

PART 1 - GENERAL

- | | | | |
|-----|---------------------|----|---|
| 1.1 | Related Work | .1 | Refer to other Specification Sections for related information. |
| | | .2 | Refer to Section 01 33 00 for Shop Drawing/Submission requirements. |
| 1.2 | Source Approval | .1 | Source of materials to be incorporated into work or stockpiled requires acceptance. |
| | | .2 | Inform <i>Departmental Representative</i> of proposed source of aggregates and provide access for sampling at least 4 weeks prior to commencing production. |
| | | .3 | If, in opinion of <i>Departmental Representative</i> , materials from the proposed source do not meet, or cannot reasonably be processed to meet specified requirements, procure an alternative source to demonstrate that materials from source in question can be processed to meet specified requirements. |
| | | .4 | Should a change of material source be proposed during work, advise <i>Departmental Representative</i> 4 weeks in advance of proposed change to allow sampling and testing. |
| | | .5 | Acceptance of material at source does not preclude future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified, or if its field performance is found to be unsatisfactory. |
| 1.3 | Production Sampling | .1 | Aggregate will be subject to continual sampling during production. |
| | | .2 | Provide <i>Departmental Representative</i> with ready access to source and processed material for sampling and testing. |
| 1.4 | Measurement for | | |

Payment .1 This item will not be measured separately.

PART 2 - PRODUCTS

- 2.1 Materials
- .1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances.
 - .2 Flat and elongated particles are those whose greatest dimension exceeds four times their least dimension.
 - .3 Fine aggregates satisfying requirements of applicable section shall be one, or a blend of following:
 - .1 Natural sand
 - .2 Manufactured sand
 - .3 Screening produced in crushing of quarried rock, boulders, gravel or slag
 - .4 Coarse aggregates satisfying requirements of applicable section shall be one of following:
 - .1 Crushed rock or slag
 - .2 Gravel and crushed gravel composed of naturally formed particles of stone.

PART 3 - EXECUTION

- 3.1 Development of Aggregate Source
- .1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials as directed by the *Departmental Representative*.
 - .2 Clear, grub and strip an area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.

- .3 When operating in stratified deposits use excavation equipment and methods that will produce a uniform, homogeneous aggregate.
- .4 When excavation is completed, provide drains or ditches as required to prevent surface standing water.
- .5 Trim off and dress slopes of waste material piles and leave site in a neat condition.
- .6 Provide silt fence or other means to prevent contamination of existing watercourse or natural wetland features.

3.2 Processing

- .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
- .2 Blend aggregate if required to obtain gradation requirements specified. Use approved methods and equipment.
- .3 Blending to increase percentage of crushed particles or decrease percentage of flat and elongated particles is permitted.
- .4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate gradation.
- .5 Where necessary, screen, crush, wash, classify and process aggregates with suitable equipment to meet requirements.
- .6 Use only equipment approved in writing by Departmental Representative.

3.3 Handling

- .1 Handle and transport aggregates to avoid segregation, contamination and degradation.

3.4 Stockpiling

- .1 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

- .2 To ensure that no material other than stockpiled aggregate is used, do not incorporate bottom 300 mm of stockpile into work, if aggregates are stockpiled on ground.
- .3 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
- .4 Reject intermixed or contaminated materials. Remove and dispose of rejected materials as directed within 48 hours of rejection.
- .5 Stockpile materials in uniform layers of thickness as follows:
 - .1 Max 1 m for coarse aggregate and base course materials.
 - .2 Max 2 m for fine aggregate and subbase materials.
 - .3 Max 1.5 m for other materials.
- .6 Complete each layer over entire stockpile area before beginning next layer.
- .7 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
- .8 Coning of piles or spilling of material over edges of pile will not be permitted.
- .9 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

END OF SECTION

PART 1 - GENERAL

1.1 Description of Work

- .1 This Section includes but is not limited to all normal removals as required to complete the work, including but not limited to:
 - .1 Complete removal of existing wharf including approach and head block timber cribwork, ballast, concrete frames and braced timber frame post and deck system.
 - .2 Partial removal and rework of wharf approach and service area as required to facilitate existing wharf removal and construction of new.
- .2 All items to be verified by a site visit prior to submission of a tender. All available plans of the existing structure are available for viewing upon request to the Departmental Representative.
- .3 All derricks, fuel lines, or buildings to be removed by others unless otherwise indicated.

1.2 Site Information

- .1 Results of prior soundings, soil borings and geotechnical investigations may be available for inspection by contacting the Departmental Representative.
- .2 Results of most recent soundings, geotechnical, and surveys are included with the drawings. This data is made available for tendering purposes only. It should be noted that this information may differ from present site conditions.
- .3 The Contractor will be responsible for making their own interpretation of soil conditions at any location, other than borehole locations. Borehole descriptions shown on the logs are only descriptive of conditions at locations described by boreholes themselves.

1.3 Related Work

- .1 Refer to other specification sections for related information.

- .2 Refer to Section 01 33 00 for Shop Drawing/Submission requirements.
- 1.4 Submissions
 - .1 Methodology:
 - .1 When requested provide methodology for carrying out the work
 - .2 Provide submission in accordance with Section 01 33 00.
- 1.5 Protection
 - .1 Prevent movement, settlement or damage of adjacent structures. Provided bracing and shoring as required. In event of damage, immediately replace such items or make repairs to approval of *Departmental Representative* and at no additional cost to *Departmental Representative*.
 - .2 Prevent debris from going adrift and becoming a menace to navigation.
 - .3 All damage to existing structures, roadways, pipelines, electrical systems not specified for removal to be repaired at the Contractor's cost to the satisfaction of the *Departmental Representative*.
- 1.6 Measurement for Payment
 - .1 Site work, demolition and removals will be measured in accordance with Section 01 29 10.
- PART 2 - PRODUCTS
 - .1 Not applicable.
- PART 3 - EXECUTION
 - 3.1 Preparation
 - .1 Inspect site and verify with *Departmental Representative* items designated for removal and items to be preserved.
 - .2 Locate and protect utility lines. Preserve in operating condition active utilities traversing site.

- .3 Provide temporary power and lighting as shown on the plan or as required by the *Departmental Representative*.
- .4 Existing fill and vent pipes, oil waste tanks, above ground propane tanks, and underground storage tanks to be protected from any damages. All repairs to damages as a result of Contractor's operations to be at his cost and to the satisfaction of the *Departmental Representative*.

3.2 Removal

- .1 Remove items indicated.
- .2 Do not disturb adjacent structures designated to remain in place. The contractor must exercise caution during removals adjacent to the existing wharf and breakwater structures.
- .3 At end of each day's work, leave work in safe condition so no part is in danger of toppling or falling.
- .4 Neatly saw cut concrete and asphalt surfaces at limits of removals. Should cut edges become damaged during work of the project, saw cut and further remove to sound material prior to reinstatement.

3.3 Disposal of Material

- .1 Disposal of materials not designated for salvage or re-use in work, will be the contractor's responsibility, and must be disposed of off-site.
- .2 The material to be disposed is to be transported and disposed of in an environmentally acceptable manner to the satisfaction of the *Departmental Representative*, and in accordance with any local, Municipal, Provincial and Federal restrictions and regulations.

3.4 Restoration

- .1 Upon completion of work, remove debris, trim surfaces and leave work site clean.

- .2 Reinststate areas and existing works outside areas of demolition to conditions that existed prior to commencement of work. Match condition of adjacent, undisturbed areas.

END OF SECTION

PART 1 - GENERAL

- | | | | |
|-----|---------------------|----|--|
| 1.1 | Description | .1 | This section specifies requirements for excavating and backfilling for installation of the new wharf and services. |
| 1.2 | Reference Standards | .1 | American Society for Testing and Materials International (ASTM) |
| | | .1 | ASTM C117-17, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing. |
| | | .2 | ASTM C136/C136M-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates. |
| | | .3 | ASTM D698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³) (600 kN-m/m ³). |
| | | .4 | ASTM D1557-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³) (2,700 kN-m/m ³). |
| | | .5 | ASTM D4318-17, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils. |
| | | .2 | Canadian General Standards Board (CGSB) |
| | | .1 | CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series. |
| | | .2 | CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric. |
| | | .3 | CSA Group (CSA) |
| | | .1 | CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005). |
| | | .2 | CSA-A3001-03, Cementitious Materials for Use in Concrete. |
| | | .3 | CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete. |
| 1.3 | Related Work | .1 | Refer to other Specification Sections for related information. |
| 1.4 | Definitions | .1 | Rock excavation: excavation of material from solid masses of igneous, sedimentary or metamorphic rock which, prior to its removal, was integral with its parent mass, and boulders or rock fragments having individual volume in excess of 1.5 m ³ . Frozen material is not classified as rock. |
| | | .2 | Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation including dense tills, hardpan, frozen materials and partially cemented materials such as asphalt which can be ripped and excavated with heavy construction equipment. |

- .3 Unsuitable materials:
 - .1 Weak, chemically unstable, and compressible materials.
 - .2 Frost susceptible materials:
 - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM C136: Sieve sizes to CAN/CGSB-8.2.
 - .2 Table:

| Sieve Designation | % Passing |
|-------------------|-----------|
| 2.00 mm | 100 |
| 0.10 mm | 45 - 100 |
| 0.02 mm | 10 - 80 |
| 0.005 mm | 0 - 45 |
 - .3 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.
- .4 Unshrinkable fill: weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.5 Protection of Existing Features

- .1 Existing buried utilities and structures:
 - .1 Prior to commencing any excavation work, notify applicable owner or authorities, establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during work.
- .2 Existing structures and surface features:
 - .1 Protect existing buildings and surface features which may be affected by work from damage while work is in progress and repair damage resulting from work.

1.6 Shoring and Bracing

- .1 Engage services of qualified Professional Engineer who is registered or licensed in Province of Work to design and inspect cofferdams, shoring, bracing and underpinning required for Work.
- .2 Comply with applicable authority having jurisdiction to protect existing features.

1.7 Samples

- .1 At least 2 weeks prior to commencing work, inform *Departmental Representative* of proposed source of fill materials and provide access for sampling.

- | | | |
|-----------------------------|----|---|
| 1.8 Measurement for Payment | .1 | Work performed under this Section will be incidental to work involved in other sections of this specification unless otherwise noted in Section 01 29 10. |
|-----------------------------|----|---|

PART 2 - PRODUCTS

- | | | |
|---------------|----|---|
| 2.1 Materials | .1 | Granular Base material in accordance with Section 32 11 23. |
| | .2 | Granular Sub Base material in accordance with Section 32 11 19. |
| | .3 | Corestone in accordance with Section 35 31 24. |
| | .4 | Crushed rock mattress in accordance with Section 31 37 10. |
| | .5 | Unshrinkable fill: proportioned and mixed to provide: |
| | .1 | Maximum compressive strength of 0.4 MPa at 28 days. |
| | .2 | Maximum cement content of 25 kg/m ³ : to CSA-A3001, Type GU. |
| | .3 | Minimum strength of 0.07 MPa at 24 h. |
| | .4 | Concrete aggregates: to CSA-A23.1/A23.2. |
| | .5 | Cement: Type GU. |
| | .6 | Slump: 160 to 200 mm. |

PART 3 - EXECUTION

- | | | |
|-------------------------------------|----|--|
| 3.1 Site Preparation And Protection | .1 | Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated. |
| | .2 | Protect existing features in accordance with applicable local regulations. |
| | .3 | Keep excavations clean, free of standing water, and loose soil. |
| | .4 | Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage. |
| | .5 | Protect buried services that are required to remain undisturbed. |
| 3.2 Stockpiling | .1 | Stockpile fill materials in areas approved by <i>Departmental Representative</i> . Stockpile granular materials in manner to prevent segregation. |
| 3.3 Dewatering | .1 | Keep excavations free of water while work is in progress. |
| | .2 | Protect open excavations against flooding and damage due to surface run-off. |

- .3 Dispose of water in a manner not detrimental to public and private property, or any portion of work completed or under construction.
- 3.4 Excavation
 - .1 Excavate to lines, grades, elevations and dimensions indicted or as directed by *Departmental Representative*. Maintain sides and slopes of excavations in safe condition by appropriate methods.
 - .2 Dispose of surplus and unsuitable excavated material in approved location off site.
 - .3 Do not obstruct flow of surface drainage or natural watercourses.
 - .4 Stockpile suitable excavated materials required for backfill in approved location.
 - .5 Dispose of surplus and unsuitable excavated material off site.
 - .6 Excavation must not interfere with bearing capacity of adjacent foundations.
- 3.5 Trench Bottom Preparation
 - .1 Where required due to removal of unsuitable material or unauthorized over-excavation bring bottom of excavation to design grade with approved material.
 - .2 Compact trench bottom to density at least equal to density of adjacent surrounding soil.
 - .3 Line excavations (full perimeter) that are to be filled with unshrinkable fill with filter fabric prior to placement of fill.
- 3.6 Pre-Installation Inspection
 - .1 Excavations require inspection and approval prior to commencement of installation operations.
- 3.7 Backfilling
 - .1 Do not proceed with backfilling operations until *Departmental Representative* has inspected and approved installations.
 - .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
 - .3 Do not use backfill material which is frozen or contains ice, snow or debris.
 - .4 Backfilling around installations:
 - .1 Place bedding and surround material as specified elsewhere.
 - .2 Place material by hand under, around, and over installations until 300 mm of cover is provided. Dumping material directly on installations will not be permitted.

- .5 Place granular material in uniform layers not exceeding 150 mm in thickness up to subgrade elevation or top of trench. Compact each layer before placing succeeding layer. Thicker lifts of material may be accepted by Departmental Representative if it can be shown that specified compaction is achieved over the full thickness of the layer.
 - .6 Compact granular backfill material to a minimum 95% of corrected maximum dry density, maximum density ASTM D698, AASHTO T99 Method C, unless noted otherwise.
 - .7 Compact using approved mechanical tamping devices, or by hand tamping to achieve specified compaction.
 - .8 Backfilling around installations:
 - .1 Place bedding and surround material as specified elsewhere.
 - .2 Do not backfill around or over cast-in-place concrete within [24] hours after placing of concrete.
 - .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 1.0m.
 - .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
 - .1 Permit concrete to cure for minimum [14] days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative.
 - .2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.
 - .9 Place unshrinkable fill in areas as indicated. Consolidate and level unshrinkable fill with internal vibrators.
- 3.8 Restoration
- .1 Upon completion of work, remove surplus materials and debris and correct defects noted by *Departmental Representative*.
 - .2 Clean and reinstate areas affected by work as directed by Departmental Representative.
 - .3 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.
 - .4 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

PART 1 - GENERAL

- | | | | |
|-----|----------------------------|----|--|
| 1.1 | Related Work | .1 | Refer to other Specification Sections for related information. |
| 1.2 | References | .1 | ASTM D4595-17(or latest edition), Tensile Properties of Geotextiles by the Wide-Width Strip Method. |
| | | .3 | CAN/CGSB-148.1-03 (or latest edition), Methods of Testing Geotextiles and Geomembranes. |
| | | .4 | ASTM D4751-16, Standard Test Methods for Determining Apparent Opening Size of a Geotextile. |
| 1.3 | Mill Certificates | .1 | At least two weeks prior to start of work, furnish <i>Departmental Representative</i> with copies of mill test data and certificate that filter fabric delivered to job site meets requirements of this section. |
| 1.4 | Approval | .1 | Obtain written approval of <i>Departmental Representative</i> for filter fabric before installation of material in work. |
| 1.5 | Measurement for Payment | .1 | Filter fabric will be measured in accordance with Section 01 29 10. |

PART 2 - PRODUCTS

- | | | | |
|-----|-----------|----|--|
| 2.1 | Materials | .1 | Synthetic fiber: rot proof, unaffected by action of oil or salt water and not subject to attack by insects or rodents. |
| | | .2 | Fabric: nonwoven polyester and/or polypropylene fabric. |
| | | .3 | Seams: sewn in accordance with manufacturer's recommendations. |
| | | .4 | Physical properties: to ASTM D4595, CAN/CGSB-148.1 and ASTM D4751: |
| | | .1 | Tensile Strength 900 N |
| | | .2 | Tear Strength 360 N |
| | | .3 | Elongation at break 50% |
| | | .4 | Filtration Opening Size = 100 - 80um. |
| | | .5 | Permeability = 2 x 10 ⁻¹ cm sec. |

PART 3 - EXECUTION

- | | | | |
|-----|------------------------|----|--|
| 3.1 | Preparation of Base | .1 | Fine grade area to be covered with filter fabric to a uniform surface area. Fill depressions with suitable material. |
| 3.2 | Placing | | |

- | | | |
|---------------|----|--|
| Filter Fabric | .1 | Place filter fabric on prepared surface loosely from top of the slope to the bottom allowing fabric to conform easily to contours of the slope. |
| | .2 | Allow one (1) meter of fabric for overlapping and anchoring purposes, 700 mm at the top and 300 mm at the bottom of the slope. |
| | .3 | Longitudinal seems will have a minimum of 450 mm overlap and will be pinned every 600 mm with 100 mm nails. |
| | .4 | Anchor top of fabric at 1 meter intervals with 15mm diameter steel rods 600 mm in length. Anchor bottom of fabric by folding fabric and placing fill on top. |
| | .5 | Place fill material over filter fabric to a depth of 200 mm. No equipment will be permitted on fabric prior to this cover. |

END OF SECTION

PART 1 - GENERAL

- | | | | |
|-----|-------------------------|----|---|
| 1.1 | Related Work | .1 | Refer to other Specification Sections for related information. |
| | | .2 | Refer to Section 01 33 00 for Shop Drawing/Submission requirements. |
| 1.2 | Reference Standards | .1 | ASTM C127-15 (or latest edition), Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate. |
| | | .2 | AASHTO T85-17 (or latest edition), Standard Method of Test for Specific Gravity and Absorption of Coarse Aggregate |
| 1.3 | Submissions | .1 | Product Data/Samples: .1 Provide samples of materials proposed for the work. |
| | | .2 | Methodology: .1 Provide methodology for carrying out the work. |
| | | .3 | Provide submissions in accordance with Section 01 33 00. |
| 1.4 | Measurement for Payment | .1 | Crushed Rock Mattress will be measured in accordance with Section 01 29 10. |
| | | .2 | Prices will include the entire cost of supplying and placing the material in the work, including pre-placement and post placement surveys where specified. Prices are also to include rough grading as necessary, the levelling and finish grading of the crib seat mattress, taking soundings, and diving inspections where shown on the drawings and specified. |

PART 2 - PRODUCTS

- | | | | |
|-----|-----------|----|---|
| 2.1 | Materials | .1 | Hard durable crushed quarried rock, free from silt, clay, organic matter and other foreign substances and free from splits, seams or defects likely to impair its soundness during handling or under action of water. Conglomerate material will not be accepted. |
| | | .2 | Specific gravity of not less than 2.65 when tested to ASTM C127 or AASHTO T85. |
| | | .3 | Crushed Rock Mattress material will be 50 - 150 mm angular crusher run rock or screened semi angular quarry run rock, free from fines. Top surfaces may be smaller, subject to approval of Departmental Representative, to facilitate levelling. |

PART 3 - EXECUTION

- | | | | |
|-----|-------------|----|---|
| 3.1 | Preparation | .1 | Dredge and remove existing material in accordance with Section 35 20 23 and project drawings in the area where crushed rock fill and rip-rap are to be placed. |
| | | .2 | Sound/survey area and record elevation of material on which rock fill and rip-rap will be placed before placing subsequent materials. |
| 3.2 | Placement | .1 | Do not place mattress stone or rock fill until bottom area has been accepted by <i>Departmental Representative</i> . |
| | | .2 | Place material to avoid segregation of material sizes. Do not drop material through water. |
| | | .3 | Level top surface of rock fill to specified grade using methods of levelling and placement approved by the <i>Departmental Representative</i> . |
| | | .4 | Level top surface of mattress to specified grade. Use a sweep beam suspended from a barge as a screed to level surface of each mattress layer. Other methods of levelling may be employed subject to acceptance by Departmental Representative. |
| | | .5 | Complete dive inspection of mattress at cribwork bearing locations (cross ties, etc) on the rock mattress to verify grades of mattress and full bearing of cribwork during setting. |
| 3.3 | Tolerances | .1 | Surfaces of bearing layer to be within 50 mm of elevation indicated and variation in elevation over whole area of bearing layer not to exceed 75 mm. |
| | | .2 | All other layers to be within 100mm of lines shown. |
| 3.4 | Protection | .1 | Take into account anticipated weather conditions and degree of exposure of site in setting requirements for protection. |
| | | .2 | Schedule and carry out construction so that each phase of work is not left exposed longer than necessary. |
| | | .3 | The Contractor should note that the work site is subject to water level variations due to tidal action. |
| | | .4 | The Contractor will be responsible to replace any material lost due to storms, tidal erosion or by his own activities |

END OF SECTION

PART 1 - GENERAL

- 1.1 Related Work
- .1 Refer to other Specification Sections for related information on aggregates, mattress, and miscellaneous items.
 - .2 Refer to Section 01 33 00 for Shop Drawing/Submissions requirements.
- 1.2 Reference Standards
- .1 CAN/CSA-080 Series 15 - Wood Preservation.
 - .2 CSA 086.1-14, Engineering Design in Wood.
 - .3 Copper naphthenate containing 2% copper for Brush or Spray Treatment for Field Cuts.
 - .4 NLGA standard grading rules for Canadian Lumber 1980 edition (or latest edition at time of tendering).
 - .5 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .6 ASTM A153/A153M-16a, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - .7 ASTM A307-14, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
 - .8 ASTM B111/B111M-16 (or latest edition), Standard Specification for Copper and Copper-Alloy Seamless Condenser Tubes and Ferrule Stock.
- 1.3 Submissions
- .1 At least two weeks prior to finalizing timber order, submit drawings, clearly indicating assembly of timber pieces for construction of cribwork wharf. Show splice locations, splice details, fastening arrangements.

- .2 Submit detailed methodology for field treatment, crib building, launching, setting and ballasting.
- .3 Provide submissions, in accordance with Section 01 33 00.
- 1.4 Measurement for Payment
 - .1 Timber cribwork will be measured in accordance with Section 01 29 10.

PART 2 - PRODUCTS

- 2.1 Materials
 - .1 Timber: Graded and stamped to National Lumber Grading Authority (NLGA) No. 1 Structural. Eastern Hemlock, Western Hemlock or Douglas Fir Species, only, will be used.
 - .2 Timber Treatment:
 - .1 Preservative treatment to CAN/CSA-080 Series for Marine Construction Coastal Waters. Where assay retentions are not indicated, they are to be taken as 1.5 times the indicated gauge retention. Use one type and color of treatment throughout unless otherwise indicated.
 - .2 Make arrangements for timber testing by:
 - .1 Plant Inspection: Provide treatment plant identification, date of treatment, list of various pieces in the charge, charge number, plant assay testing results, concentration and type of preservative used, duration of treatment, gauge retention, species of wood; and make arrangements with the treatment plant to locate bundles, move bundles, break open bundles and carry out other measures to facilitate the inspection.
 - .2 Field Inspection: Providing same information as above and facilitating the inspection in the field.

- .3 Filling in and submitting a preprinted form, agreed to by the *Engineer*, containing the above information.
- .3 The *Departmental Representative* may test in the plant or in the field or may choose to not test some charges at either the plant or the field.
- .4 Timber will be protected during handling, shipping, offloading and field handling, by use of suitable equipment and procedures. Use rope or fabric strap slings on site for moving bundles or individual timbers, rather than metal grabs, chains or cables.
- .3 Miscellaneous Hardware
Hardware must meet the following specifications:
 - .1 Machine bolts, lag bolts, drift bolts, anchor bolts, nuts, round plate washers: to ASTM A307.
 - .2 Spikes: to CSA B111.
 - .3 Hot dip galvanized hardware, bolts, nuts, washers and spikes to ASTM A123M, with minimum zinc coating of 600 g/m².
 - .4 All hardware will be galvanized unless otherwise shown on plans.
- .4 Ballast Stone:
Minimum specific gravity of 2.65. Supply hard durable stone containing no organic material, silt, clay or foreign substances. Ballast stone to be graded with maximum sizes not exceeding 400 mm on any side and minimum size not less than 250mm.

PART 3 - EXECUTION

- 3.1 Crib Construction
 - .1 Timber supplied to be precut to required length, per reviewed drawings prior to preservative treatment.
 - .2 Boreholes for drift bolts to be 1.5mm smaller in diameter than bolt and for full length of bolt. Boreholes for machine bolts

to be same diameter as bolts. Boreholes for lag bolts to be same diameter as shank for unthreaded portion and 0.70 times the shank diameter for the threaded portion. Threaded portion of lag bolts will be installed using a wrench, not by driving.

- .3 Construct timber cribwork to height indicated in crib building methodology, prior to placing in work.
- .4 Bottom timbers: Secure three courses, unless noted otherwise, of bottom timbers together with machine bolts at every intersection with each other and vertical posts. Splice locations shown on plans.
- .5 Splices: Provide at locations and per details shown on plans or reviewed drawings, if changed.
- .6 Ballast floor: Place ballast floor, as indicated. Omit ballast floor in bays, as shown on plans.
- .7 Longitudinals: Secure longitudinals to intersection of cross ties with drift bolts and to intersection of vertical posts with machine bolts, as shown on plans.
- .8 Crossties: Secure crossties to intersection of longitudinals with drift bolts and to intersection of vertical posts with machine bolts, as shown on plans.
- .9 Vertical posts: To be in one length from bottom of cribwork, unless splice details are shown on plans or according to reviewed shop drawings.
- .10 Fillers: Place filler timber as indicated. Secure fillers with drift bolts to timbers immediately below.

3.2 Handling Treated Timber

- .1 Handle treated material to avoid damage causing Timber alteration in original treatment.

- .2 Treat in field, spike holes, boreholes, plugged holes, cuts and any damage to treated material, using Copper naphthenate, as specified herein, regardless of plant treatment type.
- .3 Provide methodology pertaining to heating and application. Apply to dry surfaces for maximum benefit.
- .4 Treat boreholes, using a pressurized container with an extension rod, to produce a fine spray in the holes with one application. Alternately a cylindrical brush may be used.
- .5 Treat field cuts and any abrasions with minimum of two liberal applications, using either spray or brush.
- .6 In addition, field cuts and underwater damaged areas will receive a coating of plastic compound, capped with lead flashing secured with galvanized roofing nails. Plastic compound not to be water soluble and is subject to approval.
- .7 Environmental Concern: Ensure no spillage or excess application of field preservative. Provide workmen with sufficient training and protective gear to properly and safely handle the treated materials and to apply field treatment, so as to prevent undue hazard to themselves, others, or the environment.
- .8 Contain all debris and leachates (films on water surface) within the area of the work by using containment facilities such as floating booms or screens.

3.3 Preparation

- .1 Mattress:
 - .1 Level top of levelling course, using a sweep beam capable of sweeping the entire width of the mattress in one operation. Once sweeping is done and elevations taken on a grid consisting

of every meter along a crosstie location and the same along lines one half meter each side of and parallel to the cross ties, have a diver carry out an inspection to locate hollows, humps, extent of mattress and to check side slope stability. Touch up, resweep and repeat the above procedure until the mattress is within the tolerances specified. If any delay what-so-ever exists between final touch-up and crib setting, repeat the above procedure - starting with elevations - immediately prior to placing crib.

.2 Alternate methods of levelling subject to acceptance by *Departmental Representative*.

.2 Setting Crib:

.1 Prior to setting crib, mark locations on all crib vertical posts of known distances above bottom of lowest crosstie, so that elevations of bottom of crib can be easily determined using the tide or survey equipment. Once crib bottoms out on the falling tide, and prior to placing any ballast, have a diver check bearing at each crosstie location. At same time, determine elevation of bottom of crib at each crosstie location along the perimeter and down the middle. If diver report is flawless and crib is located within tolerances in all respects, commence ballasting. Provide crib setting report, showing the above information.

3.4 Ballasting

.1 Place ballast stone in a manner which will not damage timber cribwork. As a minimum, the top courses of timber will be protected with planks. *Departmental Representative* to accept placing methodology.

.2 When placing the crib, ballast the bays containing the ballast floors with sufficient (less than 1 meter) ballast to just start setting of the crib. Have crib

rechecked for bearing and elevation. If there is no need to refloat, then ballast these bays just sufficiently and evenly to prevent floatation. Then ballast the bays containing no ballast floor to L.N.T. unless otherwise shown. Thereafter ballast crib uniformly throughout, ensuring ballast differential is maintained at less than two meters.

- 3.5 Tolerances
- .1 Construction crib overall dimensions to within tolerance of 1 in 300.
 - .2 Locate crib within 50 mm of location indicated.
 - .3 Adjoining cribs to line up exactly.
 - .4 Final bottom elevation of fully ballasted crib to be 0 to 150 mm below the elevation indicated on the plans.
 - .5 Refloat a crib out of alignment, not correctly located or at wrong elevation. Repair mattress, prior to resetting.
 - .6 Some settlement of the crib structure is anticipated into the mattress. Adjust thickness of concrete deck haunches as required to achieve final deck elevation and alignment shown on drawings. Do not level the cribwork with shims.

END OF SECTION