SECTION 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
- 1. Framing with dimension lumber.
- 2. Rooftop equipment bases and support curbs.
- 3. Wood blocking and nailers.
- 4. Wood furring.
- 5. Sheathing.
- 6. Plywood backing panels.
- 7. Building wrap.

1.2 DEFINITIONS

- A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise indicated.
- B. Exposed Framing: Dimension lumber not concealed by other construction.
- C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
- 1. NELMA Northeastern Lumber Manufacturers Association.
- 2. NLGA National Lumber Grades Authority.
- 3. RIS Redwood Inspection Service.
- 4. SPIB Southern Pine Inspection Bureau.
- 5. WCLIB West Coast Lumber Inspection Bureau.
- 6. WWPA Western Wood Products Association.

1.3 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
- 2. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee Board of Review.
- C. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
 - 1. Preservative-treated wood.
 - 2. Engineered wood products.
- 3. Expansion anchors.
 - 4. Metal framing anchors.

1.4 QUALITY ASSURANCE

A. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

1.6 LEED REQUIREMENTS

- A. Regional materials, regional manufacture: Use dimensioned lumber manufactured within 500 mile radius of project.
- B. Regional materials, regional extraction: Use dimensioned lumber extracted, harvested or recovered within 500 mile radius of project.
- C. Waste Management:
 - 1. Schedule ordering of lumber and materials to minimize field cuts. Submit schedule as part of LEED documentation.
 - 2. Collect offcuts and scrap and place in designated areas for salvage use.
 - 3. Utilized offcut as blocking or for short length members.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Laminated-Veneer Lumber:
 - a. Boise Cascade Corporation.
 - b. Roseburg Forest Products.
 - c. Trus Joist MacMillan.
 - 2. Parallel-Strand Lumber:
 - a. Trus Joist MacMillan.
 - 3. Prefabricated Wood I-Joists:
 - a. Boise Cascade Corporation.
 - b. Roseburg Forest Products.
 - c. Trus Joist MacMillan.
 - 4. Metal Framing Anchors:
 - a. Simpson Strong-Tie Company, Inc.
 - 5. Pressure-Treated Wood:
 - a. Arch Treatment Technologies, Inc.

2.2 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 3. Provide dressed lumber, S4S, unless otherwise indicated.
 - 4. Provide dry lumber with 15 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.
- B. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall

be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

- C. Wood Structural Panels:
 - 1. Plywood: DOC PS 1.
 - 2. Thickness: As needed to comply with requirements specified but not less than thickness indicated.
- 3. Factory mark panels according to indicated standard.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Pressure-Treated Wood: In accordance with AWPA C2 (lumber) and AWPA C9 (plywood).
 - Preservative Chemicals: Acceptable to authorities having jurisdiction and the following:
 - a. (West Coast) Copper Boron Azole, Type A (CBA-A).
 - b. Copper azole, Type B (CA-B).
 - 2. Preservative Retention:

1.

- a. Decking: 0.08 pcf.
- b. Above Ground: 0.10 pcf.
- c. Ground or Fresh Water Contact: 0.21 pcf.
- 3. Species: Mixed southern pine; SPIB.
- 4. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece, or omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings, and the following:
- 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
- 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
- 3. Wood framing members less than 18 inches (460 mm) above grade.
- 4. Wood floor plates that are installed over concrete slabs directly in contact with earth.
- E. Product: Acceptable products include but are not limited to the following:
 - 1. Wolmanized Natural Select Wood by Arch Treatment Technologies, Inc.
- F. Substitutions: The specified product can be used with standard galvanized fasteners. Any proposed substitution should be made with the understanding that stainless steel fasteners will have to be used unless written verification can be provided to show that galvanized fasteners are allowed with substitute product.

2.4 DIMENSION LUMBER

- A. General: Provide dimension lumber of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated.
- B. Framing, Rafters, Joists, and Partitions: No. 2 grade and any of the following species:
- 1. Spruce-pine-fir (south) or Spruce-pine-fir; NELMA, NLGA, WCLIB, or WWPA.

2.5 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction, including the following:
- 1. Rooftop equipment bases and support curbs.
- 2. Blocking.

- 3. Furring.
- 4. Nailers.
- B. For items of dimension lumber size, provide No. 2 grade lumber with 15 percent maximum moisture content and any of the following species:
 - 1. Spruce-pine-fir (south) or Spruce-pine-fir; NELMA, NLGA, WCLIB, or WWPA.

2.6 ENGINEERED WOOD PRODUCTS

- A. Laminated-Veneer Lumber: A composite of wood veneers with grain primarily parallel to member lengths, manufactured with an exterior-type adhesive complying with ASTM D 2559.
- 1. Extreme Fiber Stress in Bending, Edgewise: 2500 psi (17.2 MPa) for 12-inch nominal- (286-mm actual-) depth members.
- 2. Modulus of Elasticity, Edgewise: 1,800,000 psi (12 400 MPa).
- B. Parallel-Strand Lumber: A composite of wood strand elements with grain primarily parallel to member lengths, manufactured with an exterior-type adhesive complying with ASTM D 2559.
- C. Wood I-Joists: Prefabricated units complying with APA PRI-400; depths and performance ratings not less than those indicated.
 - 1. Web Material: Either oriented strand board or plywood, Exposure 1.
 - 2. Structural Capacities: Establish and monitor structural capacities according to ASTM D 5055.
 - 3. Trademark: Factory mark I-joists with APA trademark indicating nominal joist depth, joist class, span ratings, mill identification, and I-joist compliance with APA standard.
- D. Rim Boards: Performance-rated product complying with APA PRR-401.
 - 1. Material: Mat-formed panels, all-veneer panels, composite panels, or structural composite lumber.
- 2. Thickness and Grade: 1-inch (25-mm) rim board, 1-1/8-inch (28-mm) rim board, or 1-1/8-inch (28-mm) rim board plus.
- 3. Trademark: Factory mark with APA trademark indicating thickness, grade, and compliance with APA standard.

2.7 SHEATHING

- A. Plywood Wall Sheathing: APA rated sheathing, Exposure 1, fir plywood.
- 1. Span Rating: Not less than 32/16.
- 2. Thickness: Not less than 1/2 inch, unless noted otherwise.
- B. Plywood Roof Sheathing: APA rated sheathing, Exposure 1, fir plywood.
- 1. Span Rating: Not less than 32/16.
- 2. Thickness: Not less than 5/8 inch, unless noted otherwise.

2.8 SUBFLOORING AND UNDERLAYMENT

- A. Plywood Subflooring: APA rated sheathing, Exposure 1, single-floor panels or sheathing.
- 1. Span Rating: Not less than 24 oc or 32/16.
- 2. Thickness: Not less than 3/4 inch.
- 3. Edge Detail: Tongue and groove.
- B. Plywood Underlayment for Resilient Flooring or Ceramic Tile: DOC PS 1, Exterior A-C with fully sanded face.

2.9 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fireretardant treated, in thickness indicated or, if not indicated, not less than 3/4 inch (19 mm) thick. Paint flat black as required by electrical code.
- 2.10 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
- 1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: CABO NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening to Cold-Formed Metal Framing: Hilti Kwik-Flex or Elco Dril-Flex; no substitutes,
- 1. Plywood sheathing: $10-24 \times 1-1/4$ inch wafer head #3.
- 2. $2 \times 12^{-1/2}$ inch wafer head #3.
- F. Lag Bolts: ASME B18.2.1. (ASME B18.2.3.8M).
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

2.11 METAL FRAMING ANCHORS

- A. General: Provide framing anchors made from metal indicated, of structural capacity, type, and size indicated, and as follows:
 - 1. Research/Evaluation Reports: Provide products acceptable to authorities having jurisdiction and for which model code research/evaluation reports exist that show compliance of metal framing anchors, for application indicated, with building code in effect for Project.
- 2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
- C. Joist Hangers: U-shaped joist hangers with 2-inch- (50-mm-) long seat and 1-1/4-inch- (32-mm-) wide nailing flanges at least 85 percent of joist depth.
- D. Bridging: Rigid, V-section, nailless type, 0.062 inch (1.6 mm) thick, length to suit joist size and spacing.
- E. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.
- F. Rafter Tie-Downs: Bent strap tie for fastening rafters or roof trusses to wall studs below.
- G. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base.

2.12 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by both adhesive and panel manufacturers.
- 1. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Do not use materials with defects that impair quality of rough carpentry or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- C. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.
- D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. CABO NER-272 for power-driven fasteners.
 - 2. Published requirements of metal framing anchor manufacturer.
 - 3. Table 2305.2, "Fastening Schedule," in the BOCA National Building Code.
- E. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.
- F. Use finishing nails for exposed work, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- 1. Install blocking for Owner-installed furnishings. Coordinate with Architect for locations and refer to drawings.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build anchor bolts into masonry during installation of masonry work. Where possible, secure anchor bolts to formwork before concrete placement.

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal- (19-by-38-mm actual-) size furring vertically at 16 inches (406 mm) o.c.

3.4 WOOD FRAMING INSTALLATION, GENERAL

- A. Framing Standard: Comply with AFPA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

- C. Do not splice structural members between supports.
- D. Where built-up beams or girders of 2-inch nominal- (38-mm actual-) dimension lumber on edge are required, fasten together with 2 rows of 20d (100-mm) nails spaced not less than 32 inches (812 mm) o.c. Locate one row near top edge and other near bottom edge.
 - 1. For continuous members, locate end joints over supports.

3.5 WALL AND PARTITION FRAMING INSTALLATION

- A. General: Arrange studs so wide face of stud is perpendicular to direction of wall or partition and narrow face is parallel. Provide single bottom plate and double top plates using members of 2-inch nominal (38-mm actual) thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions. Anchor or nail plates to supporting construction, unless otherwise indicated.
- 1. For walls, provide wood studs spaced 16 inches (406 mm) o.c., unless otherwise indicated.
- B. Construct corners and intersections with three or more studs. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- 1. Provide continuous horizontal blocking at midheight of partitions more than 96 inches (2438 mm) high, using members of 2-inch nominal (38-mm actual) thickness and of same width as wall or partitions.
- C. Fire block concealed spaces of wood-framed walls and partitions at each floor level and at ceiling line of top story. Where fire blocking is not inherent in framing system used, provide closely fitted wood blocks of 2-inch nominal- (38-mm actual-) thick lumber of same width as framing members.
- D. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Set headers on edge and support on jamb studs.
 - 1. For non-load-bearing partitions, provide double-jamb studs with headers not less than 4-inch nominal (89-mm actual) depth for openings 48 inches (1200 mm) and less in width, 6-inch nominal (140-mm actual) depth for openings 48 to 72 inches (1200 to 1800 mm) in width, 8-inch nominal (184-mm actual) depth for openings 72 to 120 inches (1800 to 3000 mm) in width, and not less than 10-inch nominal (235-mm actual) depth for openings 10 to 12 feet (3 to 3.6 m) in width.
 - 2. For load-bearing walls, provide double-jamb studs for openings 72 inches (1800 mm) and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated.
- E. Provide bracing in walls, at locations indicated, full-story height, unless otherwise indicated. Provide one of the following:
 - 1. Plywood panels not less than 48 by 96 inches (1219 by 2438 mm) applied vertically.

3.6 FLOOR JOIST FRAMING INSTALLATION

- A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inches (38 mm) of bearing on wood or metal, or 3 inches (76 mm) on masonry. Attach floor joists as follows:
 - 1. Where supported on wood members, by toe nailing or by using metal framing anchors, if indicated on plans.
- 2. Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.
- B. Fire Cuts: At joists built into masonry, bevel cut ends 3 inches (76 mm) and do not embed more than 4 inches (102 mm).
- C. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches (1200 mm).
- D. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than 1/3 depth of joist; do not locate closer than 2 inches (50 mm) from top or bottom.
- E. Provide solid blocking of 2-inch nominal (38-mm actual) thickness by depth of joist at ends of joists unless nailed to header or band.

- F. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches (102 mm) or securely tie opposing members together. Provide solid blocking of 2-inch nominal (38-mm actual) thickness by depth of joist over supports.
- G. Anchor members paralleling masonry with 1/4-by-1-1/4-inch (6.4-by-32-mm) metal strap anchors spaced not more than 96 inches (2438 mm) o.c., extending over and fastening to 3 joists. Embed anchors at least 4 inches (102 mm) into grouted masonry with ends bent at right angles and extending 4 inches (102 mm) beyond bend.
- H. Provide solid blocking between joists under jamb studs for openings.
- I. Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above.
- 1. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.
- J. Provide bridging of type indicated below, at intervals of 96 inches (2438 mm) o.c., between joists.
 - 1. Diagonal wood bridging formed from bevel-cut, 1-by-3-inch nominal- (19-by-64-mm actual-) size lumber, double-crossed and nailed at both ends to joists.
- 2. Steel bridging installed to comply with bridging manufacturer's written instructions.
- 3. Bridging may be omitted where joist depth is 12-inch nominal (286-mm actual) size or less and where indicated live load is 40 lbf/sq. ft. (1915 Pa) or less.

3.7 CEILING JOIST AND RAFTER FRAMING INSTALLATION

- A. Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.
 - Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate and nail to first joist or anchor with framing anchors or metal straps. Provide 1-by-8-inch nominal- (19-by-184-mm actual-) size or 2-by-4inch nominal- (38-by-89-mm actual-) size stringers spaced 48 inches (1200 mm) o.c. crosswise over main ceiling joists.
- B. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors, if indicated on plans. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
 - 1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches (50 mm) deeper. Bevel ends of jack rafters for full bearing against valley rafters.
 - 2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches (50 mm) deeper. Bevel ends of jack rafters for full bearing against hip rafter.
- C. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal- (19-by-140-mm actual-) size boards between every third pair of rafters, but not more than 48 inches (1219 mm) o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.
- D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions, if any.

3.8 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations contained in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
- 1. Subflooring:
 - a. Glue and screw to wood framing.
 - b. Space panels 1/8 inch (3 mm) apart at edges and ends.
- 2. Sheathing:

- a. Nail to wood framing.
- b. Screw to cold-formed metal framing.
- c. Space panels 1/8 inch (3 mm) apart at edges and ends.
- 3. Underlayment:
 - a. Nail to subflooring.
 - b. Space panels 1/32 inch (0.8 mm) apart at edges and ends.
 - c. Fill and sand edge joints of underlayment receiving resilient flooring just before installing flooring.
- 4. Plywood Backing Panels: Nail or screw to supports.

3.9 WASTE MANAGEMENT

- A. Separate wood waste in accordance with the Waste Management Plan.
- B. Separate the following categories for salvage or reuse on site:
- 1. Sheet materials larger than 2 square feet.
- 2. Framing members longer than 16 inches.
- 3. Multiple cutoffs of any size larger than 12 inches.
- C. The following categories may be reused in the manufacture or particleboard or medium density fiberboard:
- 1. Composite Wood: Plywood, OSB, LVL, I-joist, parallel-strand, laminated-strand, MDF, or particleboard.
- 2. Clean dimensional lumber.
- D. Set aside damaged wood for acceptable alternative uses; bracing, blocking, cripples or ties.
- E. Collect offcuts and scrap and place in designated areas for recycling.
- F. Do not burn scraps of treated wood. Do not mix treated wood scraps with untreated wood. Separate, store, and dispose of hazardous wood wastes according to local regulations.
- G. Close and seal tightly all partly used adhesive containers and store protected in well-ventilated, fire-safe area at moderate temperatures.
- H. Place used adhesive tubes and containers in areas designated area for hazardous materials.

END OF SECTION