

## **PART 1 GENERAL**

### **1.1 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM A307-14e1, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .2 ASTM C954-15, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
  - .3 ASTM D2559-12ae1 Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions.
  - .4 ASTM F1667-17, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
- .2 American Wood Preservers Association (AWPA):
  - .1 AWPA Book of Standards, 2017.
- .3 Canadian Standards Association (CSA International)
  - .1 CAN/CSA O80 Series-15, Wood Preservation
  - .2 CSA O86-14, Engineering Design in Wood, Includes Update No. 1 (2016), Update No. 2 (2017).
  - .3 CSA O121-17, Douglas Fir Plywood.
  - .4 CSA O141-05 (R2014), Softwood Lumber.
  - .5 CAN/CSA O325-16, Construction Sheathing.
  - .6 CSA S16-14, Design of steel structures, Includes Update No. 1 (2016).
- .4 National Lumber Grading Association (NLGA):
  - .1 Standard Grading Rules for Canadian Lumber 2014.
- .5 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC S102-10, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

### **1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit product data in accordance with Division 01: Procedures:
  - .1 Submit manufacturer's printed product literature, specifications and data sheets.
  - .2 Submit MSDS sheets or official manufacturer literature stating no added urea-formaldehyde was used in the manufacturing of composite wood.

### **1.3 QUALITY ASSURANCE**

- .1 Lumber identification: Grade stamp of an agency certified by the Canadian Lumber Standards Accreditation Board.
- .2 Plywood identification: Grade mark in accordance with applicable CSA standards.

## **1.4 DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver wood products bundled or crated to provide adequate protection during transit. Inspect wood products for damage upon delivery and remove and replace damaged materials.
- .2 Store materials a minimum of 150 mm off the ground on blocking. Keep materials under cover and dry. Provide for air circulation within and around stacks and under temporary coverings.
- .3 Protect sheet materials to prevent breaking of corners and damage to surfaces.

## **PART 2 GENERAL**

### **2.1 GRADES**

- .1 Use CLS grade marked lumber conforming to the Standard Grading Rules for Canadian Lumber published by the National Lumber Grades Authority.

### **2.2 LUMBER**

- .1 Lumber: Stud Grade to CAN/CSA O141, softwood, S-P-F, S4S, graded and stamped in accordance with National Lumber Grading Association (NLGA) Standard Grading Rules for Canadian Lumber and as follows:
  - .1 Moisture Content: maximum 8% at time of installation.
  - .2 Maximum moisture content when used for attachment of drywall: 8%.
  - .3 Stud (No.3) Grade or better, having the following minimum properties:
    - .1 Sizes: 38 mm or 89 mm wide by maximum 140 mm depth as noted on drawings.
    - .2 Bending at extreme fibre ( $F_b$ ): 7.0 MPa.
    - .3 Longitudinal shear ( $F_v$ ): 1.0 MPa.
    - .4 Compression parallel to grain ( $F_c$ ): 7.0 MPa.
    - .5 Compression perpendicular to grain ( $F_{cp}$ ): 5.3 MPa.
    - .6 Tension parallel to grain ( $F_t$ ): 3.2 MPa.
    - .7 Modulus of elasticity ( $E/E_{05}$ ): 9000/5500 MPa.
    - .8 Finger jointed material will not be acceptable without written acceptance from the Departmental Representative.
- .2 Lumber: Structural Light Framing and Structural Joists and Planks to CAN/CSA O141, softwood, S-P-F, S4S, graded and stamped in accordance with National Lumber Grading Association (NLGA) Standard Grading Rules for Canadian Lumber and as follows:
  - .1 Moisture Content: maximum 8% at time of installation.
  - .2 Maximum moisture content when used for attachment of drywall: 8%.
  - .3 Grade: No. 2 or better, and having the following minimum properties:
    - .1 Sizes: 38 mm or 89 mm wide by depth as indicated on drawings.
    - .2 Bending at extreme fibre ( $F_b$ ): 11.8 MPa.
    - .3 Longitudinal shear ( $F_v$ ): 1.0 MPa.
    - .4 Compression parallel to grain ( $F_c$ ): 11.5 MPa.
    - .5 Compression perpendicular to grain ( $F_{cp}$ ): 4.6 MPa.
    - .6 Tension parallel to grain ( $F_t$ ): 5.5 MPa.

.7 Modulus of elasticity (E/ E<sub>05</sub>): 9500/6500.

## 2.3 PANEL MATERIALS

- .1 Sheathing for structural shear wall and diaphragms:
  - .1 Plywood: Douglas Fir (DFP) Exterior Grade, to CSA O121, thickness as indicated on drawings.
  - .2 Exterior Grade Plywood: Douglas Fir (DFP) Exterior Grade, to CSA O121, thickness as shown on drawings, or as required to suit purpose and conditions if not indicated, to National Building Code of Canada (NBC) 2015.
  - .3 Fire Rated Plywood, to CSA O325, Class A fire retardant produced under Performance Standard PS-1, certified by the American Plywood Association.
    - .1 Fire-Rated Materials: ULC-labelled fire resistant, provide grade stamp or certification as noted for fire retardant pressure treated lumber.
  - .4 Panels shall have no added urea formaldehyde.
  - .5 Interior sheathing shall be ULC-labelled fire resistant, provide grade stamp or certification as noted for fire retardant pressure treated lumber.
  - .6 All plywood used in sub-flooring assembly shall be T&G Unsanded Sheathing Grade Phenolic Bonded Douglas fir Plywood with staggered joints.
  - .7 Underlayment:
    - .1 Plywood to CSA O325, 10 mm thick S1S, with no knot fillers detrimental to areas to receive finish floor products, meeting the requirements of ASTM F1482 at minimum.
  - .8 Plywood Sheathing (Roof): Douglas Fir (DFP), Exterior Grade, to CSA O121, T&G Edges, 19 mm thick.

## 2.4 MISCELLANEOUS LUMBER

- .1 Provide lumber for support or attachment of other construction, including furring, blocking, nailing strips, ground, rough bucks, cants, curbs, fascia, backing sleepers, and similar members.
- .2 Fabricate miscellaneous lumber from dimension lumber of sizes indicated, and into shapes shown on drawings.
- .3 Moisture Content: 19% maximum for lumber items not specified to receive wood preservative treatment.
- .4 Grade: for dimension lumber sizes provide No. 2 or Standard grade lumber per NLGA. For board-sized lumber, provide sheathing grade, S2S.

## 2.5 WOOD PRESSURE TREATMENTS

- .1 Where lumber or plywood is indicated as preservative treated or is specified to be treated, treat in accordance with CAN/CSA O80.9M and AWWA.
- .2 Wood preservatives containing arsenic or chromium are not permitted.

- .3 Pressure treat above ground items with Copper Azole (CA-B) preservative to a minimum AWWA retention of  $1.6 \text{ kg/m}^3$ . After treatment, kiln-dry lumber and plywood to maximum moisture content of 19% and 15% respectively. Treat indicated items and the following:
  - .1 Wood cants, nailing strips, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapour barriers, and waterproofing.
  - .2 Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry and concrete.
  - .3 Wood framing members less than 460 mm above grade.
  - .4 Wood floor plates installed over concrete slabs directly in contact with earth.
- .4 Pressure treat wood members in contact with ground or freshwater with Copper Azole (CA-B) preservative to a minimum AWWA retention of  $3.4 \text{ kg/m}^3$
- .5 Complete fabrication of treated items before treatment where possible. If cut after treatment apply field treatment to cut surfaces.
- .6 Wood Preservatives: Maximum allowable VOC limit 350 g/L in accordance with SCAQMD Rule #1113 - Architectural Coatings.
- .7 Fire-Retardant Treatment: to CAN/SCA O80.9M, CAN/CSA O80.20M and CAN/CSA O80.27M, pressure impregnated, and as follows:
  - .1 Flame Spread Classification: FSC 25 maximum.
  - .2 Smoke developed of not more than: 75.

## **2.6 METAL FRAMING CONNECTORS AND HANGERS**

- .1 Fabricated zinc coated steel products tested or designed in accordance with CSA O86 and CSA S16. Types and products as indicated on drawings.

## **2.7 ACCESSORIES**

- .1 Sealants: in accordance with Section 07 92 00 – Joint Sealants. Maximum allowable VOC limit 250 g/L in accordance with SCAQMD Rule 1168.
- .2 General purpose adhesive: structural construction adhesive, to ASTM D2559. Maximum allowable VOC limit 70 g/L in accordance with SCAQMD Rule 1168.
- .3 Nails, spikes, and staples: to ASTM F1667, double hot dipped galvanized for exterior work and pressure preservative and fire retardant treated materials; hot dipped galvanized for all other purposes.
- .4 Screws for Fastening to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- .5 Rough Hardware (bolts, nuts, washers, etc.): hot dip galvanized in conformity to CSA G164 or Grade A low carbon steel, conforming to ASTM A307.
- .6 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead plugs, recommended for purpose by manufacturer.
- .7 Joist hangers: minimum 1 mm thick sheet steel, galvanized ZF001 coating designation.

- .8 Roof sheathing H-Clips: formed "H" shape, thickness to suit panel material, extruded 6063-T6 aluminum alloy type approved by Consultant.

### **PART 3 EXECUTION**

#### **3.1 CONSTRUCTION REQUIREMENTS - GENERAL**

- .1 Work shall be executed to meet or exceed the requirements of National Building Code of Canada (NBC) 2015, Part 9, and the requirements of this Section. Refer to structural drawings and specifications for structural elements.

#### **3.2 INSTALLATION**

- .1 Comply with requirements of NBC Part 9 supplemented by following paragraphs.
- .2 Install members true to line, levels and elevations, square, plumb, level and true.
- .3 Construct continuous members from pieces of longest practical length.
- .4 Install spanning members with crown-edge up.
- .5 Select exposed framing for appearance. Install lumber and panel materials so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.
- .6 Install subflooring and combined subfloor and underlay with panel end-joints located on solid bearing, staggered at least 800 mm.
  - .1 Secure floor subflooring to floor joists using screws and construction adhesive. Place continuous adhesive bead in accordance with manufacturer's instructions, single-bead on each joist and double-bead on joists where panel ends butt.
- .7 Install blocking at locations indicated to support washroom accessories.
- .8 Install wall sheathing in accordance with manufacturer's printed instructions.
- .9 Install roof sheathing in accordance with requirements of NBC.
- .10 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding, electrical equipment mounting boards, and other work as required.
- .11 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
- .12 Use dust collectors and high-quality respirator masks when cutting or sanding wood panels.

#### **3.3 WOOD FRAME CONSTRUCTION**

- .1 Space framing members as required to meet or exceed NBC. Construct members of continuous pieces of longest possible length.
- .2 Provide 38 x 89 mm blocking at 610 mm on centre between engineered floor joists for lateral support of wall plates where walls run parallel to joists.

- .3 Make allowance for erection stresses. Securely brace members in place to maintain plumb and true until permanently fixed and held to structure.
- .4 Install fire-blocking as detailed.
- .5 Fabricate wood frame construction to the requirements of the NBC, Part 9, except where more stringent requirements are indicated on the drawings.
- .6 Minimum sizes and spacing of members, thickness of materials, allowable species and lumber grades, shall meet the requirements of the above noted standards, unless indicated or specified otherwise.
- .7 Minimize cutting of framing members for pipes, etc. by prior consultation with other trades. Cutting limitations in accordance with Part 9 of the Building Code.
- .8 Construct framing as necessary to accommodate the work of other trades.

### **3.4 ERECTION**

- .1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
- .2 Countersink bolts where necessary to provide clearance for other work.
- .3 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.

### **3.5 FASTENINGS AND ROUGH HARDWARE**

- .1 Unless indicated otherwise, fasten to hollow masonry units with toggle bolts; to solid masonry or concrete surfaces with expansion shields and bolts.
- .2 Where screws are required use lead or inorganic fibre plugs. Wood or organic plugs not permitted.
- .3 Powder actuated fasteners may be used in lieu of bolts if approved by the Departmental Representative in writing prior to materials arriving on site.
- .4 Provide all rough hardware such as nails, bolts, nuts, washers, screws, clips and strap metal.

### **3.6 SHEATHING INSTALLATION**

- .1 Install wall sheathing horizontally to wood framing using minimum 50 mm long coated nails at 150 mm along edges and 305 mm along vertical members in the middle of the sheets.
- .2 Leave 2 mm to 3 mm between sheets to allow for shrinkage of wood framing.
- .3 Install blocking behind all sheathing joints.

### **3.7 MISCELLANEOUS**

- .1 Install wood stud framing for temporary weather closure and cladding. Construct to resist wind pressures.

### **3.8 EXTERIOR CARPENTRY WORK**

- .1 Construct exterior work using hot dip galvanized nails, screws or bolts. Bolts, nuts and washers shall be hot dip galvanized.

- .2 Plane all sides and backs; sand exposed faces and surfaces, round all edges to prevent checking of edges.
- .3 Countersink bolts and washers, fill holes with matching wood plugs.
- .4 Apply two liberal coats of clear surface applied wood preservative, allowing the first coat to soak in completely prior to applying second coat in accordance with manufacturers instructions.

### **3.9 PRESSURE PRESERVATIVE TREATED WOOD INSTALLATION**

- .1 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation. Allow first coating to fully soak into grain before applying second coating in accordance with manufacturer's instructions.
- .2 Remove with fine sandpaper chemical deposits on treated wood to receive applied finish.
- .3 Use only hot dipped galvanized, corrosion resistant nail or screw fasteners. Staples are not acceptable for installation of preservative treated materials.
- .4 Use water borne preservative treated wood for:
  - .1 Wood in contact with masonry or concrete,
  - .2 Wood within 450 mm of grade,
  - .3 Wood decking and fence boards,
  - .4 Wood in contact with flashings
  - .5 Wood in contact with waterproofing membranes, confirm compatibility with membrane manufacturer prior to application.
- .5 Use oil borne preservative treated wood for:
  - .1 Wood in contact with the ground,
  - .2 Wood in contact with freshwater,
  - .3 Landscaping timbers,
  - .4 Retaining walls,
  - .5 Piers or docks,
  - .6 Pilings,
  - .7 Bases of utility poles,
  - .8 Bases of fence posts.

### **3.10 FIRE RETARDANT TREATED WOOD INSTALLATION**

- .1 Install as indicated, as required by NBC 2015, and/or as directed by authorities having jurisdiction.
- .2 Field Cuts:
  - .1 Do not rip, mill or conduct extensive surfacing of fire retardant treated lumber, label will be voided.
  - .2 Only end cuts, drilling holes and joining cuts are permitted.
  - .3 All cuts on plywood will be considered end cuts.
  - .4 Fire-retardant lumber and plywood can be given a light sanding for cosmetic cleaning after treatment.
  - .5 Pre-cut to the greatest extent possible before treating.
- .3 Fire retardant treated plywood used in structural applications shall be graded or span-rated material.

- .4 Use only hot-dipped galvanized, corrosion resistant nail or screw fasteners. Staples are not acceptable for installation of fire resistant treated materials.
- .5 Where humidity conditions are such that moisture may condense between hardware and treated wood, hardware shall be back-primed with a corrosive inhibitive paint.

### **3.11 POWER, TELECOMMUNICATIONS AND DATA PANEL BOARDS**

- .1 Install 19 mm thick Fire Rated Plywood Panels on walls behind electrical, telephone and data rooms receiving wiring and equipment; minimum 1220 mm x 2440 mm panels on periphery walls over 300 mm wide, mounted 150 mm off of finished floor.

### **3.12 CLEANING**

- .1 Progress Cleaning: clean in accordance with Division 01: Cleaning. Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01: Cleaning. Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .3 Manage and dispose of demolition and construction waste materials in accordance with Division 01: Construction/Demolition Waste Management and Disposal.

### **3.13 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by Work of this Section.

**END OF SECTION**