

SECTION 06 10 00  
ROUGH CARPENTRY

Part 4 - GENERAL

4.1 RELATED SECTIONS

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

4.2 SUMMARY

- A. Section includes work and related accessories for rough carpentry work.
  - 1. Framing with dimensional lumber.
  - 2. Structural Glued Laminated Timber.
  - 3. Plywood.
  - 4. Structural-Use and OSB Panels.
  - 5. Preservative and fire resistive treatment.

4.3 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. American Institute of Timber Construction (AITC):
  - 1. AITC 111 - Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection
  - 2. AITC TCM - Timber Construction Manual, 5th Edition.
  - 3. ANSI/AITC A190.1 - American National Standard, Structural Glued Laminated Timber.
- C. American Lumber Standards Committee (ALSC): Softwood Lumber Standards.
- D. American Wood Preservers Association (AWPA):
  - 1. AWPA M2 - Standard for Inspection of Treated Wood Products.
  - 2. AWPA M4 - Care of Preservative Treated Wood Products.
  - 3. AWPA M6 - Brands Used on Forest Products.
  - 4. AWPA P5 - Water Borne Preservatives.
- E. The Engineered Wood Association (APA):
  - 1. APA E30 - Engineered Wood Construction Guide.
  - 2. APA E445 - Performance Standards and Qualification Policy for Structural-Use Panels.
  - 3. APA EWS R540 - Builder Tips Proper Storage and Handling of Glulam Beams.
  - 4. APA EWS T300 - Technical Note: Glulam Connection Details.
  - 5. APA F405 - Performance Rated Panels.
  - 6. APA L870 - Voluntary Product Standard, PS 1-09, Structural Plywood.
- F. APA S350 - Performance Standard for Wood-Based Structural-Use Panels
  - 1. ASME B18.2.1 - Square and Hex Bolts and Screws (Inch Series)
  - 2. ASME B18.2.2 - Standard for Square and Hex Nuts
  - 3. ASME B18.6.1 - Wood Screws (Inch Series)

- G. ASTM International (ASTM):
  - 1. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - 2. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
  - 3. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - 4. ASTM D198 - Standard Test Methods of Static Tests of Lumber in Structural Sizes
  - 5. ASTM D2344 - Standard Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates.
  - 6. ASTM D2898 - Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing.
  - 7. ASTM F1667 - Driven Fasteners: Nails, Spikes, and Staples.
  - 8. ASTM F547 - Nails for Use with Wood and Wood-Base Materials.
- H. International Code Council (ICC): ICC IBC International Building Code.
- I. National Design Specification (NDS) for Wood Construction: AF&PA T101 - (2015) National Design Specification (NDS) for Wood Construction.
- J. Southern Pine Inspection Bureau (SPIB): SPIB 1003 - Standard Grading Rules for Southern Pine Lumber.
- K. Truss Plate Institute (TPI):
  - 1. TPI 1 - National Design Standard for Metal Plate Connected Wood Truss Construction; Commentary and Appendices.
  - 2. TPI HIB - Commentary and Recommendations for Handling, Installing and Bracing Metal Plate Connected Wood Trusses.

#### 4.4 SUBMITTALS

- A. Submit the following according to Conditions of the Construction Contract and Division 1 Specification Sections.
- B. Shop Drawings: Sealed and signed by a Professional Engineer registered in the state of South Carolina. Review is for general conformance to member dimensional requirements and architectural applications and features only. Shop drawings shall clearly indicate but not be limited to:
  - 1. Structural Glue Laminated Members
  - 2. Trussed Rafters
  - 3. Trussed Joists
  - 4. Fabricated Structural Members
  - 5. Modifications of Structural Members - Drawings of structural laminated members, fabricated wood trusses, engineered wood joists and rafters, and other fabricated structural members indicating materials, shop fabrication, and field erection details; including methods of fastening.
- C. Product Data: Copies of manufacturers' product data for fire-retardant treatment, engineered wood products, structural-use and OSB panels.
- D. Design Data: Submit design analysis and calculations showing design criteria used to accomplish the applicable analysis for modifications of structural members.
- E. Test Reports: Submit test reports for preservative-treated lumber and plywood.
- F. Certificates: Submit certificates of the following:

1. Certificates of grade - Manufacturer's certificates (approved by an American Lumber Standards approved agency) attesting that lumber and material not normally grade marked meet the specified requirements. Certificate of Inspection for grade marked material by an American Lumber Standards Committee (ALSC) recognized inspection agency prior to shipment.
2. Preservatives Treatment: For type specified, include certification by treating plant stating chemicals and process used, net amount of preservative retained and conformance with AWWA UCS U1 Commodity Standards (C9 and C15).

#### 4.5 DELIVERY AND STORAGE

- A. Comply with General Conditions and Section 016000 "Product Requirements," including the following:
  1. Deliver materials to the site in an undamaged condition.
  2. Store, protect, handle, and install prefabricated structural elements in accordance with manufacturer's instructions and as specified.
  3. Store materials off the ground to provide proper ventilation, with drainage to avoid standing water, and protection against ground moisture and dampness.
  4. Store wood I-beams and glue-laminated beams and joists on edge.
  5. Adhere to requirements for stacking, lifting, bracing, cutting, notching, and special fastening requirements.
  6. Laminated timber shall be handled and stored in accordance with AITC 111 or APA EWS R540.
  7. Remove defective and damaged materials and provide new materials.

#### 4.6 GRADING AND MARKING

- A. Lumber - Mark each piece of framing and board lumber or each bundle of small pieces of lumber with the grade mark of a recognized association or independent inspection agency. Such association or agency shall be certified by the Board of Review, American Lumber Standards Committee, to grade the species used. Surfaces that are to be exposed to view shall not bear grademarks, stamps, or any type of identifying mark. Hammer marking will be permitted on timbers when all surfaces will be exposed to view.
- B. Structural Glued Laminated Timber - Mark each member with the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of structural glued laminated timber products. The marking shall indicate compliance with ANSI/AITC A190.1 and shall include all identification information required by ANSI/AITC A190.1.
- C. Plywood - Mark each sheet with the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the plywood. The mark shall identify the plywood by species group or span rating, exposure durability classification, grade, and compliance with APA L870. Surfaces that are to be exposed to view shall not bear grademarks or other types of identifying marks.
- D. Structural-Use and OSB Panels - Mark each panel with the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the panel. The mark shall indicate end use, span rating, and exposure durability classification.
- E. Preservative-Treated Lumber and Plywood - The Contractor shall be responsible for the quality of treated wood products. Each treated piece shall be inspected in accordance with AWWA M2 and permanently marked or branded, by the producer, in accordance with AWWA M6. The Contractor shall submit the inspection report of an approved independent inspection agency that offered products comply with applicable AWWA Standards. The appropriate Quality Mark on each piece will be accepted, in lieu of inspection reports, as evidence of compliance with applicable AWWA treatment standards.
- F. Fire-Retardant Treated Lumber - Mark each piece in accordance with AWWA M6, except pieces that are

to be natural or transparent finished. In addition, exterior fire-retardant lumber shall be distinguished by a permanent penetrating blue stain. Labels of a nationally recognized independent testing agency will be accepted as evidence of conformance to the fire-retardant requirements of AWWPA M6.

#### 4.7 SIZES AND SURFACING

- A. ALSC PS 20 for dressed sizes of yard and structural lumber. Lumber shall be surfaced four sides. Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced. Other measurements are IP or SI standard.

#### 4.8 MOISTURE CONTENT

- A. Air-dry or kiln-dry lumber. Kiln-dry treated lumber after treatment. Maximum moisture content of wood products shall be as follows at the time of delivery to the job site:
  - 1. Framing lumber and board, 19 percent maximum
  - 2. Timbers 5 inches and thicker, 25 percent maximum
  - 3. Materials other than lumber; moisture content shall be in accordance with standard under which the product is produced

#### 4.9 PRESERVATIVE TREATMENT

- A. Preservative Treatment Types and Amounts
  - 1. 0.25 pcf intended for above ground at locations specified on the plans.
  - 2. 0.40 pcf intended for ground contact and fresh water use.
  - 3. 0.60 pcf intended for Ammoniacal Copper Quaternary Compound (ACQ)-treated foundations.
  - 4. 0.80 to 1.00 pcf intended for ACQ-treated pilings.
  - 5. All wood shall be air or kiln dried after treatment. Specific treatments shall be verified by the report of an approved independent inspection agency, or the AWWPA Quality Mark on each piece. Brush coat areas that are cut or drilled after treatment with either the same preservative used in the treatment or with a 2 percent copper naphthenate solution.
- B. Treat lumber with preservative treatment as indicated on the plans. The following items shall be preservative treated:
  - 1. Wood framing, woodwork, and plywood up to and including the subflooring at the first-floor level of structures having crawl spaces when the bottoms of such items are 24 inches or less from the earth underneath.
  - 2. Wood members that are in contact with water.
  - 3. Exterior wood steps, platforms, and railings; and all wood framing of open, roofed structures.

#### 4.10 FIRE-RETARDANT TREATMENT

- A. Fire-retardant treated wood shall be pressure treated. Treatment and performance inspection shall be by an independent and qualified testing agency that establishes performance ratings. Each piece or bundle of treated material shall bear identification of the testing agency to indicate performance in accordance with such rating.

#### 4.11 QUALITY ASSURANCE

- A. Drawing Requirements: For fabricated structural members, trusses, glu-lam members, indicate materials, details of construction, methods of fastening, and erection details. Include reference to design criteria used and manufacturers design calculations. Submit drawings for all proposed modifications of

- structural members. Do not proceed with modifications until the submittal has been approved.
- B. Data Required: Submit calculations and drawings for all proposed modifications of structural members. Do not proceed with modifications until the submittal has been approved.
  - C. Certificates of Grade: Submit certificates attesting that products meet the grade requirements specified in lieu of grade markings where appearance is important and grade marks will deface material.

## PART 5 - PRODUCTS

### 5.1 MATERIALS

#### A. Engineered Wood Products

1. Shear Parallel to Length - Maximum 1,000 psi in accordance with ASTM D2344.
2. Density -ASTM D6111.
3. Compressive Strength
  - a. Secant Modulus: Minimum 70,000 psi in accordance with ASTM D6108.
  - b. Stress at 3 percent strain: Minimum 1,500 psi in accordance with ASTM D6108.
  - c. Compression Parallel to Grain: Minimum 3,000 psi in accordance with ASTM D6112.
  - d. Compression Perpendicular to Grain: Minimum 1,000 psi in accordance with ASTM D6112.
4. Flexural Strength - Minimum 2,000 psi in accordance with ASTM D6109.
5. Tensile Strength - Minimum 2,000 psi in accordance with ASTM D6109.
6. Coefficient of Thermal Expansion - Maximum 0.000080 in/in/degree F in accordance with ASTM D696.
7. Screw Withdrawal - 350 lbs in accordance with ASTM D6117.
8. Nail Withdrawal - 150 lbs in accordance with ASTM D6117.

### 5.2 LUMBER

- A. Structural Lumber: All structural lumber shall be PS 20; S4S. Maximum of 19 percent moisture content, surfaced dry, No1 Grade Southern Pine graded under SPIB grading rules.
- B. Structural Glued Laminated Timber:
  1. ANSI/AITC A190.1, allowable working stress values for loads of normal duration in pounds per square inch (psi) but not less than the Fb, Ft, Fc, and E specified on the plans.
  2. Fabricated with wet-use adhesives.
- C. Plywood, Structural-Use, and Oriented Strand Board (OSB) Panels: APA L870, APA S350, APA E445, and APA F405 respectively.
  1. Subflooring:
    - a. Plywood - C-D Grade, Exposure 1 durability classification, Span rating of 24/16.
    - b. Structural-Use and OSB Panels - Sheathing grade with durability equivalent to Exposure 1, Span Rating of 32/16. OSB, APA E445, Rated Sturd-I-Floor.
  2. Wall Sheathing:
    - a. Plywood - C-D Grade, Exposure 1, and a minimum thickness of 3/8 inch, except where indicated to have greater thickness.
    - b. Structural-Use and OSB Panels - Sheathing grade with durability equivalent to Exposure 1, Span

Rating of 16/0 or greater. OSB, APA Rated Sheathing. OSB shall be a phenolic-glued, low-formaldehyde board.

3. Roof Sheathing

- a. Plywood - C-D Grade, Exposure 1, with an Identification Index of not less than 24/0. Provide exterior grade particleboard with phenol resin for interior and exterior applications.
- b. Structural-Use Panel - Sheathing grade with durability equivalent to Exposure 1, Span Rating of 24/0 or greater

4. Diaphragms:

- a. Plywood - Structural I grade, Exposure 1, and a minimum thickness of 3/8 inch.
- b. Structural-Use and OSB Panels - Sheathing grade with durability equivalent to Exposure 1 and a minimum thickness of 3/8 inch.

5. Shear Walls:

- a. Plywood - Structural I Grade and a minimum thickness of 3/8 inch.
- b. Structural-Use and OSB Panels - Sheathing grade with durability equivalent to Interior plywood with Exterior glue (Exposure 1) and a minimum thickness of 3/8 inch.

5.3 OTHER MATERIALS

- A. Trussed Rafters: Metal plate connected trusses designed in accordance with TPI 1 and TPI HIB and fabricated in accordance with TPI 1.
- B. Trussed Joists: Metal plate connected parallel chord wood trusses designed and fabricated in accordance with TPI 1.

5.4 ROUGH HARDWARE

- A. Unless otherwise indicated or specified, rough hardware shall be of the type and size necessary for the project requirements. Sizes, types, and spacing of fastenings of manufactured building materials shall be as recommended by the product manufacturer unless otherwise indicated or specified. Rough hardware exposed to the weather or embedded in or in contact with preservative treated wood, exterior masonry, or concrete walls or slabs shall be hot-dip zinc-coated in accordance with ASTM A153.
  1. Bolts, Nuts, Studs, and Rivets - ASME B18.2.1, ASME B18.5.2.1M, ASME B18.5.2.2M and ASME B18.2.2.
  2. Anchor Bolts - ASTM A307, size as indicated, complete with nuts and washers.
  3. Lag Screws and Lag Bolts - ASME B18.2.1.
  4. Wood Screws - ASME B18.6.1.
  5. Nails and Staples - ASTM F547, size and type best suited for purpose; staples shall be as recommended by the manufacturer of the materials to be joined. For sheathing and subflooring, length of nails shall be sufficient to extend 1 inch into supports. In general, 8-penny or larger nails shall be used for nailing through 1 inch thick lumber and for toe nailing 2 inch thick lumber; 16-penny or larger nails shall be used for nailing through 2 inch thick lumber. Nails used with treated lumber and sheathing shall be hot-dipped galvanized in accordance with ASTM A153. Where detailed nailing requirements are not specified, nail size and spacing shall be sufficient to develop an adequate strength for the connection. The connection's strength shall be verified against the nail capacity tables in AF&PA T101. Reasonable judgment backed by experience shall ensure that the designed connection will not cause the wood to split. If a load situation exceeds a reasonable limit for nails, a specialized connector shall be used.

6. Wire Nails - ASTM F1667.
7. Timber Connectors - Unless otherwise specified, timber connectors shall be in accordance with TPI 1, APA EWS T300 or AITC TCM.
8. Clip Angles - Steel, 3/16 inch thick, size as indicated; or zinc-coated steel or iron commercial clips designed for connecting wood members.
9. Joist Hangers - Steel or iron, zinc coated, sized to fit the supported member, of sufficient strength to develop the full strength of the supported member in accordance with ICC IBC, and furnished complete with any special nails required.
10. Tie Straps - For joists supported by the lower flange of steel beams, provide 1/8 by 1-1/2 inch steel strap, 2 feet long except as indicated otherwise.
11. Joist Anchors - For joists supported by masonry walls, provide anchors 3/16 by 1 1/2 inch steel tee or strap, bent and of length to provide 4 inches embedment into wall and 12 inches along joist except as indicated otherwise. For joists parallel to masonry or concrete walls, provide anchors 1/4 by 1-1/4 inch minimum cross-sectional area, steel strap, length as necessary to extend over top of first three joists and into wall 4 inches, and with wall end of bend or pin type except as indicated otherwise.
12. Toothed Rings and Shear Plates - AF&PA T101.
13. Beam Anchors - Steel U-shaped strap anchors 1/4 inch thick by 1-1/2 inches wide except as indicated otherwise.
14. Metal Framing Anchors - Construct anchors to the configuration shown using hot dip zinc-coated steel conforming to ASTM A653. Steel shall be not lighter than 18 gage. Special nails supplied by the manufacturer shall be used for all nailing.
15. Panel Edge Clips - Extruded aluminum or galvanized steel, H-shaped clips to prevent differential deflection of roof sheathing.

## PART 6 - EXECUTION

### 6.1 INSTALLATION

- A. General - Fit framing lumber and other rough carpentry, set accurately to the required lines and levels, and secure in place in a rigid manner. Do not splice framing members between bearing points. Set joists, rafters, and purlins with their crown edge up. Frame members for the passage of pipes, conduits, and ducts. Do not cut or bore structural members for the passage of ducts or pipes without approval. Reinforce all members damaged by such cutting or boring by means of specially formed and approved sheet metal or bar steel shapes, or remove and provide new, as approved. Provide as necessary for the proper completion of the work all framing members not indicated or specified. Spiking and nailing not indicated or specified otherwise shall be in accordance with the Nailing Schedule contained in ICC IBC; perform bolting in an approved manner. Spikes, nails, and bolts shall be drawn up tight. Use slate or steel shims when leveling joists, beams, and girders on masonry or concrete. Do not use shimming on wood or metal bearings. When joists, beams, and girders are placed on masonry or concrete, a wood base plate shall be positioned and leveled with grout. The joist, beam, or girder shall then be placed on the plate. When joists, beams, and girders are set into masonry or concrete, a pocket shall be formed into the wall. The joist, beam, or girder shall then be placed into the pocket and leveled with a steel shim.
- B. Beams and Girders - Set beams and girders level and in alignment and anchor to bearing walls, piers, or supports with U-shaped steel strap anchors. Embed anchors in concrete or masonry at each bearing and through-bolt to the beams or girders with not less than two bolts. Provide bolts not less than 1/2 inch in diameter and with plate washers under heads and nuts. Install beams and girders not indicated otherwise with 8 inch minimum end bearing on walls or supports. Install beams and girders into walls with 1/2 inch clearance at the top, end, and sides. Provide joints and splices over bearings only and bolt or spike together.
- C. Roof Framing or Rafters - Tops of supports or rafters shall form a true plane. Valley, ridge, and hip

- members shall be of depth equal to cut on rafters where practicable, but in no case less than depth of rafters and nominally 2 inches thick. Rafters shall have full and solid bearing on plates. Valleys, hips, and ridges shall be straight and true intersections of roof planes. Necessary crickets and watersheds shall be formed. Rafters, except hip and valley rafters, shall be bolted by angles. Rafters shall be toe-nailed to ridge, valley, or hip members with at least three 8-penny nails. Rafters shall be braced to prevent movement until permanent bracing, decking or sheathing is installed. Hip and valley rafters shall be secured to wall plates by clip angles. Openings in roof shall be framed with headers and trimmers. Unless otherwise indicated, headers carrying more than two rafters and trimmers supporting headers carrying more than one rafter shall be double. Hip rafters longer than the available lumber shall be butt jointed and scabbed. Valley rafters longer than the available lumber shall be double, with pieces lapped not less than 4 feet and well spiked together. Trussed rafters shall be installed in accordance with TPI HIB. Engineered wood joists shall be installed in accordance with distributor's instructions.
- D. Joists - Provide joists of the sizes and spacing indicated, accurately and in alignment, and of uniform width. Joists shall have full bearing on beams; provide laps over bearing only and spike. Where joists are of insufficient length to produce a 12 inch lap, butt joists over bearing and provide wood scabs 2 nominal inches thick by depth of joists by 24 inches long or metal straps 1/4 by 1 1/2 inch by not less than 18 inches long nailed to each joist with not less than four 10-penny nails, or approved sheet metal connectors installed in accordance with the manufacturer's recommendations. Provide joists built into masonry with standard steel wall bearing boxes. Provide metal hangers for joists framing into the side of headers, beams, or girders. The minimum joist end bearing shall be 4 inches, and joists built into concrete or masonry shall have a 1/2 inch minimum clearance at the top, end, and sides. For joists approved to be bored for the passage of pipes or conduits, bore through the neutral axis of the joist. Provide steel joist hangers of proper size and type to receive the ends of all framed joists.
1. Floor (Ceiling) Framing - Except where otherwise indicated joists shall have bearings not less than 4 inches on concrete or masonry and 1-1/2 inches on wood or metal. Joists, trimmers, headers, and beams framing into carrying members at the same relative levels shall be carried on joist hangers. Joists shall be lapped and spiked together at bearings or butted end-to-end with scab ties at joint and spiked to plates. Openings in floors shall be framed with headers and trimmers. Headers carrying more than two tail joists and trimmers supporting headers carrying more than one tail joist shall be doubled, unless otherwise indicated. Joists built into masonry shall be provided with standard steel wall bearing boxes. Engineered wood joists shall be installed in accordance with distributor's instructions.
  2. Doubled Joists - Provide under bearing walls and partitions running parallel with the floor joists, around stairways, chimneys, fireplaces, and at other openings where joists are cut and framed. Double, space for clearance, block apart 4 feet on center, rigidly frame, and spike together joists under partitions that are to receive ducts, pipes, and conduits.
  3. Tie Straps - For joists supported by the lower flange of steel beams, provide straps at every fourth joist and the corresponding fourth joist on the opposite side. Tie joists across the top of the steel beam with a steel strap. Form straps to lie flat across the top of the beam and twist at the ends to provide flat contact with the side of each joist. Nail each strap at each end with three 10-penny nails spaced 2 inches o.c.
  4. Joist Anchors - Provide anchors for each fourth joist supported by a masonry wall. Build wall end of anchors into the wall. Nail anchor to the joist with three 10-penny nails spaced 2 inches o.c. Anchor the first three joists parallel to concrete or masonry walls at bridging points, but not less than 8 feet o.c. from end walls. Let anchors into the tops of each joist and spike to the top of joist with one 10-penny nail. Extend anchors at least 4 inches into the wall.
  5. Bridging - Provide bridging for floor and ceiling joists and for roof rafters having slopes of less than 1/3. Locate bridging as indicated and as specified herein. Provide bridging for spans greater than 6 feet, but do not exceed 8 feet maximum spacing between rows of bridging. Install rows of bridging uniformly. Provide metal or wood cross-bridging, except where solid bridging is indicated. Do not



- nail the bottom end of cross-bridging until the subfloor has been laid.
6. Wood Cross-Bridging - Provide wood cross-bridging not less than 2 by 4 nominal size. Nail wood cross-bridging at each end with three 8-penny nails for 2 by thick material.
- E. Columns and Posts - Set columns and posts, plumb, in alignment, and with full and uniform bearing. Do not embed the bottom and bearing surfaces of columns in concrete or set in direct contact with concrete slabs on grade.
- F. Wall Framing:
1. Studs - Select studs for straightness and set plumb, true, and in alignment. In walls and partitions more than eight feet tall, provide horizontal bridging at not more than 8 feet o.c. using nominal 2 inch material of the same width as the studs; install the bridging flat. Sizes and spacing of studs shall be as indicated. Double studs at jambs and heads of openings and triple at corners to form corner posts. Frame corner posts to receive sheathing, lath, and interior finish. Truss over openings exceeding 4 feet in width or use a header of sufficient depth. Toe-nail studs to sills or sole plates with four 8-penny nails or fasten with metal nailing clips or connectors. Anchor studs abutting concrete or masonry walls thereto near the top and bottom and at midheight of each story using expansion bolts or powder-actuated drive studs.
  2. Plates - Use plates for walls and partitions of the same width as the studs to form continuous horizontal ties. Splice single plates; stagger the ends of double plates. Double top plates in walls and bearing partitions, built up of two nominal 2 inch thick members. Top plates for nonbearing partitions shall be single or double plates of the same size as the studs. Nail lower members of double top plates and single top plates to each stud and corner post with two 16-penny nails. Nail the upper members of double plates to the lower members with 10-penny nails, two near each end, and stagger 16 inches o.c. intermediately between. Nail sole plates on wood construction through the subfloor to each joist and header; stagger nails. Anchor sole plates on concrete with expansion bolts, one near each end and at not more than 6 feet o.c., or with powder-actuated fasteners, one near each end and at not more than 3 feet o.c. Provide plates cut for the passage of pipes or ducts with a steel angle as a tie for the plate and bearing for joist.
  3. Firestops - Provide firestops for wood framed walls and partitions and for furred spaces of concrete or masonry walls at each floor level and at the ceiling line in the top story. Where firestops are not automatically provided by the framing system used, they shall be formed of closely fitted wood blocks of nominal 2 inch thick material of the same width as the studs and joists.
  4. Diagonal Bracing - Provide diagonal bracing at all external corners and internal angles and at maximum 40 foot centers in stud walls, except that bracing may be omitted where diagonally applied wood sheathing, plywood or structural-use panel sheathing is used. Bracing shall be of 1 by 6 material, let into the exterior face of studs. Extend bracing from top plates to sill at an angle of approximately 45 degrees and double nail at each stud. When openings occur near corners, provide diagonal knee braces extending from the corner post above headers to top plates and from below window sills to the main sill. Nail bracing at each bearing with two 8-penny nails.
  5. Plywood, Structural-Use, and OSB Panel Wall Sheathing - Apply horizontally or vertically. Extend sheathing over and nail to sill and top plate. Abut sheathing edges over centerlines of supports. Allow 1/8 inch spacing between panels and 1/8 inch at windows and doors. If sheathing is applied horizontally, stagger vertical end joints. Nail panels with 6-penny nails spaced 6 inches o.c. along edges of the panel and 12 inches o.c. over intermediate supports. Keep nails 3/8 inches away from panel ledges. Provide 2 by 4 blocking for horizontal edges not otherwise supported.
  6. Wood Sheathing - Sheathing end joints shall be made over framing members and so alternated that there will be at least two boards between joints on the same support. Each board shall bear on at least three supports. Boards shall be nailed at each support using two nails for boards 6 inches and less in width and three nails for boards more than 6 inches in width. Roof sheathing shall not be installed where roof decking is installed.

- G. Trusses - Metal plate connected wood trusses shall be handled, erected, and braced in accordance with TPI HIB and as indicated.
- H. Structural Glued Laminated Timber Members - Brace members before erection. Align members and complete all connections before removal of bracing. Unwrap individually wrapped members only after adequate protection by a roof or other cover has been provided. Treat scratches and abrasions of factory applied sealer with two brush coats of the same sealer used at the factory.
- I. Plywood and Structural-Use Panel Roof Sheathing - Install with the grain of the outer plies or long dimension at right angles to supports. Stagger end joints and locate over the centerlines of supports. Allow 1/8 inch spacing at panel ends and 1/4 inch at panel edges. Nail panels with 8-penny common nails or 6-penny annular rings or screw-type nails spaced 6 inches o.c. at supported edges and 12 inches o.c. at intermediate bearings. Do not use staples in roof sheathing. Where the support spacing exceeds the maximum span for an unsupported edge, provide adequate blocking, tongue-and-groove edges, or panel edge clips, in accordance with APA E30.
- J. Stair Framing - Cut carriages to exact shape required to receive treads and risers, with risers of uniform height and treads of uniform width. Provide trimmers, nailers, and blocking as required to support finish materials.

## 6.2 MISCELLANEOUS

- A. Wood Blocking: Provide proper sizes and shapes at proper locations for the installation and attachment of wood and other finish materials, fixtures, equipment, and items indicated or specified.
- B. Diaphragms: Install plywood, structural-use, or OSB panels with the long dimension perpendicular to supports. End joints shall be staggered and located over the centerline of supports. Longitudinal joints shall be staggered and provided with blocking. Nail panels with 8-penny nails spaced not more than 12 inches on centers around the diaphragm boundaries and along continuous panel edges and 12 inches on centers at all other supported edges and 12 inches o.c. over intermediate bearings.
- C. Shear Walls: Install plywood or structural-use panels with long dimension parallel or perpendicular to supports. Provide blocking behind edges not located over supports. Nail panels with 8-penny nails spaced not more than 6 inches on centers along panel edges and 6 inches o.c. over intermediate bearings.
- D. Bridging: Wood bridging shall have ends accurately bevel-cut to afford firm contact and shall be nailed at each end with two nails. Metal bridging shall be installed as recommended by the manufacturer. The lower ends of bridging shall be driven up tight and secured after subflooring or roof sheathing has been laid and partition framing installed.
- E. Corner Bracing: Corner bracing shall be installed when required by type of sheathing used or when siding, other than panel siding, is applied directly to studs. Corner bracing shall be let into the exterior surfaces of the studs at an angle of approximately 45 degrees, shall extend completely over wall plates, and shall be secured at each bearing with two nails.
- F. Sill Plates: Sill plates shall be set level and square and anchor bolted at not more than 6 feet on centers and not more than 12 inches from end of each piece. A minimum of two anchors shall be used for each piece.

## 6.3 INSTALLATION OF TIMBER CONNECTORS

- A. Installation of timber connectors shall conform to applicable requirements of AF&PA T101.

6.4 ERECTION TOLERANCES

- A. Framing members which will be covered by finishes such as wallboard, plaster, or ceramic tile set in a mortar setting bed, shall be within the following limits:
  - 1. Layout of walls and partitions: 1/4 inch from intended position;
  - 2. Plates and runners: 1/4 inch in 8 feet from a straight line;
  - 3. Studs: 1/4 inch in 8 feet out of plumb, not cumulative; and
  - 4. Face of framing members: 1/4 inch in 8 feet from a true plane.
  
- B. Framing members which will be covered by ceramic tile set in dry-set mortar, latex-portland cement mortar, or organic adhesive shall be within the following limits:
  - 1. Layout of walls and partitions: 1/4 inch from intended position;
  - 2. Plates and runners: 1/8 inch in 8 feet from a straight line;
  - 3. Studs: 1/8 inch in 8 feet out of plumb, not cumulative; and
  - 4. Face of framing members: 1/8 in 8 feet from a true plane.

PART 7 - COMPENSATION

7.1 MEASUREMENT AND BASIS OF PAYMENT

- A. No separate payment will be made for this work. Rough Carpentry will be as a part of the Total Bid and shall be full compensation for the satisfactorily completed work including, but not limited to, all labor, materials, equipment, and incidental costs to furnish and install the carpentry as identified in this section.

END OF SECTION 06 10 00

SECTION 06 43 00  
COMPOSITE WOOD RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Composite wood railings.

1.2 ACTION SUBMITTALS

- A. Product Data: For composite wood lumber and anchors. Include installation instructions.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Store materials under cover and protected from weather and contact with damp or wet surfaces. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.
- B. Handle and store composite lumber to comply with manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 COMPOSITE LUMBER

- A. Composite Lumber, General: Products acceptable to authorities having jurisdiction with current model code evaluation reports that show compliance with building code in effect for Project for indicated type of construction.
- B. Composite Lumber: Solid shapes made from a mixture of cellulose fiber and polyethylene or polypropylene.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Azek Building Products
    - b. Fiberon
    - c. Tamko; Envision Composite Lumber
    - d. Trex
  2. Surface Texture: Woodgrain.
  3. Color: As selected by Architect from manufacturer's full range.

2.2 FASTENERS

- A. General: Provide fasteners of size and type indicated, acceptable to authorities having jurisdiction, and that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into substrate.
  1. Use stainless steel.

- B. Stainless-Steel Bolts: ASTM F593, Alloy Group 2; with ASTM F594, Alloy Group 2 hex nuts and, where indicated, flat washers.
- C. Postinstalled Anchors: Stainless-steel, torque-controlled expansion anchors 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 according to ASTM E488 conducted by a qualified independent testing and inspecting agency.
  - 1. Stainless-steel bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 2.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit work to other construction; scribe and cope as needed for accurate fit.
- B. Install composite lumber to comply with manufacturer's written instructions.

#### 3.2 RAILING INSTALLATION

- A. Balusters: Fit to railings and screw in place. Countersink fastener heads, fill flush, and sand filler.
- B. Posts: Secure to substrates with through bolts or lag screws.
- C. Railings: Fasten railings to posts with countersunk-head wood screws or rail bolts.

END OF SECTION 06 43 00