

## Bridge Timbers and Lumber Material Standard

### Definitions and Application

1. **Lumber:** Lumber is a manufactured product derived from a log in a sawmill or planing mill as defined in the National Lumber Grades Authority “Standard Grading Rules for Canadian Lumber” (**NLGA**) Para. 3 – Lumber. In respect of timber deck bridge components, the catch-all general term “lumber” used herein includes: (1) structural joists and planks (2” to 4” thick, 5” & wider), (2) structural beams and stringers (rectangular timbers, 5” & thicker, width more than 2” greater than thickness), and (3) structural posts and timbers (square timbers, 5” x 5” & larger, width not more than 2” greater than thickness).
2. **Rough lumber:** The term “rough lumber” means lumber that has not been dressed (surfaced), but which has been sawed, edged and trimmed at least to the extent of showing saw marks or equivalent on the four longitudinal surfaces of each piece for its overall length. Rough lumber is used for the following timber deck bridge components:
  - guardrail (‘curbs’), riser blocks and brackets
  - deck running (‘wear’) planks
  - sub-deck planks
  - cross-ties
  - stringers
  - other rough lumber components that may be utilized in bridge construction (e.g., timber sills, ballast wall timbers).
3. **Full sawn lumber:** When specified to be full sawn, lumber may be manufactured to the oversize tolerance, but may not be undersize at the time of manufacture. Tolerance in sawing is defined in **NLGA** Para. 747 – Tolerance in Sawing.
4. **Standard sawn lumber:** For comparison to full sawn lumber, standard sawn lumber means rough green lumber sawn ¼ inch off the nominal thickness and/or width size with a variation over and under the Standard Sawn Size being defined in **NLGA** Para. 820d – Alternate Sizes.
5. **Accredited Grading Agency:** A Grading Agency accredited by either the Canadian Lumber Standards Accreditation Board (**CLSAB**), or by the American Lumber Standard Committee (**ALSC**) Board of Review.
6. **Qualified graders:** Lumber grading must be undertaken by qualified graders that are authorized by an accredited Grading Agency.
7. In case of contradiction, the requirements in this document:
  - a. govern over the specifications in the ministry’s (i) standard bridge drawings, and (ii) “Forest Service Bridge Design and Construction Manual;”
  - b. do not govern over project specific requirements written by the ministry for a particular purchase order or contract.

### General Requirements

8. Unless otherwise specified by the ministry, all supplied lumber must be **new** (i.e., not recycled or reclaimed) **rough lumber** material conforming to the species, grade, manufacture and trim requirements described herein.
9. Rough lumber must be graded<sup>1</sup> in accordance with:
  - a. **NLGA** grading rules, which meet the provisions of CSA O141 “Softwood Lumber”; or
  - b. **ALSC** Board of Review approved grading rules, which meet the provisions of Product Standard PS 20 “American Softwood Lumber Standard.”

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<sup>1</sup> “The grading of lumber is the application of a grading rule to lumber for the purpose of determining the grade of a piece of lumber based on inspection and/or on non-destructive mechanical methods” (**NLGA** Para. 11 – Grading).

## Lumber Species, Grade, Manufacture and Trim Requirements

### Lumber Species

10. Unless otherwise specified by the ministry:

- a. untreated rough lumber must be only Douglas-Fir/Larch (D Fir-L), except where noted in appended Tables 1 and 2;
- b. preservative treated rough lumber must be only Coastal Douglas-fir (Coastal D-Fir), except where noted in appended Tables 1 and 2. Treated lumber must be treated in accordance with the ministry's **Pressure Treated Wood Standard for Timber Deck Bridge Components** corresponding to the required lumber species and treatment type specified by the ministry in a purchase order or contract document. This standard is available at:  
<http://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/resource-roads/presstrtdwoodstd.pdf>

### Lumber Grade

11. Unless otherwise specified by the ministry, all rough lumber must be:

- a. **No.1 grade** for cross-ties and stringers, graded to standard grading rules based on piece size according to:
  - i. NLGA "Posts and Timbers" for 5 inch x 5 inch size and larger, and width not more than 2 inches greater than thickness (e.g., 200 mm x 200 mm size; 200 mm x 250 mm size or 250 mm x 300 mm size);
  - ii. NLGA "Beams and Stringers" for 5 inch and thicker size, and width more than 2 inches greater than thickness (e.g., 200 mm x 300 mm size).
- b. **No.2 grade** for all other timber deck bridge components, as shown in appended Tables 1 and 2, graded to standard grading rules based on piece size.

### Manufacture and Trim Requirements

12. Unless otherwise specified by the ministry, all rough lumber must be:

- a. Full sawn;
- b. Trimmed<sup>2</sup> such that pieces are:
  - i. trimmed for removal of sniped, splintered or uneven log lengths;
  - ii. trimmed full to length specified, and if 2 inches thickness or less, not more than 3 inches over length; 3 and 4 inches thickness not more than 4 inches over length; 5 inches and thicker not more than 6 inches over length consistent with **NLGA** Para. 36 – Trimmed Length;
- c. Double end trimmed (DET): The trimmed length of any lumber piece must be double end trimmed (**DET**) such that both ends of the piece are trimmed square to an out-of-square manufacturing tolerance limited to 1/16 inch for each nominal 1 inch of thickness or width consistent with **NLGA** Para. 748b – "Double end trimmed (DET)."

## Lumber Quality Verification

13. The ministry will accept the following two methods for verification of lumber quality in a lumber shipment, subject to the provisions listed below:

- a. Grade stamped lumber (preferred method); **or**
- b. Certificate of Inspection that identifies non-grade stamped lumber in a shipment, prepared and signed by an accredited Grading Agency, if this alternative method of lumber quality verification is **expressly accepted by the ministry in a purchase order or contract in lieu of grade stamped lumber**. In this method, the producing saw mill or lumber broker (as appropriate) must contact an accredited Grading Agency to verify the lumber quality according to the purchase order or contract terms.

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<sup>2</sup> "Trimming of lumber is the act of cross-cutting a piece to a given length" (**NLGA** Para. 748a – Trim).

### Grade Stamped Lumber

14. For verification of lumber quality, and unless otherwise expressly accepted by the ministry, each piece of rough lumber must be marked with a certified grade stamp issued by the accredited Grading Agency, showing as a minimum the:
- a. registered symbol of the certified agency (i.e., accredited Grading Agency)
  - b. mill and/or grader identity usually by number
  - c. grading rule used where applicable
  - d. grade
  - e. species or species group.

### Certificate of Inspection

15. If the ministry will accept a Certificate of Inspection in lieu of grade stamped lumber, the certificate must contain the following minimum information:
- a. Name of the accredited Grading Agency;
  - b. Certificate number and document date;
  - c. Date the lumber inspection was made, and name of the Grading Inspector who is supervised by the accredited Grading Agency;
  - d. Name of shipping mill or place at which the lumber inspection was made;
  - e. Mill number, and order numbers of buyer and seller (if necessary);
  - f. Lot markings (numbers), hammer brands, paint daubs, or other means of lumber identification to associate the lumber in the shipment with the Certificate of Inspection;
  - g. The shipment destination (if known);
  - h. The lumber species and seasoning, and grade rule standards applied (e.g., NLGA);
  - i. Description of material inspected: Lot #, species, sizes, lengths, applicable grades, tally of pieces, package #, volume (m<sup>3</sup> or FBM), and the specific grading rule that was used for each size category of lumber supplied including grading rule paragraph # (e.g., **NLGA** Para. 130b – “No.1” - Structural Beams and Stringers);
  - j. Certifying signature of the accredited Grading Agency Agent.

### **Lumber Shipment Bill of Materials**

16. A Bill of Materials must be supplied with the lumber shipment, prepared by the shipping saw mill. The Bill of Materials will document the following:
- a. Description of material supplied: species, sizes, lengths, applicable grades, tally of pieces, package #, volume (m<sup>3</sup> or FBM), and the specific grading rule that was used for each size category of lumber supplied including grading rule paragraph #;
  - b. the bridge structure number(s) the lumber is associated with (if the ministry purchase order or contract specifies structure numbers), or the purchase order or contract number (if the ministry contract documents do not specify structure numbers);
  - c. date of document preparation and name of person that prepared it.

<b>Table 1</b> <b>Lumber species and grade requirements for standard timber deck bridges</b> (except components for 6.1 m span “All Timber Portable Bridge” as noted in attached Table 2)			
Bridge Component	Allowable Untreated Lumber Species	Allowable Lumber Species and Use Category <sup>3</sup> if Treated (Refer to <a href="#">Pressure Treated Wood Standard for Timber Deck Bridge Components</a> )	Required Lumber Grade
Timber guardrail, riser blocks and brackets (e.g., <b>untreated</b> 250 mm x 250 mm size)	<ul style="list-style-type: none"> <li>D Fir-L<sup>4</sup> (preferred)</li> <li>Hem-Fir North<sup>5</sup> or <b>SPF West</b><sup>6</sup> (if justified by life cycle cost analysis for site-specific crossing)</li> </ul>	<b>Use Category UC4.1</b> <ul style="list-style-type: none"> <li>Coastal D-Fir</li> <li>Hem-Fir North</li> </ul>	<b>No. 2 or better</b> (e.g., NLGA Para. 131c – “No.2” – <b>Structural Posts and Timbers</b> for 250 mm x 250 mm size)
Timber deck running planks (wear planks) (e.g., <b>untreated</b> 75 mm x 250 mm size for wear planks to sub-deck; e.g., <b>untreated</b> 100 mm x 300 mm size for wear planks to cross-ties)	<ul style="list-style-type: none"> <li>D Fir-L (preferred)</li> <li>Hem-Fir North or <b>SPF West</b> (if justified by life cycle cost analysis for site specific crossing)</li> </ul>	Not treated (because mechanical wear is the life limiting factor rather than rot)	<b>No. 2 or better</b> (e.g., NLGA Para. 124c – “No.2” - <b>Structural Joists &amp; Planks</b> for 75 mm x 250 mm size)
Timber sub-deck planks (e.g., 100 mm x 300 mm for sub-deck planks to cross-ties)	<ul style="list-style-type: none"> <li>D Fir-L</li> </ul>	<b>Use Category UC4.2</b> <ul style="list-style-type: none"> <li>Coastal D-Fir</li> <li>Hem-Fir North</li> </ul>	<b>No. 2 or better</b> (e.g., NLGA Para. 124c – “No.2” - <b>Structural Joists &amp; Planks</b> for 100 mm x 300 mm size)
Timber cross-ties (e.g., 200 mm x 200 mm, 200 mm x 250 mm, 200 mm x 300 mm, 250 mm x 300 mm size, etc.)	<ul style="list-style-type: none"> <li>D Fir-L</li> </ul>	<b>Use Category UC4.2<sup>7</sup></b> <ul style="list-style-type: none"> <li>Coastal D-Fir</li> </ul>	<b>No. 1 or better</b> (e.g., NLGA Para. 131b – “No.1” – <b>Structural Posts and Timbers</b> for 200 mm x 200 mm size, 200 mm x 250 mm size or 250 mm x 300 mm size) (e.g., NLGA Para. 130b – “No.1” – <b>Structural Beams and Stringers</b> for 200 mm x 300 mm size)
Ballast wall timbers (e.g., <b>treated</b> 150 mm x 300 mm size)	None. Must treat ballast wall timbers→	<b>Use Category UC4.2<sup>8</sup></b> <ul style="list-style-type: none"> <li>Coastal D-Fir</li> </ul>	<b>No. 2 or better</b> (e.g., NLGA Para. 130c – “No.2” – <b>Structural Beams and Stringers</b> for 150 mm x 300 mm size)
Timber sills (e.g., <b>treated</b> 200 mm x 400 mm; 305 mm x 305 mm, etc.)	None. Must treat timber sills→	<b>Use Category UC4.2</b> <ul style="list-style-type: none"> <li>Coastal D-Fir</li> </ul>	<b>No. 2 or better</b> (e.g., NLGA Para. 130c – “No.2” – <b>Structural Beams and Stringers</b> for 200 mm x 400 mm size)

<sup>3</sup> The CSA 080 Use Category System (UCS) places all treated wood products into one of five major Use Categories (UC) based on the treated woods exposure condition in-service. In general, as the Use Category number rises, there is a consequential increase in the required preservative retention. The required depth of penetration may also increase. The dimensions of the treated product may also influence penetration requirement.

<sup>4</sup> D Fir-L includes Coastal Douglas-fir, Interior Douglas-fir, and Western Larch.

<sup>5</sup> Hem-Fir North is a Canadian subset of Hem-fir that includes Western Hemlock and Pacific silver (amabilis) fir.

<sup>6</sup> **Spruce-Pine-Fir West (SPF West)** is a Western Canadian subset of Spruce-Pine-Fir that includes *Engelmann Spruce*, *Western White Spruce*, *Lodgepole Pine*, and *Alpine Fir*.

<sup>7</sup> UC4.1: “Wood for Highway Construction”, exterior use for bridge construction, exposed to all weather cycles, ground contact or fresh water, normal exposure conditions (Ref. CAN/CSA 080).

<sup>8</sup> UC4.2: “Wood for Highway Construction”, exterior use for bridge construction, exposed to all weather cycles, ground contact or fresh water, high potential for decay, and/or difficult replacement, and/or critical structural components (Ref. CAN/CSA 080).

**Table 2**  
**Lumber species and grade requirements for 6.1 m span “All Timber Portable Bridge”**

(Ministry standard drawings: STD-E-025-01; STD-E-025-02; and STD-E-025-03)

<http://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/resource-roads/bridge-design-construction/std-e-025-full-set.pdf>

Bridge Component	Allowable Untreated Lumber Species	Allowable Lumber Species and Use Category if Treated (Refer to <a href="#">Pressure Treated Wood Standard for Timber Deck Bridge Components</a> )	Required Lumber Grade
Timber guardrail, riser blocks and brackets <i>(e.g., untreated 250 mm x 250 mm size)</i>	<ul style="list-style-type: none"> <li>D Fir-L</li> <li>Hem-Fir North or <b>SPF West</b></li> </ul>	<b>Use Category UC4.1</b> <ul style="list-style-type: none"> <li>Coastal D-Fir</li> <li>Hem-Fir North</li> </ul>	<b>No. 2 or better</b> (e.g., NLGA Para. 131c – “No.2” – <b>Structural Posts and Timbers</b> for 250 mm x 250 mm size)
Timber deck running planks (wear planks) <i>(e.g., untreated 75 mm x 254 mm size for wear planks to sub-deck)</i>	<ul style="list-style-type: none"> <li>D Fir-L</li> <li>Hem-Fir North or <b>SPF West</b></li> </ul>	Not treated ( <i>because mechanical wear is the life limiting factor rather than rot</i> )	<b>No. 2 or better</b> (e.g., NLGA Para. 124c – “No.2” - <b>Structural Joists &amp; Planks</b> for 75 mm x 250 mm size)
Timber sub-deck planks <i>(e.g., 100 mm x 254 mm for sub-deck planks to cross-ties)</i>	<ul style="list-style-type: none"> <li>D Fir-L</li> <li>Hem-Fir North or <b>SPF West</b></li> </ul>	<b>Use Category UC4.2</b> <ul style="list-style-type: none"> <li>Coastal D-Fir</li> <li>Hem-Fir North</li> </ul> (For expected service life of <b>greater than 10 years</b> . See timber deck and sub-deck planks note on STD-E-025-01)	<b>No. 2 or better</b> (e.g., NLGA Para. 124c – “No.2” - <b>Structural Joists &amp; Planks</b> for 100 mm x 300 mm size)
Timber cross-ties <i>(e.g., 190 mm x 190 mm, 190 mm x 240 mm)</i>	<ul style="list-style-type: none"> <li>D Fir-L only as per STD-E-025-01 for expected service life (subject to use) of <b>less than 10 years</b></li> </ul>	<b>Use Category UC4.2</b> <ul style="list-style-type: none"> <li>Coastal D-Fir</li> <li>Hem-Fir North</li> </ul> (For expected service life of <b>greater than 10 years</b> . See timber cross-ties note on STD-E-025-01)	<b>No. 1 or better</b> (e.g., NLGA Para. 131b – “No.1” – <b>Structural Posts and Timbers</b> for 190 mm x 190 mm size or 190 mm x 240 mm size)
Timber stringers <i>(e.g., 305 mm x 460 mm, 355 mm x 508 mm)</i>	<ul style="list-style-type: none"> <li>D Fir-L only as per STD-E-025-01 for expected service life (subject to use) of <b>less than 10 years</b></li> </ul>	<b>Use Category UC4.2</b> <ul style="list-style-type: none"> <li>Coastal D-Fir</li> <li>Hem-Fir North</li> </ul> (For expected service life of <b>greater than 10 years</b> . See stringer size table on STD-E-025-02 for species and sizes)	<b>No. 1 or better</b> (e.g., NLGA Para. 130b – “No.1” – <b>Structural Beams and Stringers</b> for 305 mm x 460 mm size or 355 mm x 508 mm size)

**Note:** See appended Table 1 for definitions of terms. The engineering design for the 6.1 m span “All Timber Portable Bridge” is based on use of different lumber species as noted, with design to CAN/CSA S6-06 (with exceptions to suit forestry bridges). Refer to the stringer size table on drawing STD-E-025-02 for stringer lumber species and sizes. Ballast wall timbers and timber sills must be treated, in accordance with appended Table 1.