square meter) when tested in accordance with ASTM E331.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. 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.

C. Shop Drawings: Submit shop drawings showing layout, flashings, drainage, ventilation, vapor barriers, vapor retarders, profiles and product components, including anchorage, accessories, finish colors, patterns and textures.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 3 inches (76 mm) by 5 inches (128 mm) representing actual product, color, and patterns.

F. Quality Assurance Submittals: Submit the following:

1. Test reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria, and physical requirements.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction, approving acceptable installer and approving application method.

B. Installer Qualifications:

1. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

2. Panel Installer shall assume responsibility for all components of the exterior panel system including, but not limited to attachment to sub-construction, panel to panel joinery, panel to dissimilar material joinery, and joint seal associated with the panel system.

C. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store panels horizontally, off-the-ground, in manufacturer's unopened packaging until ready for installation.

B. Examine delivered materials upon receipt to insure that no damage has occurred during shipment. Store metal-faced composite wall panels horizontally, covered with a suitable weather tight and ventilated covering. Store metal-faced composite wall panels to ensure dryness, with a positive slope for drainage of water. Do not store metal-faced composite wall panels in contact with other materials that might cause staining, denting, or other surface damage. DO NOT allow storage space to exceed 120 degrees F (49 degrees C).

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 PROJECT CONDITIONS

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.

1.9 WARRANTY

A. Finish Warranty: Commencing on Date of Substantial Completion.

1. Provide 20-year written warranty with PVDF fluoropolymer finish color coated metal finish covering color fading, chalking, and film integrity.

2. Chalking, fading or erosion of finish measured by the following tests:

a. Finish coating shall not chalk in excess of 8 numerical ratings when measured in accordance with ASTM D659.

b. Finish coating shall not change color or fade in excess of 8 NBS units as determined by ASTM D2244.

B. Material and Installation Warranty: Commencing on Date of Substantial Completion.

1. When installed as directed by ATAS International, panels covered by this warranty are warranted not to delaminate (separate) at any ATAS produced glue line for a period of five years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: ATAS International; 6612 Snowdrift Road, Allentown, PA 18106. ASD. Tel: 610-395-8445. Toll Free: 800-468-1441. Fax: 610-395-9342. Web: http://www.atas.com

B. Or Architect approved equal.

2.2 STERRACORE ALUMINUM-FACED COMPOSITE PANELS

A. SterraCore Composite Panels as provided through ATAS International.

1. Panel Construction: Finished aluminum sheet over a corrugated polyallomer (CPA) core with backer sheet.
2. Panel Facing: Smooth face, minimum 0.032 inch thick, ASTM B209 aluminum sheet.
3. Panel Backing: Random painted aluminum sheet, minimum 0.013 inch (0.33 mm) thick, ASTM B209 aluminum sheet.
4. Panel Thickness: 6 mm (1/4 inch)
5. Fire Test Performance: ASTM E84: Class A.
6. Bond Test Performance: ASTM C481-A Cyclic Aging: Pass.
7. Finish: Kynar 500 - PVDF fluoropolymer paint system meeting AAMA 2605.
8. Finish Colors: Manufacturers Standard

B. Aluminum Composite Panel Installation System:

1. Clip & Seal System.
2. One-Piece Tight fit Extrusions

2.3 ACCESSORIES

A. Manufacturer's Sealants and Accessories: Provide manufacturer's recommended sealants and accessories for product installation.

B. Flashing: Fabricate flashing materials from 0.030 inch (0.76 mm) minimum thickness aluminum sheet painted to match the adjacent curtain wall/panel system where exposed. Provide a 12 inch (305 mm) wide lap strap under the flashing at abutted conditions and seal lapped surfaces with a full bed of non-hardening sealant.

2.4 FABRICATION

A. Panels shall be fabricated and finished as required to provide material construction and performance as specified and as required by manufacturer to comply with warranty provisions.

1. Tolerances: Length and Width: plus or minus 1/16 inch (1.6mm). Squareness (Diagonals): equal within 1/8 inch (3.2mm).

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Examine substrates, areas, and conditions, with substrate installer present, for compliance with requirements for structural soundness, installation tolerances, metal panel supports, and other conditions affecting performance of work.

1. Examine primary and secondary wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances listed below.

a. 1/4 inch (6 mm) in any 20 feet (6 m) length vertically or horizontally.

b. 1/2 inch (12 mm) in any building elevation.

2. Examine solid wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required.

3. For the record, prepare written report, endorsed by panel installer and substrate installer, listing remedy for conditions detrimental to performance of work.

C. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before metal panel installation.

D. Proceed with installation only after all unsatisfactory conditions have been corrected.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 INSTALLATION

A. Comply with manufacturer's installation guides including product technical bulletins, product catalog installation instructions, and product carton instructions for installation type selected.

B. Work shall be done and completed in a thorough and workmanlike manner by mechanics skilled in their various trades.

C. Caulk Installation:

1. Use only approved sealants as described in ATAS International's Installation Guidelines.

2. The sealant manufacturer's instructions shall be followed in preparing and installing sealants.

3. Joints to receive sealant shall be clean, dry and free from dust, grit and contaminants.

4. The sealant shall completely fill the glazing pockets.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

3.4 CLEANING AND PROTECTION

A. Protection: Protect installed product and finish surfaces from damage during construction.

B. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

C. Protect installed products until completion of project.

D. Touch-up, repair or replace damaged products before Substantial Completion.

***** END OF SECTION *****

SECTION 07 50 00

ADHERED FELTBACK PVC THERMOPLASTIC MEMBRANE ROOFING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope

To install an adhered Single Ply Thermoplastic (PVC) Roofing Membrane with flashings and other system components to comprise a roofing system for the Nuview Library, Nuevo, CA. Install new tapered insulation followed by ¼" Dens Deck mechanically fastened over the sloped plywood decking. Adhere single ply roof membrane. Provide details as shown on the roof plan and detail sheet.

B. Related Work: The work includes but is not necessarily limited to the installation of:

1. Substrate Preparation
2. Wood Blocking
3. Separation Board
4. Tapered Insulation
5. Roof Membrane
6. Fasteners
7. Adhesive for Flashings
8. Roof Membrane Flashings
9. Walkways
10. Metal Flashings
11. Sealants
12. Clad Edge Metal

C. Upon successful completion of work the following warranties may be obtained:

1. Manufacturer Warranty
2. Roofing Contractor Warranty

1.02 QUALITY ASSURANCE

A. Membrane Manufacturer must certify that the proposed equal has a membrane thickness equal to the membrane thickness specified 60 mils thick, without ASTM (+/-) mil tolerance, as such tolerance is not acceptable. The felt backing shall not be included when measuring membrane thickness.

B. Membrane must have at least thirty (30) mils of waterproofing polymers above the reinforcement as documented in the Typical Physical Properties section of the Manufacturer's published Product Data Sheet for 60 mil membranes.

C. Roofing Membrane Manufacturer must have a demonstrated performance history of producing thermoplastic membranes no less, in duration of years, than the warranty duration specified.

D. Membrane Manufacturer must provide a list of at least 10 (ten) projects in which the submitted roofing material has been performing for the specified warranty duration. Membranes with modified formulation changes and undocumented proven performance will not be accepted.

E. Membrane Manufacturer must not require the use of membrane cut edge sealant at any location. This is a maintenance item that the Owner does not accept.

F. Manufacturer's warranty must have "No Dollar Limit" for the replacement of defective materials and labor with no exclusions for ponding water.

G. Membrane Manufacturer to confirm in writing that they directly manufacture the roofing membrane; private labeled membranes are not acceptable.

H. Membrane Manufacturer must have an established program for recycling membrane at the end of its useful life. Must provide 3 (three) instances in which they have done so.

I. Membrane Manufacturer must have recycled content certification from UL (Underwriters Laboratories) Environment.

J. Membrane Manufacturer must have ISO 14001 Certification and a Responsible Care program in place.

K. Upon completion of the installation and the delivery to the Manufacturer, by the Applicator of certification, that all work has been done in strict accordance with the contract specifications and Membrane Manufacturer's requirements, a Technical Service Representative will review the installed roof system.

L. There is no deviation made from the project specification or the approved shop drawings without prior written approval by the Architect, the Owner's Representative and Roofing Manufacturer.

M. The installer must have a minimum of 5 years' experience in installing roofing system of this type and nature. Contractor must be certified and approved by the roofing materials Manufacturer.

N. All work pertaining to the installation of PVC membrane and flashings must only be completed by Applicator personnel trained and authorized by roofing Manufacturer in those procedures.

O. Membrane to have no formulation changes in the last fifteen (15) years as certified by the manufacturer.

1.03 SUBMITTALS

A. All submittals which do not conform to the following requirements will be rejected. Submit proposed equals to be considered for use on this project no less than ten (10) days prior to bid date. Proposed roof systems which have been reviewed and accepted will be listed in an addendum prior to bid date; only then will roof systems be accepted at bidding. Submittals shall include the following:

1. Copies of Specification including physical properties.
2. Samples of each primary component to be used in the roof system and the manufacturer's current literature for each component.
3. Written approval by the insulation manufacturer (as applicable) for use and performance of the product in the proposed system.
4. Sample copy of Manufacturer's warranty including no exclusion for ponding water and no time limit shall be assigned to any such ponding water.
5. Sample copy of Applicator's warranty.
6. Dimensioned shop drawings which shall include:
   a. Outline of roof with roof size and elevations shown.
   b. Profile details of flashing methods for penetrations.
   c. Technical acceptance from Manufacturer.
7. Certifications by manufacturers of roofing and insulating materials that all materials supplied comply with all requirements of the identified ASTM and industry standards or

practices and requirements of this specification as stated in Section 2.01, C & D and all requirements listed in Quality Assurance.

8. Certification from the Applicator that the system specified meets all identified code and insurance requirements as required by the Specification.
9. Letter from the proposed manufacturer confirming the number of years it has DIRECTLY manufactured the proposed roof system under the trade names and/or trademarks as proposed.
10. Material Safety Data Sheets (MSDS)

1.04 CODE REQUIREMENTS

The applicator shall submit evidence that the proposed roof system meets the requirements of the local building code and has been tested and approved or listed by the following test organizations. These requirements are minimum standards and no roofing work shall commence without written documentation of the system's compliance, as required in the "Submittals" section of this specification.

A. Factory Mutual Research Corporation (FM) - Norwood, MA
   1. Class 1-90 (Attachment Criteria)

B. Underwriters Laboratories, Inc. - Northbrook, IL
   1. Class A assembly

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. All products delivered to the job site shall be in the original unopened containers or wrappings bearing all seals and approvals.

B. Handle all materials to prevent damage. Place all materials on pallets and fully protect from moisture.

C. Membrane rolls shall be stored lying down on pallets and fully protected from the weather with clean canvas tarpaulins. Unvented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions that may affect the ease of membrane weldability.

D. All adhesives shall be stored at temperatures between 40° F (5° C) and 80° F (27° C).

E. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.

F. All materials which are determined to be damaged by the Owner's Representative or the manufacturer are to be removed from the job site and replaced at no cost to the Owner.

1.06 JOB CONDITIONS

A. Membrane materials may be installed under certain adverse weather conditions but only after consultation with the Manufacturer, as installation time and system integrity may be affected.

B. Only as much of the new roofing as can be made weathertight each day, including all flashing and detail work, shall be installed. All seams shall be cleaned and heat welded before leaving the job site that day.

C. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against all risks.

D. All surfaces to receive new insulation, membrane or flashings shall be dry. Should surface moisture occur, the Applicator shall provide the necessary equipment to dry the surface prior to the application.

E. All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.

F. Uninterrupted waterstops shall be installed at the end of each day's work and shall be completely removed before proceeding with the next day's work. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as the installation progresses. Contaminated membrane shall be replaced at no cost to the Owner.

G. The Applicator is cautioned that certain membranes are incompatible with asphalt, coal tar, heavy oils, roofing cements, creosote and some preservative materials. Such materials shall not remain in contact with the membranes. The Applicator shall consult the manufacturer regarding compatibility, precautions and recommendations.

H. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the general contractor or construction manager shall provide for all necessary protection and barriers as required to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over Felt or plywood over insulation board shall be provided for all new and existing roof areas that receive rooftop traffic during construction.

I. Prior to and during application, all dirt, debris and dust shall be removed from surfaces by vacuuming, sweeping, blowing with compressed air and/or similar methods.

J. The Applicator shall follow all safety regulations as required by OSHA and any other applicable authority having jurisdiction.

K. All roofing, insulation, flashings and metal work removed during construction shall be immediately taken off site to a legal dumping area authorized to receive such materials. Hazardous materials, such as materials containing asbestos, are to be removed and disposed of in strict accordance with applicable City, State and Federal requirements.

L. All new roofing waste material (i.e., scrap roof membrane, empty cans of adhesive) shall be immediately removed from the site by the Applicator and properly transported to a legal dumping area authorized to receive such material.

M. The Applicator shall take precautions that storage and/or application of materials and/or equipment does not overload the roof deck or building structure.

N. Flammable adhesives and deck primers shall not be stored and not be used in the vicinity of open flames, sparks and excessive heat.

O. All rooftop contamination that is anticipated or that is occurring shall be reported to the manufacturer to determine the corrective steps to be taken.

P. The Applicator shall verify that all roof drain lines are functioning correctly (not clogged or blocked) before starting work. Applicator shall report any such blockages in writing (letter copy to the manufacturer) to the Owner's Representative for corrective action prior to installation of the roof system.

Q. Applicator shall immediately stop work if any unusual or concealed condition is discovered and shall immediately notify Owner of such condition in writing for correction at the Owner's expense (letter copy to the manufacturer).

R. Site cleanup, including both interior and exterior building areas that have been affected by construction, shall be completed to the Owner's satisfaction.

S. All landscaped areas damaged by construction activities shall be repaired at no cost to the Owner.

T. The Applicator shall conduct fastener pullout tests in accordance with the latest revision of the SPRI/ANSI Fastener Pullout Standard to help verify condition of deck/substrate and to confirm expected pullout values.

U. The adhered membrane shall not be installed under the following conditions without consulting the manufacturer's technical department for precautionary steps:

1. The roof assembly permits interior air to pressurize the membrane underside.
2. Any exterior wall has 10% or more of the surface area comprised of opening doors or windows.
3. The wall/deck intersection permits air entry into the wall flashing area.

V. Precautions shall be taken when using adhesives at or near rooftop vents or air intakes. Adhesive odors could enter the building. Coordinate the operation of vents and air intakes in such a manner as to avoid the intake of adhesive odor while ventilating the building. Keep lids on unused cans at all times.

W. Protective wear shall be worn when using solvents or adhesives or as required by job conditions.

1.07 BIDDING REQUIREMENTS

A. Site Visit: Bidders shall visit the site and carefully examine the areas in question as to conditions that may affect proper execution of the work. All dimensions and quantities shall be determined or verified by the contractor. No claims for extra costs will be allowed because of lack of full knowledge of the existing conditions unless agreed to in advance with the Owner or Owner's Representative.

1.08 WARRANTIES

A. Manufacturer's System Warranty (only products purchased from the membrane manufacturer are covered under System Warranty): Upon successful completion of the work to the Roofing Manufacturer's and Owner's satisfaction, and receipt of final payment, the twenty-five (25) Year System Warranty shall be issued. The System Warranty shall provide for the roof membrane, all accessories that comprise a roof system, and contractor labor. The Warranty shall be **Non-Prorated** provide for No Dollar Limit (NDL), and **shall not exclude ponding water and no time limited shall be assigned for any such ponding water during the warranty period**. Warranty shall not exclude regular foot traffic or storage on the roof surface, and it shall not obligate the owner to a maintenance schedule of any type as a condition of the warranty.

B. Applicator/Roofing Contractor Warranty: The Applicator shall supply the Owner with a separate five-year workmanship warranty. In the event any work related to roofing, flashing, or metal is found to be within the Applicator warranty term, defective or otherwise not in accordance with the Contract Documents, the Applicator shall repair that defect at no cost to

the Owner. The Applicator's warranty obligation shall run directly to the Owner, and a copy shall be sent to the manufacturer.

C. Owner Responsibility: Owner shall notify both the manufacturer and the Applicator of any leaks as they occur during the time period when both warranties are in effect.

PART 2 --PRODUCTS

2.01 GENERAL

A. The components of the Adhered roof system are to be products of the membrane manufacturer as indicated on the Detail Drawings and specified in the Contract Documents.

B. Components to be used that are other than those supplied or manufactured by the membrane manufacturer may be submitted for review and acceptance by the manufacturer. The manufacturer's acceptance of any other product is only for a determination of compatibility with membrane products and not for inclusion in the manufacturer's warranty. The specifications, installation instructions, limitations, and/or restrictions of the respective manufacturers must be reviewed by the Owner's Representative for acceptability for the intended use with the manufacturer's products.

C. Membrane shall be certified by the manufacturer to be the exact thickness as specified, ASTM tolerance does not apply.

D. Membrane shall have a minimum of thirty (30) mils of waterproofing polymers above the reinforcements as documented by a third party source.

2.02 MEMBRANE

A. Sarnafil® G410 Feltback fiberglass reinforced membrane with a factory-applied integral lacquer coating to repel dirt and sustain reflectivity.

B. Membrane shall conform to ASTM D4434-96 (or latest revision), "Standard for Polyvinyl Chloride Sheet Roofing". Classification: Type II, Grade I.

1. Sarnafil G410-15 feltback, 60 mil (1.5 mm), thermoplastic membrane with fiberglass reinforcement and a factory applied 9 oz. geotextile felt backing.
2. Or Pre-Approved Equal, subject to compliance with all specification requirements herein so stated. KEE and other like-type, non-conforming membrane products will not be approved as equal.

C. Color of Membrane

1. EnergySmart feltback (White), initial reflectivity of 0.83, initial emissivity 0.92, solar reflective index (SRI) of >104.

D. Typical Physical Properties

Parameters	ASTM Test Method	Minimum ASTM Requirement
Reinforcing Material	-	Fiberglass
Overall Thickness, min., inches (mm)	D638	[0.060inches)]
Tensile Strength, min., psi (MPa)	D638	1600 (11.1)
Elongation at Break, min. (machine x tranverse)	D638	270% / 250%
Seam strength*, min. (% of tensile strength)	D638	80
Retention of Properties After Heat Aging	D3045	-