

## **PART 1 - GENERAL**

### **1.1 DESCRIPTION**

- .1 This section specifies requirements for supply and installation of treated timber and necessary fastenings for fabrication, placing, and ballasting of timber cribwork.

### **1.2 RELATED SECTIONS**

- .1 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Section 06 05 73 - Wood Treatment.
- .3 Section 31 36 19 – Rock Mattress.

### **1.3 MEASUREMENT FOR PAYMENT**

- .1 Treated Timber Cribwork: to be measured in cubic metres (m<sup>3</sup>) of completed work which includes ballast stone, gravel, treated timber, fastenings, and all plant, labour, materials and equipment to perform work. Include incidental to this unit price all costs associated with the supply and installation rock mattress, as detailed on the drawings.
- .2 Measure timber cribwork in cubic metres determined by product. Use 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 center-line of crib between outside faces of exterior cross ties.
- .3 Cribwork below step 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, measured at each crosstie at low water elevations.
  - .3 Length: measured horizontally along centre-line of crib and parallel to level water surface between outside faces of exterior cross ties.
- .4 Cribwork above step will be determined by product of following dimensions measured in place:
  - .1 Height: average of measurements taken at each vertical from top of step crib to top of top course of timber.

**PART 1 - GENERAL**  
**(CONT'D)**

**1.3 MEASUREMENT FOR PAYMENT**  
**(CONT'D)**

- .4 (cont'd)
  - .2 Width: average of measurements between outside faces of exterior longitudinal timbers, each width measured on top tier of each row and crossties.
  - .3 Length: measured horizontally along centre-line of crib and parallel to level water surface between outside faces of exterior cross ties.
- .5 Measurements of the vertical lengths, widths and lengths of cribwork, will be taken in the presence of both the Contractor and the Departmental Representative and will be verified and signed by both parties on the site to avoid any disputes.
- .6 Measurement for new cribwork to built-up deck elevation on Structure # 412(s) to be included in the unit price for timber cribwork.

**1.4 SAFETY REQUIREMENTS**

- .1 Worker protection:
  - .1 Workers must wear gloves, respirators, dust masks, long sleeved clothing, eye protection, 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 absorbent material to sanitary landfill.

**1.5 REFERENCES**

- .1 American Society for Testing and Materials (ASTM International).
  - .1 ASTM A307-07b, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile.
  - .2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .3 ASTM A123/A123M-09, Zinc (Hot Dip Galvanized) coatings on Iron and Steel Products.
- .2 American Wood-Preserver's Association (AWPA).
  - .1 AWPA M4-06, Standard for the Care of Preservation - Treated Wood Products.

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**(CONT'D)**

**1.5 REFERENCES**  
**(CONT'D)**

- .3 Canadian Standards Association (CSA International).
  - .1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.
  - .2 CAN/CSA-G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Steel.
  - .3 CAN/CSA-O80 Series-97 (R2007), Wood Preservation.
- .4 Canadian Wood Council.
  - .1 Wood Design Manual.
- .5 National Lumber Grades Authority (NLGA).
  - .1 Standard Grading Rules for Canadian Lumber 2000 edition.

**1.6 SUBMITTALS**

- .1 Ballast:
  - .1 Submit proposed placing method to Departmental Representative for approval, prior to placing of ballast.

**1.7 WASTE MANAGEMENT**

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Dispose of all corrugated cardboard and polystyrene plastic packaging material in appropriate on-site bin for recycling.
- .3 Place materials defined as hazardous or toxic in designated containers.
- .4 Ensure emptied containers are sealed and stored safely.
- .5 Do not dispose of preservative treated wood through incineration.
- .6 Do not dispose of preservative treated wood with other materials destined for recycling or re-use.
- .7 Dispose of treated wood, end pieces, wood scraps and sawdust at a sanitary landfill.

## **PART 1 - GENERAL** **(CONT'D)**

### **1.7 WASTE MANAGEMENT** **(CONT'D)**

- .8 Dispose of unused preservative material at an official hazardous material collections site. Do not dispose of unused preservative material into sewer system, streams, lakes, on ground or in any other location where they will pose a health or environmental hazard.

## **PART 2 - PRODUCTS**

### **2.1 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 Canadian Lumber Standards Accreditation Board of CSA.
- .2 Species: Douglas Fir, Pacific Coast Hemlock and Eastern Hemlock.
- .3 Grade: No. 1 Structural.
- .4 Grading Authority: NLGA.
- .5 Preservative Treatment: to CSA O80 for coastal waters and Section 06 05 73. Supply timbers in lengths required. Cut and field treat timbers only as may be necessary to suit site conditions. Contractor will have on site sufficient lengths and thickness of treated timber to permit levelling of cribs after ballasting operations.
- .6 Miscellaneous steel: Medium structural steel conforming to CSA Specification G40.21 "Structural Quality Steels".
  - .1 Hot dip galvanized: to ASTM A123/A123M-09.
  - .2 Wire nails, spikes, staples: to CSA-B111.
  - .3 Bolts, nuts, washers: to ASTM A 307.
  - .4 Drift Bolts: to G40.21 from round stock, button head and diamond or wedge point.
  - .5 Washers:
    - .1 Round Plate Washers: for 19 mm diameter machine bolts, use 79 mm diameter by 7.9 mm thick, with hole diameter of 21 mm. Washers to G40.21.
    - .2 Square washers not permitted to be used.
  - .6 All hardware galvanized.

## **PART 2 – PRODUCTS**

### **(CONT'D)**

#### **2.1 MATERIALS**

##### **(CONT'D)**

- .7 Ballast for filling cribs to following requirements:
  - .1 Stone, consisting of hard durable particles free from clay lumps, organic material and other deleterious materials.
  - .2 Dry density in place: minimum 2600 kg per cubic meter.
  - .3 Ballast stone to be well graded with maximum sizes not exceeding 400 mm on any side and minimum size of not less than 250 mm on any side.
- .8 Gravel: Evenly graded pit run or crushed stone, maximum size, 50 mm, with not more than 8% passing the 0.075 mm sieve.

## **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- .1 Prepare area of crib base to elevation indicated on drawings.
- .2 Contractor to confirm with Departmental Representative that cribseat elevation (rock mattress or excavated cribseat) is adequate for cribwork placement. Ensure full support is provided under the timbers.
- .3 Before construction, stockpile sufficient ballast to completely fill cribs. Provide suitable plant and equipment to keep crib in proper position and alignment during sinking operations.
- .4 Take closely spaced accurate soundings and probings, 1500 mm centre to centre or less, precisely located by template, to confirm a flat bottom is established over the new crib area. In areas where crib base is stepped, construct crib to suit the configuration and take sounding to confirm proper preparation of bottom to match. Scribe cribwork to bedrock where required to approval of the Departmental Representative.
- .5 Cribs out of alignment or not correctly located to be refloated and replaced in correct position.

#### **3.2 CRIB CONSTRUCTION**

- .1 Construct timber cribwork to 400 mm above LNT prior to sinking in final position in work.

## **PART 3 - EXECUTION**

### **(CONT'D)**

### **3.2 CRIB CONSTRUCTION**

#### **(cont'd)**

- .2 Levelling Pieces:
  - .1 Place treated timber levelling pieces beneath bottom timbers to conform to shape of base area.
  - .2 Place levelling pieces horizontally.
  - .3 Secure succeeding pieces at intersections of bottom timbers and vertical posts, and other levelling pieces with machine bolts.
- .3 Bottom timbers:
  - .1 Place bottom timbers lengthwise, and crosswise to form bottom three (3) courses of cribs.
  - .2 Crosswise bottom timbers to be of one piece.
  - .3 Lengthwise bottom timbers to be of one piece.
  - .4 Secure three (3) courses of bottom timbers together with machine bolts at every intersection with each other and with vertical posts.
- .4 Ballast floor:
  - .1 Place ballast floor in pockets on bottom or middle course of bottom timbers.
  - .2 Secure each ballast floor timber to bottom timbers with drift bolts securing adjacent ballast floor timbers to same bottom timber.
- .5 Longitudinals:
  - .1 Longitudinals one length for individual cribs below LNT.
  - .2 Longitudinals minimum 6100 mm long above LNT.
  - .3 Where cribs are married together, longitudinals of sufficient length to span a minimum of a half a bay of one crib and one and a half bays of the adjacent crib.
  - .4 Butt join exterior and interior longitudinals a minimum distance of 600 mm from crosstie with joint in center of a 1200 mm long joiner block.
  - .5 Secure block to lower timber with drift bolt at center and secure longitudinals and splice at ends of block with drift bolts.
  - .6 Stagger joints in longitudinal timbers. Do not join in same bay or on same vertical post.
  - .7 Secure longitudinals to intersection of cross ties with drift bolt and to intersection of vertical posts with machine bolt every third course of longitudinals, along with the top course.
  - .8 Countersink machine bolts on exterior face above LNT.
  - .9 For structure #412(s) with built-up deck elevation, install and fasten longitudinals as indicated on the drawings.

## **PART 3 - EXECUTION**

### **(CONT'D)**

### **3.2 CRIB CONSTRUCTION**

#### **(cont'd)**

- .6 Cross ties: 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, along with the top course.
  - .2 One row of crossties and verticals may be eliminated from one crib where cribs marry together above +400 mm LNT.
  - .3 For structure #412(s) with built-up deck elevation, install and fasten crossties as indicated on the drawings.
- .7 Vertical posts: one length from bottom of cribwork to top of cribwork. Locate one vertical post at corner of each crib and at (treated) intersection of crossties with longitudinals. Use additional wedged shaped (treated) vertical posts in areas of angled crib configurations as indicated on the drawings. The wedged timber cross-section shall be no less than 50% of the full-sized vertical and extend full length of vertical.
- .8 Blocking: install treated timber filler blocking as indicated on drawings.
  - .1 Cut blocking exact length to completely fill spaces and such that the total thickness of crossties and longitudinals carrying the bearing weight of the deck be a minimum of 1200 mm for the marginal wharf and a minimum of 800 mm for the finger pier.
  - .2 Blocking of same size and material as crossties or longitudinals and fastened with two (2) drift bolts into timber immediately below it.
- .9 Levelling: treated timber required for levelling of cribwork after ballasting, must be full width continuous over entire length to be levelled.
- .10 Bolt sizing and holing:
  - .1 Drift bolts: length of drift bolts equal to thickness of timbers fastened less 50 mm, unless otherwise specified. Bore holes for drift bolts 2 mm smaller diameter than bolt and for full length of bolt.
  - .2 Machine bolts: length of machine bolts equal to thickness of timbers fastened plus thickness of washers plus 40 mm. Where bolts are countersunk, the length, as noted above, less depth of countersink. Thread machine bolts for 64 mm. Bore holes for machine bolts to same diameter as bolts.

**PART 3 - EXECUTION**  
**(CONT'D)**

**3.3 HANDLING TREATED TIMBER**

- .1 Handle treated material without damaging original treatment.
  - .1 Replace treated timber with major damage to original treatment, as instructed by Departmental Representative.
- .2 Field treatment: to CAN/CSA-O80. Apply and saturate cuts, minor surface damage, abrasions, and nail and spike holes with preservative.
- .3 Ripping of treated timber not permitted without prior approval of Departmental Representative.

**3.4 BALLAST**

- .1 Place ballast to avoid damage to timber cribwork.
- .2 Place ballast so that differential height of fill between adjacent cells, at any time, will be less than 1 m.
- .3 Pockets of cribs ballasted within 100 mm of top of crib timbers.

**3.5 GRAVEL**

- .1 Install a 100 mm layer of gravel over the top of ballast to form a base for the reinforced concrete deck.
- .2 Hand place final items of ballast stone to fill voids and depressions to hold gravel in place.
- .3 Install gravel to grade required and compact in preparation for concrete deck work.
- .4 Clean any loose gravel off timber surface prior to placement of deck.

**3.6 TOLERANCES**

- .1 1 in 300 in overall dimensions.
- .2 Locate cribs within 100 mm of locations as indicated. Horizontal misalignment within 100 mm along the outside faces.



**PART 3 - EXECUTION**  
**(CONT'D)**

**3.6 TOLERANCES**  
**(CONT'D)**

- .3 Space between ballasted cribs within 200 mm. No payment for this space will be made above or below LNT.

**3.7 PROTECTION**

- .1 Protect work from damage resulting from work on other sections and from damage resulting from environmental conditions.
- .2 Repair or replace portion or entire crib at no additional cost if damaged by work.