



CONSTRUCTION SPECIFICATION FOR STRUCTURAL WOOD SYSTEMS

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907.01 SCOPE

This specification covers the construction requirements for structural wood systems.

907.02 REFERENCES

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

| | |
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| OPSS 501 | Compacting |
| OPSS 902 | Excavating and Backfilling - Structures |
| OPSS 904 | Concrete Structures |
| OPSS 905 | Steel Reinforcement for Concrete |
| OPSS 906 | Structural Steel |
| OPSS 910 | Stressing Systems for Post-Tensioning |
| OPSS 919 | Formwork and Falsework |
| OPSS 950 | Glass Fibre Reinforced Polymer (GFRP) Reinforcement for Concrete |

Ontario Provincial Standard Specifications, Materials

| | |
|-----------|---|
| OPSS 1004 | Aggregates - Miscellaneous |
| OPSS 1010 | Aggregates, Base, Subbase, Select Subgrade, and Backfill Material |

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|-----------|--|
| OPSS 1202 | Bearings - Elastomeric Plain and Steel Laminated |
| OPSS 1203 | Bearings - Rotational and Sliding Surface |
| OPSS 1350 | Concrete - Materials and Production |
| OPSS 1355 | Precast Concrete - Materials and Production |
| OPSS 1440 | Steel Reinforcement for Concrete |
| OPSS 1601 | Wood, Preservative Treatment, and Shop Fabrication |
| OPSS 1860 | Geotextiles |

Ontario Ministry of Transportation Publications

Structural Manual

MTO Forms:

PH-CC-701 Request to Proceed

PH-CC-702 Notice to Proceed

CSA Standards

| | |
|-----------------------------|---|
| B111-1974 (R2003) | Wire Nails, Spikes and Staples |
| G40.20-13/G40.21-13 (R2023) | General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel |
| O86:19 | Engineering Design in Wood |
| O141:23 | Canadian Standard Lumber |
| S6:19 | Canadian Highway Bridge Design Code |
| S347:14 (R2018) | Method of Test for Evaluation of Truss Plates Used in Lumber Joints |

American Association of State Highway and Transportation Officials (AASHTO)

LRFDDBS-9 LRFD Bridge Design Specifications, 9th Edition

American Society of Mechanical Engineers (ASME)

B18.6.1 - 1981(R2016) Wood Screws (Inch Series)

ASTM International

| | |
|---------------------|--|
| A47/A47M-99(2022)e1 | Ferritic Malleable Iron Castings |
| A123/A123M-17 | Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products |
| A240/A240M-23 | Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications |
| A307-21 | Carbon Steel Bolts, Studs, and Threaded Rod 60 000 psi Tensile Strength |
| A480/A480M-23a | General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip |
| A653/A653M-23 | Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process |
| A722/A722M-18 | High-Strength Steel Bars for Prestressed Concrete |
| A780/A780M-20 | Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings |
| B152/B152M-19 | Copper Sheet, Strip, Plate, and Rolled Bar |
| D2395-17(2022) | Test Methods for Density and Specific Gravity (Relative Density) of Wood and Wood Based Materials |
| D4442-20 | Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials |
| D4541-17 | Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers |
| F593-22 | Stainless Steel Bolts, Hex Cap Screws, and Studs |
| F1667/F1667M-21a | Driven Fasteners: Nails, Spikes and Staples |

ICC Evaluation Service

| | |
|-------|--|
| AC116 | Nails |
| AC118 | Tapping Screw Fasteners Used in Steel-to-Steel Connections |

- AC120 Wood-frame Horizontal Diaphragms, Vertical Shear Walls and Braced Walls with Alternative Fasteners
AC233 Dowel-type Threaded Fasteners Used in Wood
AC257 Corrosion-resistant Fasteners and Evaluation of Corrosion Effects of Wood Treatments

SAE International

J429_201405 Mechanical and Material Requirements for Externally Threaded Fasteners

American Welding Society (AWS), NACE and SSPC Joint Publications

AWS C2.23M/C2.23:2018, NACE NO.12, SSPC CS-23 Application of Thermal Spray Coatings (Metallizing) of Aluminum, Zinc, and Their Alloys and Composites for Corrosion Protection of Steel

Others

National Lumber Grades Authority (NLGA): Standard Grading Rules for Canadian Lumber, 2022

907.03 DEFINITIONS

For the purpose of this specification, the definitions in OPSS 1601 and the following definitions apply:

Bright Wood means untreated wood.

Coating means a liquid, liquifiable, or mastic composition that is converted to a solid protective, decorative, or functional adherent film after application as a thin layer.

Erection Diagrams means drawings showing the dimensioned layout of the wood structure, from which shop details are made, and that correlate the fabricator's piece markings with the location in the structure.

Fastener means hardware such as bolts, lag screws, split rings and shear plates used to connect wood members or components.

Laminated Wood Deck means dimension lumber placed side by side on its narrow face to form a wood slab.

Lamination means dimension lumber sizes when used in a laminated wood deck.

Longitudinally Laminated Deck means a deck where the wood laminations are placed on edge and oriented parallel to the longitudinal centreline of the deck.

Resawn Lumber means the product of sawing any thickness of lumber to develop thinner lumber.

Ripped Lumber means the product of sawing any width of lumber to develop narrower lumber.

Stress-Laminated Wood Deck means a laminated wood deck, which is held together by pressure applied perpendicular to the laminations using high-strength bars according to CSA S6.

Stringers means sawn wood with a smaller dimension of at least 114 mm and a larger dimension more than 51 mm greater than the smaller dimension, graded for use in bending with the load applied to the narrow face.

Transversely Laminated Deck means a deck in which the wood laminations are placed on edge and joined to form a continuous wood slab then oriented transversely to the longitudinal centre line of the deck.

Truss Plates means a steel plate fastener, intended for use in structural lumber assemblies that has been punched by a special die, where the displaced material forms sharp integral teeth of various shapes and configurations, used to connect laminations at butt joints in wood-concrete composite decks.

Wood-Concrete Composite Deck means a deck that has a laminated wood base made composite with a reinforced concrete overlay.

907.04 DESIGN AND SUBMISSION REQUIREMENTS

907.04.01 Design Requirements

907.04.01.01 General

Structure wood design shall be according to Division 1 of the Structural Manual, CSA S6, CSA O86, AASHTO LRFDBDS-9, and the requirements of this specification.

The maximum live load deflection of timber decks shall be limited to $L/400$, where L is the length of span. The maximum relative live load deflection of deck panels shall be 2.5 mm or less.

907.04.01.02 Girder Notching and Taper Cuts

Notches or abrupt changes in cross section shall not be permitted unless a detailed assessment of the stress concentration effect has been made. Notches on the tension side shall also be verified for fracture shear resistance at the notch according to CSA O86.

Taper cuts shall be provided at notches to reduce abrupt differential stiffness changes. Taper cuts shall be slope cut not less than 1:12 to a maximum length of 300 mm or a maximum depth of $D/4$, where D is the depth of the member being cut. Taper cuts in glulam shall not be permitted in compression zones of the member.

907.04.02 Submissions

907.04.02.01 General

When other authorities are involved in the approval of the design or construction of a highway structure, submissions shall be made at least 35 Days prior to commencement of fabrication of the elements and one additional copy of the submission shall be provided for each authority.

The requirements of each authority and the requirements specified in the Contract Documents shall be satisfied prior to commencement of the Work.

907.04.02.02 Erection Drawings and Erection Procedure Drawings and Calculations

Erection diagrams and erection procedure drawings and calculations shall be submitted to the Contract Administrator at least 7 Days prior to commencement of erection. Prior to making a submission, an Engineer's seal and signature shall be affixed on the erection diagrams and erection procedure drawings and calculations verifying that they are consistent with the Contract Documents.

Erection diagrams and erection procedure drawings shall include at least the following:

- a) Principal dimensions of the structure;
- b) Identification marking of each element for erection;
- c) Sizes of all elements;
- d) The type of preservative treatments to be used for all wood components, including the penetration and retention required.
- e) A site plan showing crane locations and operation radii. If multiple crane set-ups are required, a separate plan shall be included for each crane set-up. The site plan shall show the location of multi-crane lifts if required. The plan shall also depict all affected utilities, drainage and protective measures that will be employed;

- f) Element connection details including size and type of fasteners, installation requirements, torquing values and methods, and oversize and slotted holes;
- g) Installation details including temporary shoring, supports and guys, and sequence for installation and removal of temporary and permanent works;
- h) Details of bracing installed to provide adequate support and stability to the element during construction;
- i) Erection tolerances; and
- j) Installation gaps considering installation temperature and moisture content.

Calculations shall account for camber and deflection of the elements under self weight during installation and assembling of elements on site.

Erection shall not commence until one set of erection diagrams and erection procedure drawings and calculations sealed and signed by an Engineer have been received.

A copy of the erection diagrams and the erection procedure drawings and calculations shall be at the site during erection.

907.04.02.03 Stressing

907.04.02.03.01 General

Working Drawings, stressing details, and calculations, including supporting documentation, shall be submitted to the Contract Administrator at least 7 Days prior to commencement of prestressing. Prior to making a submission, an Engineer's seal and signature shall be affixed on the Working Drawings, details, and calculations.

Elongation calculations shall take into account all relevant losses.

907.04.02.03.02 Stressing Working Drawings

Stressing Working Drawings shall include at least the following:

- a) Design details, including anchorages and bulkheads;
- b) Slip;
- c) Calculation data, including wobble and friction coefficients for the materials used;
- d) Stressing and re-stressing sequence;
- e) The type of jacks;
- f) Friction of jacks; and
- g) Jacking pressure.

907.04.02.04 Test Reports for Fasteners

Test reports for bolts, nuts, and washers shall be submitted to the Contract Administrator according to the Test Reports for Fasteners clause of OPSS 906.

907.05 MATERIALS

907.05.01 Bearings

Bearings shall be according to OPSS 1202 or OPSS 1203 or both.

907.05.02 Coatings

Coatings that exceed 29% solids shall not be applied to wood surfaces unless the minimum nominal dimension of the wood is less than 51 millimetres. Coatings shall be as specified in the Contract Documents.

907.05.03 Concrete

Concrete shall be according to OPSS 1350.

907.05.04 Fasteners and Hardware

907.05.04.01 General

Fasteners and hardware shall meet the requirements of CSA O86.

Fasteners used with connectors or flashing shall be the same material as any metals they are in contact with and any embedded metals they are in indirect contact with.

907.05.04.02 Bolts, Rods, and Lag Screws

Bolts and rods shall be alloy 304 or 316 stainless steel according to ASTM F593, or steel according to ASTM A307 or SAE J429 grade 2, and as specified in the Contract Documents. The nuts, bolts and washers shall be supplied and shipped together as an assembly from the same manufacturer.

Lag screws shall be alloy 304 or 316 stainless steel according to ASTM F593, or steel according to ASTM A307 or SAE J429 grade 1, and as specified in the Contract Documents.

Nuts and washers shall be the same material as the bolts and suitable for use with the types of bolts being specified.

Lock washers shall be installed on all bolt assemblies. Flat washers shall be used in conjunction with lock washers unless steel side plates are used. Lock washers shall not be installed on lag screws.

907.05.04.03 Drift Pins

Steel used for drift pins shall have a minimum yield strength of 280 MPa and shall be according to CSA G40.20/G40.21 or ASTM A307.

907.05.04.04 Galvanizing

Except for truss plates, all plain steel fasteners, connectors, and hardware shall be hot dip galvanized after manufacture according to ASTM A123. Electroplating shall not be permitted.

Heat-treated alloy components shall be galvanized according to the manufacturer's specifications.

907.05.04.05 Glulam Rivets

Glulam rivets shall be treated with the same preservative treatment as specified for the structural members. Wood rivets may only be machined after treatment if the penetration of the treatment is greater than that required to be machined so that no bright wood is exposed.

907.05.04.06 High-Strength Bars

High-strength bars shall be according to ASTM A722M.

907.05.04.07 Nails and Spikes

Nails and spikes shall be according to CSA B111 or ASTM F1667. Nails shall not be used except for deck laminations and flashing. Nails shall not be used to fasten ancillary components to the top of structural timber elements.

Copper nails shall be a minimum 98% copper and according to ASTM F1667.

907.05.04.08 Proprietary Fasteners

Proprietary fasteners shall be according to the Contract Documents, be evaluated according to AC257 for use with the wood preservative treatment specified in the Contract Documents, and meet the requirements of:

- a) AC116 for nails and spikes;
- b) AC118 for tapping screw fasteners;
- c) AC120 for wood screws used in horizontal diaphragms, vertical shear walls and braced walls; or
- d) AC233 for alternate dowel type threaded fasteners.

907.05.04.09 Split Ring and Shear Plate Connectors

Split ring and shear plate connectors shall be installed in grooves, pre-cut to the dimensions recommended by the manufacturer.

907.05.04.10 Truss Plates

Truss plates shall be according to CSA S347. Sheet steel for manufacturing truss plates shall be according to ASTM A653, Type A or Type B. Galvanizing designation shall be G90.

907.05.04.11 Washers

Steel washers shall be according to CSA G40.20/G40.21. Malleable iron casting washers shall be according to ASTM A47M. Lock washers shall be according to ASTM F436.

907.05.04.12 Wood Screws

Wood screws shall be according to ASME B18.6.1.

907.05.05 Flashing

Flashing shall be copper according to ASTM B152, or alloy 304 or 316 stainless steel according to ASTM A240 or ASTM A480, and as specified in the Contract Documents. Flashing shall be formed with a drip edge and shall not concentrate runoff onto structural members or connections. Where installed on structural timber members, flashing shall be installed to provide a minimum air gap of 25 mm between the timber and flashing. Felt or other fabrics shall not be permitted to be installed with flashing. Fasteners used to install flashing shall not penetrate the top surface of structural timber elements.

907.05.06 Geotextile

Geotextile shall be non-woven, Class II according to OPSS 1860, Table 1, with a filtration opening size (FOS) of 75-150 µm.

907.05.07 Granular Materials

Granular materials shall be as specified in the Contract Documents, OPSS 1004 and OPSS 1010.

907.05.08 Preservatives

Preservative treatment shall be according to OPSS 1601.

For wood structural systems in bridges, preservatives shall be according to CSA S6 and the Structural Manual.

All machining of wood elements shall take place prior to preservative treatment.

907.05.09 Reinforcing Bar

Steel reinforcement for concrete shall be according to OPSS 1440.

Glass fibre reinforced polymer reinforcement for concrete shall be according to OPSS 950.

907.05.10 Structural Steel

Structural steel shall be according to OPSS 906.

907.05.11 Waterproofing Membrane

Self-adhering waterproofing membrane installed between timber elements and concrete shall be a product specified in Table 1, or an equivalent accepted by the Contract Administrator. The self-adhering waterproofing membrane shall be installed according to the waterproofing manufacturer's recommendations and as specified in the Contract Documents.

907.05.12 Wood

907.05.12.01 General

Wood shall be of the species and grade specified in the Contract Documents and shall be according to OPSS 1601.

907.05.12.02 Remanufacture of Graded Lumber

Remanufactured (ripped, resawn or dressed) graded or grade marked dimension lumber and timbers shall not be used unless each piece is re-graded by a lumber grader approved by an accredited rating agency, according to the NLGA Standard Grading Rules for Canadian Lumber and CSA O141.

907.05.13 Zinc-Rich Paint

Zinc-rich touch up paint shall be supplied by a manufacturer listed on the MTO DSM.

907.06 EQUIPMENT

907.06.01 Hydraulic and Mechanical Press

Hydraulic or mechanical presses capable of applying uniform pressure over the whole area of truss plates shall be used for the installation of all truss plates.

907.06.02 Hydraulic Jack System Stress-Laminated Wood Decks

The stressing equipment shall be according to OPSS 910.

The hydraulic jack system shall be capable of stressing a minimum of six post-tensioning locations at a time. For longitudinally laminated decks, the number of jacks shall not be less than those required to stress a length of deck equal to one-half the width of the deck at the same time.

907.07 CONSTRUCTION

907.07.01 Handling and Storage of Wood

All wood shall be handled, stacked, and protected according to OPSS 1601.

907.07.02 Shop Fabrication

Shop preparation and fabrication shall be according to OPSS 1601.

All machining of wood elements shall take place prior to preservative treatment except for breakaway holes in guide rail and sign posts.

907.07.03 Field Fabrication

All field machining of wood components that expose bright wood shall not be permitted unless specified in the Contract Documents or permission is received from the Contract Administrator. Record Drawings shall identify all field machining.

Field cut portions of treated wood members shall not be buried or placed in contact with the ground. Preservative treatment shall be repaired according to OPSS 1601.

Cutting and boring shall not puncture the internal voids of bridge decks containing post-tensioning bars.

Field cuts, abrasions, and boreholes made in fabricated wood after preservative treatment shall be trimmed and treated and be according to OPSS 1601.

907.07.04 Excavation

Excavation shall be according to OPSS 902.

907.07.05 Wood in Cribs

All cribbing member sizes and fastening shall meet the requirements of CSA S6. Cribs shall be erected to the dimensions shown in the Contract Documents with each layer horizontal before placing the next.

The cribs shall be filled as specified in the Contract Documents. Filling of the cribs shall be such that distortion is avoided. Fill material shall be placed in even horizontal layers and shall be compacted according to the requirements of OPSS 501. All side walls of the cribs shall be vertical.

907.07.06 Installation of Elements

907.07.06.01 General

The Contract Administrator shall be notified in writing of the installation date of elements at least 3 Business Days prior to the commencement of installation. Installation shall be according to the Working Drawings and the Contract Documents.

The work shall consist of installation and stabilization of the elements. Elements shall be lifted and placed in a manner to ensure they are not damaged, overstressed, unstable, or unsafe at any time.

Elements shall not be stacked temporarily on other elements during installation unless allowance has been made for this in the design of the elements and the connections.

A copy of the Working Drawings shall be kept on the site during installation of the elements.

All elements shall be inspected for any defects prior to installation. Repairs shall be made prior to erection. Repairs to erected material shall only be permitted after the Contract Administrator has accepted the repair procedure.

Any error that prevents the proper assembly and fitting of parts shall be reported and the proposed method of correction submitted to the Contract Administrator. Corrective measures shall not commence until the submitted proposal is accepted.

907.07.06.02 Alignment and Elevations

The bridge shall be erected to the alignment and elevations specified in the Contract Documents.

907.07.06.03 Inspection after the Installation of the Elements

A MTO form PH-CC-701, Request to Proceed shall be submitted to the Contract Administrator after the installation of each element type for each structure within a construction stage and prior to the cutting or removal of any temporary lifting, setting, or levelling devices, or casting of concrete or grouted joints.

The next operation shall not proceed until a MTO form PH-CC-702, Notice to Proceed has been received from the Contract Administrator.

907.07.07 Fasteners

907.07.07.01 General

Fasteners shall not be installed vertically top down into bright wood. Fasteners installed vertically bottom up shall not pass through the upper surface of the member.

Fasteners shall be installed to pull all plies in a connection into firm contact without crushing wood fibre. Bolts shall be fastened to a maximum torque of 40 N-m.

907.07.07.02 Bolts and Rods

Through holes shall be horizontal and all holes shall be pre-bored unless otherwise specified in the Contract Documents. Holes shall be aligned, and the bolts and rods shall be driven with a hammer not larger than 0.5 kg.

Holes for smooth dowels and drift pins shall be 1.5 mm less in diameter than the dowels or pins. Holes for galvanized bolts shall be bored with a bit 1.5 mm larger in diameter than the bolt.

Washers shall be placed under all bolt heads and nuts. Washers may be omitted under heads of special timber bolts or dome-head bolts when the size and strength of the head is sufficient to develop connection strength without wood crushing. Wood shall not be deformed under washers due to overtightening.

Excess bolt lengths of more than 50 mm shall be cut off to a level where at least five threads are still extending beyond the nut. The cut ends of galvanized bolts shall have two coats of zinc rich paint brush applied according to the manufacturer's product data sheets. After final tightening, all nuts shall be checked, and 3-5 threads epoxied or burred effectively with a pointing tool to prevent loosening. Field cuts or damaged surfaces shall be touched-up with a zinc rich paint within 10 hours of exposure.

907.07.07.03 Lag Screws

Holes for lag screws shall have the same diameter and depth as the shank of the screw, plus a lead hole for the threaded portion with the diameter equal to:

- a) $0.65d_F$ to $0.85d_F$ for dense hardwoods;
- b) $0.60d_F$ to $0.75d_F$ for Douglas Fir-Larch; and,

c) $0.40d_F$ to $0.70d_F$ for less dense wood, where d_F is the nominal diameter of the lag screw.

The larger lead-hole diameter in each range shall apply to lag screws of the greater diameters. The length of the lead hole shall fit the threaded portion of the lag screw.

Lag screws shall be installed to the torque specified in the Contract Documents.

Lag screws shall be turned into the wood, not driven.

Washers shall be placed under all lag screw heads, except under heads of special lag screws where the size and strength of the head is sufficient to develop connection strength without wood crushing, and when installed where the head bears directly onto metal side plates without a slotted hole.

Spring washers shall not be used with lag screws.

907.07.07.04 Nailing for Laminated Decks

Gauge lines for horizontal nailing shall be followed. Nails in the upper gauge line shall be inclined slightly downward and those in the lower gauge line inclined slightly upward. The nail heads shall be flush and well set so that they do not protrude from the surface. Power nailing devices shall be permitted for stress-laminated wood decks according to the CSA S6.

907.07.08 Placement of Members

907.07.08.01 Stringers and Girders

Except elements, stringers and girders shall be placed and adjusted when necessary, so that full and accurate bearing is achieved on the supports. Sawn wood members shall be oriented so that elevation differences between adjacent members, due to natural curvatures along their lengths, are minimized. All flexural members shall be installed with the edge containing the most significant knots facing upwards unless the manufacturer's stamp identifies otherwise.

907.07.08.02 Laminated Wood Deck

Except elements, each lamination shall be placed in the bridge so that initially, full and accurate bearing is achieved. Subsequently the alignment of predrilled holes in stress-laminated decks or slots in composite wood-concrete decks shall be achieved. Finally, the laminations shall be brought to position by nailing.

Rough-sawn lumber shall be surfaced on one side (S1S) to ensure uniform thickness for all laminations.

907.07.09 Stress-Laminated Wood Decks

907.07.09.01 Stressing

Hydraulic jacks shall be used for stressing the stress-laminated wood decks. For transversely laminated decks, all tendons shall be uniformly stressed at the same time. When initially stressing, the full tension shall not be applied until all laminations are aligned and in full contact with adjacent laminations.

High-strength bars shall be stressed to the forces shown in the Contract Documents. The tensioning shall be performed in the following sequence:

- a) Initial stressing (at time of construction of deck) - the initial stressing shall consist of two stressing operations not less than 12 hours apart.
- b) First restressing - not less than 2 weeks after completion of the initial stressing.
- c) Second restressing - not less than 4 weeks after the first restressing.

The allowable variation of prestressing force in each bar shall be 5%.

The Contract Administrator may increase the time periods between re-stressing when the ambient temperature is below 0 °C.

907.07.09.02 Securing of Deck

The deck shall not be secured to the supporting members, except as specified in the Segmental Construction clause, until after the first restressing. When a deck requires restraint against buckling during stressing, the restraint shall not inhibit free movement of the deck perpendicular to the laminates.

907.07.09.03 Segmental Construction

When a deck is to be constructed in segments, each segment shall undergo all re-stressing's as specified in the Stressing clause before being installed. The method of installation of the segments shall be such that the final assembled deck is continuous.

When the method of installation requires the temporary release of stressing in a segment in order to facilitate installation, that segment shall then be stressed twice before any segments are attached to it. The first stressing shall be at the time of installation of that segment. The second stressing shall be performed no sooner than 4 x T after the first stressing, where T equals the total time period the segment was not under stress.

907.07.10 Wood-Concrete Composite Decks

907.07.10.01 Wood Base Construction

Wood-concrete interface construction of the deck shall be according to CSA S6. Machining shall be completed prior to preservative treatment of the wood. Fasteners and spikes shall not be installed in the top of structural timber elements and shall not expose bright wood. Notch and spike construction shall not be permitted.

907.07.10.02 Concrete

Concrete shall be according to OPSS 904.

907.07.10.03 Concrete Reinforcement

Steel reinforcement for concrete shall be placed according to OPSS 905 and CSA S6.

Glass fibre reinforced polymer reinforcement for concrete shall be placed according to OPSS 950.

907.07.10.04 Formwork and Falsework

Formwork and falsework shall be according to OPSS 919.

907.07.11 Coatings

907.07.11.01 General

Coating of preservative treated wood shall be according to OPSS 1601.

907.07.11.02 Repair of Hot Dip Galvanizing

When the galvanized surface of a steel component is damaged or uncoated, the exposed steel shall be repaired if the cumulative total of the damaged and uncoated areas does not exceed 2% of the total area of each component or 0.02 m², whichever is less. Where the cumulative area exceeds these amounts, the damaged coating shall be stripped, and the component re-galvanized according to ASTM A123 or ASTM A653 as applicable for the component.

Damaged and uncoated areas shall be cleaned of all rust and other contaminants and repaired using one of the following methods:

a) Soldering method using zinc-tin-copper solder

The surface preparation and application of flux and zinc-tin-copper solder shall be according to ASTM A780 and the manufacturer's recommendations. The finished thickness of the metal coating in the repaired area shall be a minimum of 90 µm. The repaired surface shall be ground flush with the surrounding galvanized coating.

b) Thermal Metal Spraying

The surface preparation and application of thermal spray metal coating or metallizing shall be done according to SSPC-CS 23.00/AWS C2.23M/NACE No. 12 to provide a minimum thickness of 200 µm applied in two separate coats.

The metal coating on the repaired areas shall have a minimum adhesion of 2.8 MPa, when tested according to ASTM D4541.

c) Zinc-Rich Touch-Up Paint

This method of repair of galvanized coating is permitted when the individual damaged and uncoated area is less than 625 mm².

Two coats of one of the approved zinc-rich touch-up paint shall be brush applied after the surface preparation according to ASTM A780.

907.07.12 Paving

Wood bridge decks without concrete topping shall be primer-sealed with an epoxy sealer or epoxy binder and a fine aggregate course to facilitate traffic. Prior to applying the primer-sealer to the wood deck it shall be clean and free of debris and excess preservative. Blotters used to remove excess chemicals shall be removed prior to priming.

The cured epoxy sealer/binder primer-seal shall be sprayed with asphalt primer and paved with asphalt as specified in the Contract Documents. Prior to applying the asphalt primer and base course of asphalt to the epoxy primer-sealer, it shall be clean and free of debris and excess preservative. Blotters used to remove excess chemicals shall be removed prior to paving.

907.07.13 Management of Excess Material

Management of excess material shall be as specified in the Contract Documents.

907.08 QUALITY ASSURANCE

907.08.01 General

Visual inspection, non-destructive testing, and sampling shall be done in the fabrication shop and in the field by an Owner's inspector to confirm the material supplied, fabrication, and erection has been done as specified in the Contract Documents.

Electric power, scaffolding, protection from the weather, and free access for inspection and testing of material, to all aspects of the fabrication, delivery, and erection of the elements shall be supplied.

Moisture content of wood shall meet the requirements of the Contract Documents, measured according to ASTM D4442. Wood species may be confirmed by specific gravity according to ASTM D2395 and end grain analysis.

907.09 MEASUREMENT FOR PAYMENT

907.09.01 Actual Measurement

907.09.01.01 Wood in Cribs

Measurement of wood in cribs shall be by volume in cubic metres using dressed dimensions of the wood with no deductions for grooves, notches, and holes.

907.09.02 Plan Quantity Measurement

When measurement is by plan quantity, such measurement shall be based on the units shown in the clause under Actual Measurement.

907.10 BASIS OF PAYMENT

907.10.01 Fabrication of Mass Timber Elements - Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment, and Material to do the work. Fabrication of elements shall include the treatment with preservatives.

DLT and GLT elements that are stored at the fabricator's premises or some other location away from the Working Area shall be paid for when the Contractor obtains a lease from the property owner that names the Owner as the tenant. The Owner shall provide the form of lease for this purpose that specifies payment of \$10.00 for the term of the lease. The Contractor shall retain full responsibility for the elements.

**907.10.02 Delivery of Mass Timber Elements - Item
Erection of Mass Timber Elements - Item**

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

**907.10.03 Wood in Structure - Item
Wood in Cribs - Item**

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment, and Material to do the work.

When rock is available on the Contract, no deduction shall be made from the tender item "Rock Excavation, Grading," for the quantity of rock used in cribs.

907.10.04 Excavation for Wood Cribs

When excavation for wood cribs overlaps with excavation for other work, measurement of the overlapping excavation shall be according to the specification for such other work.

907.10.05 Shop and Field Inspection and Testing

The supply of electric power, scaffolding, protection from the weather, and access for material testing and inspection shall be the Contractor's responsibility at no extra cost to the Owner.

**Table 1
Waterproofing Materials**

| Manufacturer | Self-Adhering Waterproofing Membrane | Primer/Adhesive | Joint Sealant |
|---|---|---|---------------------------|
| WR Meadows | MEL-ROL | Mel-prime | Pointing mastic |
| Henry | Blueskin WP200 | Blueskin Primer | 570-05 Polybitume |
| Grace Construction Products | Bituthene System 4000 | Bituthene System 4000 Surface Conditioner | Bituthene Liquid Membrane |
| <p>Notes:</p> <p>A. The membrane shall be applied with the primer/adhesive.</p> <p>B. The self-adhering waterproofing membrane, the primer/adhesive, and the joint sealant shall be from the same manufacturer.</p> | | | |