

31 23 33 – EXCAVATING, TRENCHING AND BACKFILLING

Part 1 General

1.1 MEASUREMENT PROCEDURES

- .1 Excavation for installation of timber cribs to be considered incidental to supply and installation of square sawn timber.
- .2 Granular surface 20mm minus will be measured in tonnes of material supplied and placed to the final dimensions indicated on the drawings and incorporated into the completed work and shall include all labour, equipment and materials necessary to complete the work.
- .3 Granular fill 100mm minus will be measured in tonnes of material supplied and placed to the final dimensions indicated on the drawings and incorporated into the completed work and shall include all labour, equipment and materials necessary to complete the work.
- .4 Weigh all stone placed in the Work at the quarry on a scale approved and certified as correct. Prior to use, have weigh scale certified as meeting requirements of Statutes of Canada, Chapter 36, Weights and Measures Act 1971 and subsequent amendments. Provide the Departmental Representative with a copy of the certificate and display certificate in prominent location. Costs for maintenance and operation of scale shall be considered incidental to the work.
- .5 Provide the Departmental Representative with weigh tickets at time of delivery to site.
- .6 Construction, maintenance and removal of haul roads are to be considered incidental to this work.

1.2 SOURCE SAMPLING

- .1 Inform Engineer of proposed source of materials and provide access for sampling at least 2 weeks prior to commencing work.

Part 2 Products

2.1 MATERIALS

- .1 Granular fill material: in accordance with following requirements:
 - .1 Crushed, pit run or screened stone, gravel or sand.
 - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1.

- .3 The gradation and physical requirements to be as follows:

Sieve Designation	% Passing
100 mm	100
75 mm	95-100
50 mm	85-100
19 mm	75-100
16 mm	57-83
9.5 mm	37-61
5 mm	12-32
1.2 mm	8-23
0.4 mm	5-10
0.08 mm	5-8

- .2 Granular surfacing material: A-base 20mm minus

- .1 Crushed, pit run or screened stone, gravel or sand.
.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1.
.3 The gradation and physical requirements to be as follows:

Sieve Designation	% Passing
20 mm	100
10 mm	35-85
5 mm	15-65
0.08 mm	0-12

Part 3 Execution

3.1 EXCAVATION

- .1 Excavate to lines, grades, elevations and dimensions as directed by Engineer.
.3 Excavation must not interfere with bearing capacity of adjacent foundations.
.5 Keep excavated and stockpiled materials safe distance away from edge of excavation as directed by Engineer.
.6 Restrict vehicle operations directly adjacent to open trenches.
.7 Dispose of surplus and unsuitable excavated material off site.
.9 Do not obstruct flow of surface drainage or natural watercourses.
.10 Notify Engineer when bottom of excavation is reached.
.11 Obtain Engineer approval of completed excavation.

3.2 BACKFILLING

- .1 Do not commence backfilling until areas of work have been inspected and approved by Engineer.
- .2 Ensure no frozen material is placed.
- .3 Place material only on clean unfrozen surface, free from snow or ice.
- .5 Place granular materials using methods which do not lead to segregation or degradation.
- .7 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Engineer may authorize thicker lifts (layers) if specified compaction can be achieved.
- .8 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .9 Remove and replace portion of layer in which material has become segregated during spreading.

3.3 COMPACTION

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Compact to density of not less than 98% corrected maximum dry density.
- .3 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
- .4 Apply water as necessary during compaction to obtain specified density.
- .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Engineer.
- .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.4 SITE TOLERANCES

- .1 Finished granular surface to be within 20 mm of elevation as indicated but not uniformly high or low.

3.5 PROTECTION

- .1 Maintain finished granular surface in condition conforming to this section until granular surfacing is accepted by Engineer.

END OF SECTION

31 32 19 – GEOTEXTILES

Part 4 General

4.1 MEASUREMENT AND PAYMENT

- .1 Measure geotextiles in square metres of surface covered by material. No allowance will be made for seams and overlaps.

4.2 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-4.2 No. 11.2-[2004], Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
 - .2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.
 - .1 No.2-M85 Methods of Testing Geosynthetics - Mass per Unit Area.
 - .2 No.3-M85, Methods of Testing Geosynthetics - Thickness of Geotextiles.
 - .3 No.6.1-93, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.
 - .4 No.7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.
 - .5 No. 10-94, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.
- .2 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 1860-November 2010, Material Specification for Geotextiles.

4.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for geotextiles and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Test and Evaluation Reports:
 - .1 If requested, submit copies of mill test data and certificate at least 4 weeks prior to start of Work.

4.4 SAMPLES

- .1 Submit to the Engineer the following samples at least 1 week prior to commencing work:
 - .1 Minimum of 1 m of roll width of geotextile

4.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.

- .2 Storage and Handling Requirements:
 - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect geotextiles from direct sunlight and UV rays.
 - .3 Replace defective or damaged materials with new.

Part 5 Products

5.1 MATERIAL

- .1 Non-woven geotextiles shall be Class II and consist of a manufactured sheet, web, or batt of directionally or randomly oriented fibres, filaments, or other elements produced by bonding or interlocking the elements by mechanical, thermal, or chemical means.
- .2 Tensile strength, Marv, minimum 660 N to CAN/CGSB 148.1, Method No. 7.3.
- .3 Elongation at break, typical, >50% to CAN/CGSB 148.1, Method No. 7.3.
- .4 Tear strength, MARV, minimum, 250 N to CAN/CGSB 4.2, Method No. 12.2.
- .5 Puncture strength, MARV minimum, 1375 N to ASTM D 6241.
- .6 Permittivity, minimum, to 0.05 CAN/CGSB 148.1, Method No. 4 s⁻¹.
- .7 Ultraviolet stability, minimum, 50% retained tensile strength at 500 hours to ASTM D 4355.

Part 6 Execution

6.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for geotextile material installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Engineer.
 - .2 Inform Engineer of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

6.2 INSTALLATION

- .1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with securing pins and washers.
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .3 Overlap each successive strip of geotextile 600 mm over previously laid strip.
- .4 Pin successive strips of geotextile with securing pins at 2000 mm interval at midpoint of lap as indicated.

- .5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .6 After installation, cover with overlying layer within 4 hours of placement.
- .7 Replace damaged or deteriorated geotextile to approval of Engineer.
- .8 Place and compact soil layers in accordance with relevant specification sections.

6.3 CLEANING

- .1 Progress Cleaning:
 - .2 Leave Work area clean at end of each day.
 - .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

6.4 PROTECTION

- .1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION

31 53 13 – TIMBER CRIBWORK

Part 1 General

1.1 MEASUREMENT PROCEDURES

- .1 Treated decking will be paid for by the square metre of decking supplied, installed and remaining in the work. This item includes all fastenings.
- .2 Treated square sawn timber to be measured in cubic metres of timber supplied, installed and remaining in the work, including all fastenings. This item to include curb, stringers, cribwork timbers and all timber material required for the construction of the new wharf. This item includes all fastenings.
- .3 Ballast rock will be paid for by the cubic metre supplied, installed and remaining in the work. This item to include ballast rock salvaged from existing wharf.
- .4 Cubic measure of timber to be determined by product of actual cross-sections and length dimensions in place. The cross-section dimensions will be obtained from Table N-9 in "Metric Handbook for Canadian Softwood Lumber".

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A307-04, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
 - .2 CSA-O80 Series-97(R2002), Wood Preservation.
- .3 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber 2003 edition.

1.3 QUALITY ASSURANCE

- .1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.
- .2 Worker protection:
 - .1 Workers must wear gloves, eye protection and protective clothing when handling, drilling, sawing or cutting 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 approved landfill.

1.4 WASTE MANAGEMENT

- .1 Do not dispose of preservative treated wood through incineration.

- .2 Do not dispose of preservative treated wood with other materials destined for recycling or reuse.
- .3 Dispose of treated wood, end pieces, wood scraps and sawdust at an approved landfill.

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.
 - .1 Species: Group A (Douglas Fir).
 - .2 Grade: Structural, No 2 or better.
 - .3 Grading authority: BCLMA
 - .4 All timber to be rough sawn.
 - .5 All decking to be square sawn sized lumber.
 - .6 All specified treated timber and planks to be pressure treated with CCA or ACA preservative, incision method, to 6.4 kg/cubic metre (0.40 lb/cubic foot) retention or refusal. Treatment to conform to the latest edition of CSA specification 080.
 - .7 All end cuts, abrasions and bolt holes to be well soaked with two coats of ACQ preservative acceptable to Engineer.
 - .8 Machine bolts used are to be of sufficient length to accept two washers and one fully threaded hexagonal headed nut.
 - .9 Drift bolts to have countersunk, tapered head and chisel point as manufactured by Dominion Bridge or equivalent.
 - .10 Bore holes for drift bolts 1.5 mm smaller diameter than bolt and 52 mm short of length of bolt. Bore holes for machine bolts to same diameter as bolt.
 - .11 All end cuts to be placed above high water line where possible.
- .2 Miscellaneous steel:
 - .1 Hot dip galvanized: to CAN/CSA-G164.
 - .2 Wire nails, spikes, staples: to CSA-B111.
 - .3 Bolts, nuts, washers: to ASTM A307.
 - .4 Steel straps and plates: to CAN/CSA-G40.21, Grade 300.
- .3 Ballast for filling cribs to following requirements:
 - .1 Stone, consisting of hard durable particles free from clay lumps, organic material and other deleterious materials. Ballast stone supplied to be well graded with maximum size not exceeding 250 mm and minimum size to be not less than 200 mm. Appropriately sized clean ballast rock from the existing wharf may be used for ballast rock.

Part 3 Execution

3.1 PREPARATION

- .1 Place and level crushed rock mattress as indicated.
- .2 Before construction, stockpile sufficient ballast to completely fill cribs.
- .3 Take closely spaced accurate soundings, precisely located by template, to surface of mattress, to determine actual configuration of base area of crib.
 - .1 Construct crib bottom to match base configuration.

3.2 DECKING AND CURB

- .1 Decking will be 76 mm square sawn sized lumber laid heart side down. Planks will be spaced 6 mm apart and secured with two 200 mm galvanized spiral spikes per timber contact. Plank widths to be not less than 240 mm and not more than 310 mm wide. Deck planks to cross width of wharf in one length except where indicated on Drawing P-1.
- .2 Planks to be cut flush with outer faces of work.
- .3 All planks to be pre-drilled for the spikes to prevent splitting.
- .4 In cases where the thickness of deck planks vary due to shrinkage or swelling, planks are to be sorted and installed so that changes in elevations are kept to a minimum. Chamfer edges of plank where changes cannot be avoided.
- .5 Place curb on risers and secure with countersunk 20 mm diameter machine bolts as shown on the plan.
- .6 Riser blocks are to be secured to the deck with two 200 mm galvanized spiral spikes.

3.3 CRIB CONSTRUCTION

- .1 All longitudinal and cross timbers shall be of sufficient length to span crib in one length or as noted on drawing. Longitudinals and cross timbers to be drifted to each other at each contact point with 20 mm x 355 drift bolts. Each longitudinal and cross timber to be fastened to vertical binder post with 20 mm machine bolt complete with nut and 2 washers. All machine bolts used to be of sufficient length to accept 2 washers and have room for fully threading a hexagonal nut. All machine bolts to be countersunk on exterior faces.
- .2 Place ballast floor on pockets on bottom or second course from bottom timbers. Secure each ballast floor timber to bottom timbers with 20 mm x 305 drift bolts.
- .3 Vertical binder posts to be in one length from bottom of cribwork to top of cribwork.
- .4 Stringers to be installed in lengths as shown on drawings. Stringers to be fastened to crib timbers with 20 mm x 406 drift bolts at each contact.
- .5 Maximum spacing between cross timbers and longitudinal not to exceed 215mm.

- .6 Bore holes for drift bolts 1.5 mm smaller diameter than bolt 52 mm short of length of bolt. Bore holes for machine bolts to same diameter as bolts.

- .7 .7 Salvage and reinstall existing mooring bollards and steel safety ladders in locations designated by Engineer.

3.4 HANDLING TREATED TIMBER

- .1 Handle treated material without damaging original treatment.
 - .1 Replace treated timber with major damage to original treatment, as instructed by Engineer.
- .2 Field treatment: apply and saturate cuts, minor surface damage, abrasions, and nail and spike holes with preservative to CAN/CSA-O80 Series.

3.5 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 Cribs to be fully ballasted from ballast floor to bottom of stringers.

3.6 TOLERANCES

- .1 1 in 300 in overall dimensions.

3.7 CLEANING

- .1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

35 59 11 – TIMBER FLOAT WHARVES

Part 1 General

1.1 MEASUREMENT FOR PAYMENT

- .1 Timber float wharves to be measured by as indicated on the Unit Price Table.
- .2 Connections between float wharves, fastenings, hardware and mooring cleats shall not be measured separately for payment, but considered incidental to the work.
- .3 Transition plates will be paid for per unit picked up at 501 University Cres., Winnipeg, MB and installed on site including any required fasteners and backing plates.
- .4 Re-installation of existing timber float wharves and aluminum ramp to be included in lump sum costs for the project.

Part 2 Products

2.1 MATERIALS

- .1 Lumber and timber: except as otherwise specified, use lumber and timber graded and stamped in accordance with applicable grading rules and standards of associations or agencies approved to grade lumber by Canadian Lumber Standards Administration Board of CSA.
 - .1 Species: Douglas Fir Group 1b.
 - .2 Grade: structural or better
 - .3 Grading authority: BCLMA
 - .4 All timber to be S4S.
 - .5 Galvanized bolts and nuts: to ASTM A307-07b.
 - .6 Countersunk head bolts to CSA B34-67(R1972).
 - .7 Washers: pressed steel.
 - .8 Galvanized spikes and nails: spiral type to CSA B111-1974(R2003).
 - .9 Hot-dip galvanized, stainless steel, silicone, bronze or copper wood screws and fasteners: to ASTM Standards: ASTM-A153 (for hot-dip fastener products), and ASTM-A653 (coating designation G-185 for hot-dip connector and sheet products) and Type 305 and 316 for stainless steel.
 - .10 Plastic bushings: ultra high molecular weight polyethylene (UHMWPE), density 0.94, black.
 - .11 Shapes, plates: fabricated from steel confirming to CAN/CSA-G40.20-04 and CAN/CSA-G40.20-04, Grade 300W.
 - .12 Primer: CAN\CGSB-1.40-M80 primer, structural steel, oil alkyd type.
 - .13 Preservative:
 - .1 Pressure Treatment: all specified treated timber and planks to be pressure treated with CCA or ASA preservative salts to 0.64 g/cu. cm. (0.40 lbs/cu. ft.) retention.

- .14 Machine bolts used are to be of sufficient length to accept two washers and one fully threaded hexagonal headed nut.
- .15 Mooring Cleats: galvanized grey iron ship or dock cleat (two hole type) indicated on drawings.
- .16 Floatation units:
 - .1 Dimensions/Capacity:
 - .1 Floatation units for principal float wharves and finger float wharves shall be of size 600 mm x 1200 mm x 300 mm deep with a minimum buoyancy of 196 kg each.
 - .2 Alternate floatation units shall be used only with written approval of engineer.
 - .2 Materials:
 - .1 One piece, seamless rotational moulded outer shell.
 - .2 Manufactured from linear polyethylene resin with UV inhibitors and carbon black pigment.
 - .3 Nominal shell thickness minimum 3.8 mm.
 - .4 Heavy duty, reinforced moulded in mounting slots.
 - .5 Built in vent.
 - .6 Foam filled to 1.0-1.5 lbs/ft³
 - .3 Warranty:
 - .1 Manufacturer to warrant floats for a period of ten (10) years from date of purchase against cracking, peeling, sloughing and ultraviolet deterioration. Floatation units shall retain their resiliency against being frozen in or other abrasions from normal usage.
 - .2 Contractor will submit to engineer manufacturer's documentation indicating date of purchase.
 - .3 Alternate floatation units meeting or exceeding the above specification may be used only upon written approval of the engineer.

Part 3 Execution

3.1 CONSTRUCTION

- .1 Construct timber floats as indicated on drawings.
- .2 Build work square, true, straight and accurate to the required size, with all joints closely fitted and properly secured.
- .3 Except where specified, use of shims, wedges, or short pieces of timber not permitted.
- .4 Drill holes for bolts the same size as bolt diameter.
- .5 Lay deck planks, stringers and headers in one piece.
- .6 Project all bolts at least 6 mm beyond nut.

- .7 Place a washer under the head of each bolt and under nuts in contact with wood.
- .8 Connect floatation units with lag bolts c/w rubber and stainless steel washer as indicated on drawings.
- .9 Install stringers as designated.
- .10 Decking: Screw planks to each stringer contact with two (2) wood screws to a minimum penetration of 50 mm. Holes in decking are to be pre-drilled. Drill all screws 2 mm below deck surface. Space planks maximum 10 mm apart.
- .11 Curbing: If specified on drawings, nail timber curb along edges of deck with spiral nails at 600 mm centers. Chamfer exposed sides of curb 12 mm along upper edges. Curbing in minimum lengths of 4 m. Nail riser blocks to deck with 2 spiral spikes.
- .12 Fabricate and install all connection hardware as indicated.
- .13 Paint all float connectors, shapes and plates with one coat of primer prior to installation.

END OF SECTION