This specification outlines the requirements for supply of timber and necessary fastenings, fabrication, placing and ballasting of timber cribwork as specified.

PART 1 REFERENCES

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

ASTM International

A307	Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 psi Tensile Strength

CSA Group

B111	Wire Nails, Spikes and Staples
G40.20/G40.21	General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
G164	Hot Dip Galvanizing of Irregularly Shaped Articles
O80	Wood Preservation

Other

Canadian Wood Council (CWC)	Wood Design Manual
National Lumber Grades Authority (NLGA)	Standard Grading Rules for Canadian Lumber

~~Regulations of the Canadian Lumber Standards Accreditation Board~~
~~Timber Design Manual 1974 Issued by Laminated Timber Institute of Canada~~
~~The National Lumber Grades Authority (NLGA)~~

PART 2 GENERAL

2.1 SUBMITTALS

.1 Provide submittals in accordance with Section 01340 – Shop Drawings, Samples and Submissions.

.2 Shop Drawings:

.1 Submit proposed placing method for ballast to the Owner for approval, before placing of ballast

.3 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

2.2 QUALITY ASSURANCE

.1 Worker Protection:

.1 Workers must wear appropriate personal protective equipment including long sleeved and other protective clothing when handling, drilling, sawing, cutting or sanding preservative treated wood and applying preservative materials.

.2 Workers must not eat, drink or smoke while applying preservative material.

.3 Clean up spills of preservative materials immediately with absorbent material. Safely discard of adsorbent material to sanitary landfill.

2.3 WASTE MANAGEMENT AND DISPOSAL

.1 Place materials defined as hazardous or toxic in designated containers.

.2 Ensure emptied containers are sealed and stored safely.

.3 Do not dispose of preservative treated wood through incineration.

.4 Do not dispose of preservative treated wood with other materials destined for recycling or reuse.

~~.1~~.5 Dispose of treated wood, end pieces, wood scraps and sawdust at a sanitary landfill.

PART 3 PRODUCTS

3.1 MATERIALS

.1 Timber: use timber graded and stamped in accordance with applicable grading rules and standards of associations or agencies approved to grade lumber by the Regulations of the Canadian Lumber Standards Accreditation Board.

.2 Species: Douglas Fir Group A.

.3 Grade: No. 1 Structural

.4 Grading authority: The National Lumber Grades Authority (NLGA)

.5 Preservative treatment: ~~CSA CAN / CSA O80 Series 08:21~~.

.1 For fresh water cribwork no wood preservative shall be used.

.2 For salt water cribwork treat in accordance with CSA CAN / CSA O80 ~~Series 08:21~~, with the following minimum assay retentions:

Waterborne preservatives 24 kg/m^3, oil-borne preservatives 30 kg/m^3.

.6 Miscellaneous steel:

.1 Hot dip galvanized: to CAN/CSA -G164
.2 Wire nails, spikes, staples: CSA B111.
.3 Bolts, nuts, washers: to ASTM A307.
.4 Ogee washers: To Wood Design Manual~~Timber Design Manual 1974 issued by Laminated Timber Institute of Canada,~~ and as follows: ogee washers to be of cast iron free from injurious defects or impurities.
.5 Steel straps and plates: CSA G40.20/G40.21 Grade 350W.
.6 Drift bolts: CSA G40.20/G40.21 from round stock, button head and diamond or wedge point.

.7 Ballast stone for filling cribs to the following requriements:

.1 Stone, consisting of ~~Supply~~ hard durable particles free from clay lumps, ~~quarry stone containing no~~ organic material and other deleterious materials.
.2 ~~, silt, clay or foreign substances.~~ Mminimum dry bulk density in place of 2600 kg per cubic metre. ~~Supply hard durable quarry stone containing no organic material, silt, clay or foreign substances.~~
.3 Gradations to be within limits specified when tested to ASTM C136.

.1 ~~=~~Ballast stone to be well graded with maximum sizes not exceeding 200 mm and not more than 10 % of material by mass passing 25 mm sieve.

.8 Geotextile in accordance with Section 02897 – Geotextile (Filter Fabric). Type as indicated in Contract Documents.

.9 Timber Cribbing Backfill: as indicated in Contract Documents.

PART 4 EXECUTION

4.1 PREPARATION

.1 Dredge area of crib base to elevations shown on the contract drawings.

.2 Before construction stockpile~~provide~~ sufficient ballast to completely fill cribs.

.3 Take closely spaced accurate soundings 1500 mm centre to centre or ~~less~~ precisely located by template to determine actual slope of base area of crib.

.1 ~~and~~ Cconstruct crib bottom to match base slope configuration.

.4 Provide suitable plant and equipment to keep the crib in proper position and alignment during sinking operation.

.2.5 If a crib is out of alignment or not in the correct location, the Contractor will be required to refloat the crib and replace the crib in its correct position.

4.2 CRIB CONSTRUCTION

.1 Precut and pre-bore timber prior to preservative treatment. There will be no field application of preservative treatment when pressure treated timbers are to be used for a water intake cribwork structure.

.2 Bore holes for drift bolts 1.5 mm smaller diameter than bolt and for full length of bolt. Bore holes for machine bolts to same diameter as bolts.

.3 Construct timber cribwork to full height prior to sinking in final position in work.

.4 Levelling pieces:

.1 Pplace levelling pieces beneath bottom timbers in such a manner that they will to conform to shape of base area.

.2 Place levelling pieces horizontally.

.4.3 Secure so that succeeding pieces will be solidly secured at intersections of bottom timbers and vertical posts, and other levelling pieces with machine bolts of proper length.

.5 Bottom timbers:

.1 Pplace bottom timbers lengthwise, and crosswise to form bottom three courses of cribs.

.2 Crosswise bottom timbers to be of one piece.

.3 Lengthwise bottom timbers to be minimum 6 m long.

.4 Splice timbers in lengthwise direction at centre of a 1.5 m long splice block.

.5 Stagger butt joints in bottom timbers, so that no joints maximumis further than 0.5 m from a crosswise timber and joint will not be located in same bay as a joint in course below.

.5.6 Secure three courses of bottom timbers together with machine bolts at every intersection with each other and vertical posts.

.6 Ballast floor:

.1 Pplace ballast floor on pockets on bottom or middle course of bottom timbers.

.6.2 Secure each ballast floor timber to bottom timbers with drift bolts securingso that adjacent ballast floor timbers are not secured to same bottom timber.

.7 Longitudinals:

.1 Bbutt join exterior and interior longitudinals in centre of a 1.5 m block.

.2 Secure block to lower timber with drift bolt at centre and secure longitudinals to be spliced to block with drift bolts at ends.

.3 Longitudinals to be as indicated on the contract drawings.

.4 Stagger joints in longitudinal timbers so that adjacent longitudinals, directly above or below, will not be joined in same bay or on same vertical post.

.5 Secure longitudinals to intersection of cross ties with drift bolt and to intersection of vertical posts with machine bolt every third course of longitudinals.

.7.6 Countersink machine bolts on exterior face above Lowest Normal Tide (LNT).

.8 Cross ties: to be in one length across cribs.

.1 Secure cross ties to intersection of longitudinals with drift bolt and to intersection of vertical posts with machine bolt every third course of cross tie.

.8.2 The top course shall be machine bolted as well. All machine bolts on the exterior face from elevation 300 mm below LNT to the deck elevation shall be countersunk.

.9 Vertical posts: to be in one length from bottom of cribwork to top of cribwork. Extend front posts to elevation LNT.

.10 Fillers: place filler timber as indicated. Secure fillers with drift bolts to timbers immediately below.

.11 Drift Bolts: will have length equal to thickness of timbers to be fastened less 50 mm.

.12 Machine Bolts: will have length equal to thickness of timbers being fastened plus thickness of washers plus 40 mm less depth of countersinking, if countersinking is indicated on the contract drawings.

4.3 HANDLING TREATED TIMBER

.1 Handle treated material without to avoid damaginge causing alteration in original treatment.

.1 Replace treated timber with major damage to original treatment, as instructed by the Owner.

.2 Site Treatment: Apply and thoroughly saturate cuts, minor surface damage, abrasions, and nail and spike holes with Treat in field, cuts and damage to surface of treated material with an appropriate preservative in accordance with CSA CAN / CSA O80. Ensure that damaged areas such

~~as abrasions nail and spike holes, are thoroughly saturated with field treatment solutions in accordance with CSA CAN / CSA O80.~~

.3 Do NOT field treat any timbers when being used for a water intake structure.

4.4 BALLAST

.1 Place ballast to avoid ~~stone in a manner that will not~~ damage timber cribwork. Owner to approve placing method.

.2 Place ballast so that differential height of fill between adjacent cells, at any time, will be less than 600 mm.

.3 After the final items of ballast stone are in place and before any granular fill is put in place, a layer of filter fabric shall be loosely spread over the ballast stone. All joins in the filter fabric shall be lapped 200mm. The filter fabric shall be securely held in place until the granular fill is placed on top of the fabric. Vehicular traffic will not be permitted to operate directly on the fabric.

~~.2~~.4 A 150mm thick layer of granular fill shall be placed over the top of the ballast and filter fabric in the crib to form a base for the wharf concrete deck. Install gravel to the grade required and compact to 100% of the maximum dry density in accordance with ASTM D698 in preparation for concrete slab work.

4.5 TOLERANCES

.1 Construct crib overall dimensions to tolerance of 1 in 300.

PART 5 PAYMENT

5.1 MEASUREMENT FOR PAYMENT

.1 Timber cribwork will be measured in cubic metres of completed work including rock ballast as specified in the Contract Documents.

.2 Cubic measure of cribs will be determined by product of following dimensions measured in place:

.1 Height: average of measurements taken at each vertical from bottom of lowest timber to top side of uppermost course of timber.

.2 Width: average of measurements between outside faces of exterior longitudinal timbers, each width measured on top ties of each row of cross ties.

.3 Length: measured horizontally along centre-line of crib between outside faces of exterior cross ties.

PART 6 BASIS OF PAYMENT

.1 All costs associated with the work outlined in this specification shall be deemed to be included in the appropriate unit and lump sum prices quoted as outlined in the Measurement for Payment subsection of this section and as included in the MERX Schedule of Quantities and Prices.

~~.1~~.2 Geotextile Filter Fabric will be paid in accordance with Section 02897 – Geotextile (Filter Fabric).