

PART 1 - GENERAL

- 1.1 Description .1 This section specifies requirements for construction of a rubblemound breakwater consisting of component layers, including rip rap, and to dimensions indicated.
- 1.2 Reference Standards .1 ASTM C127-88(1993)e1 (or latest edition) Specific Gravity and Absorption of Coarse Aggregate.
.2 AASHTO T85-88 (or latest edition) Specific Gravity and Absorption of Coarse Aggregate.
- 1.3 Related Work .1 Refer to other Specification Section for related information.
- 1.4 Source Sampling .1 Inform Departmental Representative of proposed source of materials and provide access for sampling at least 2 weeks prior to commencing work. Forward, prepaid, a sample to be used to Public Works and Government Services Canada, P.O. Box 2247, Halifax, N.S., B3J 3C9 for approval. Sample to be between 5 and 10 kg, representative of quarry and submitted minimum 2 weeks prior to starting work.
- 1.5 Existing conditions and Haul Road .1 It is important that Contractors intending to bid on work visit the site and ascertain what preparatory work will be required for the following:
.1 Condition of existing structures over which material must be hauled.
.2 Preparation, maintenance and removal of temporary roadways to and on the breakwater for the use of trucks, cranes, excavators, draglines, etc.
.3 Preparation, maintenance and removal of all temporary causeways and/or fills as required for trucks, loaders, excavators, cranes, draglines, etc.
.4 The land surrounding the site is the property of Her Majesty the Queen in the Right of Canada and the Contractor will exercise extreme care to prevent damage to the land.
.5 Contractor shall be solely responsible for construction and maintenance of haul roads which shall be considered incidental to the work. All temporary roads shall be removed at the completion of the project and the land restored to its original condition.
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PART 2 - PRODUCTS

2.1 Materials

- .1 Rock materials:
- .1 All rock materials to be tested and approved by the Departmental Representative prior to installation in the work.
 - .2 All rock material to be free from cracks, seams and other defects which may impair durability.
 - .3 Armourstone/Rip Rap to meet the following requirements:
 - .1 Relative density minimum 2.65 and absorption maximum 2.0%. Slate, sandstone, shale and stone containing mica not acceptable for filterstone or armourstone.
 - .4 Corestone to meet the following requirements:
 - .1 Relative density minimum 2.50.
 - .5 Actual relative density and absorption will be determine by testing selected samples of material being incorporated in to the works. Materials with a specific gravity less than 2.65 or an absorption rate in excess of 2% will be rejected.
- .2 Cornerstone:
- .1 To be pit run or quarried material rough and angular in shape requiring approval by the Departmental Representative prior to being used in the work.
 - .2 Material not to contain organic matter, frozen lumps, sod, roots, logs, stumps or any other objectionable matter.
 - .3 Corestone gradation shall be within the following limits:

| Imperial Size | Metric Size | % Passing by Mass |
|---------------|-------------|-------------------|
| 18" | 450 mm | 100 |
| 8" | 200 mm | 44-75 |
| 4" | 100 mm | 25-50 |
| 2" | 50 mm | 7-14 |
 - .4 Material to be screened, if required, to ensure no fines or stones less than 0.2 kilograms are placed in the work.
 - .5 Material to be blended so that a homogeneous mix of smaller and larger sizes within the approved range is attained.
- .3 Rip Rap:
- .1 Greatest dimension of each stone not to exceed two times least dimension.
 - .2 Rip Rap shall be quarried or field stone, rough and angular in shape.
 - .3 Rip Rap shall vary in size between 200 kg and 400 kg where shown on the drawings.

PART 3 - EXECUTION

3.1 Corestone

- .1 Place core material to lines, grades and dimensions indicated the plan.

3.1 Corestone
(Cont'd)

- .2 Place material on clean harbour bottom to specified grades, and after the removal of kelp, debris, snow, ice, etc.
- .3 Execute work in such a manner to protect core material from storm wave action or tidal erosion damage. Replacement of material lost due to storm or erosion damage will be the responsibility of the Contractor.
- .4 Do not extend corestone material for breakwater more than 10 metres beyond filterstone protection.
- .5 Corestone material may be placed by end dumping. However, Contractor shall note that due to the side slopes of the breakwater that mechanical placing of the core will be necessary to produce the slopes and shapes required.
- .6 Grades, lines, dimensions, slope and quantity of core, to be reviewed and approved by the Departmental Representative before proceeding with overlaying filter layer.

3.2 Rip Rap

- .1 Place Rip Rap layer material to liens, grades and dimensions indicated on the plans.
- .2 Place Rip Rap layer material in two layers as shown on plans.
- .3 Do not extend Rip Rap material more than 1.8 metres beyond wharf face.
- .4 Place each Rip Rap individually using mechanical means to the lines, grades and dimensions shown on the plans. Do not dump filter units into place. Commence placement at toe of slope and proceed up the slope towards the crest. Place each Rip Rap so that it is stable, secure on slope and supported by units below. Control placement of Rip Rap so as to produce a uniform and continuous cover over the underlying layer.
- .5 Replace Rip Rap units broken or damaged during placement. Damaged units to be removed from the work and will not be paid for.
- .6 Grades, lines, dimensions, slopes and quantity of Rip Rap to be reviewed and approved by Departmental Representative before proceeding with the overlying armour layer.

3.3 Tolerances

- .1 Completed component layers to be within following tolerances of lines and grades as indicated:
 - .1 Core: ± 50 mm
 - .2 Rip Rap: ± 150 mm
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- 3.4 Cross Sections .1 During Construction the Contractor shall submit cross-section sheets to the Departmental Representative showing the following:
- .1 Cross-sections at stations every 10 metres along the breakwater slope.
 - .2 The design cross-section showing proposed core, filter, and armourstone in solid lines.
 - .3 Superimposed in dashed lines elevations taken at 2 metre intervals perpendicular to the centreline and at top and toe of slopes showing core and Rip Rap as constructed surfaces.
 - .4 Cross-sections to be referenced to B/3 with stations shown for reference.
 - .5 Cross-sections to be submitted as work at each station is completed for each class of stone. Next layer not to be placed until Departmental Representative or his representative has reviewed and approved the as-built elevations for underlying layer.
- 3.5 Protection .1 Take into account anticipated weather conditions and degree of exposure of site and tidal conditions 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 Progress of placement of core and stone to be recorded daily by Departmental Representative's inspector with Contractor's concurrence. Replacement of material lost due to storm wave action or tidal erosion damage to be based on daily journal of work progress and to be considered incidental to the work.
- 3.6 Temporary Navigational Buoys .1 The contractor is to maintain temporary buoy's to mark the position of construction area. All buoy's are to meet the requirements of Canadian Coast Guard Standard TP968-1984 and be equipped with radar reflectors.
- .2 The Contractor shall coordinate the buoy installation with the local harbour authority.
 - .3 The Contractor is responsible for all costs associated with the supply, installation and removal of all temporary navigational buoy's.

PART 1 - GENERAL

- 1.1 Description of Work
- .1 This section specifies requirements for the following items:
 - .1 Ladders
 - .2 Sheathing
 - .3 Mooring Cleats
- 1.2 Reference Standards
- .1 ASTM A307-94 (or latest edition), Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.
 - .2 CAN/CSA-G40.21-M92 (or latest edition), Structural Quality Steels.
 - .3 CAN/CSA-G164-M92 (or latest edition), - Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .4 ASTM A48-94a (or latest edition), Gray Iron Castings.
- 1.3 Related Work
- .1 Refer to other specification section for related information including Section 06 05 73.
 - .2 Refer to Section 01 33 00 for Shop Drawings/Submissions requirements.
- 1.4 Submissions
- .1 Shop Drawings:
 - .1 Clearly indicate the following items:
 - .1 General arrangement, dimensions, clearance locations and directions, of assemblies as installed on structures.
 - .2 Locations, sizes and installation tolerances of anchor bolts, eye bolts and embedded parts.
 - .3 Types of material used, finishes and core thickness.
 - .4 All other pertinent details and accessories.
 - .2 Product data/Samples:
 - .1 Provide Product data and manufacturers brochures for the mooring cleats.
 - .3 Test Results:
 - .1 Provide test results for the galvanized items.
 - .4 Submissions:
 - .1 Provide submissions in accordance with Section 01 33 00.
- 1.5 Measurement for Payment
- .1 Ladders, including timber, rungs, holdfast, and fasteners will be measured in accordance with Section 01 29 00.
 - .2 Sheathing including fastening, will be measured in accordance with Section 01 29 00.
 - .3 Mooring cleats/Mooring Rings, including fastening, will be measured in accordance with Section 01 29 00.
 - .4 Manhole Access Assembly including cover and grate will be measured in accordance with Section 01 29 00.
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1.5 Measurement
for Payment
(Cont'd)

- .5 DR35 Storm sewer pipe will be measured in accordance with Section 01 29 00.

PART 2 - PRODUCTS

2.1 Materials

- .1 Timber: Any timber supplied by Contractor must conform to Section 06 05 73 Dimension Timber
- .2 Hardware and miscellaneous items must meet the following specifications:
- .1 Machine bolts, lag bolts, drift bolts, anchor bolts, nuts, washers to ASTM A307.
 - .2 Ladder rungs, holdfasts and miscellaneous steel: to CSA C40.21, Grade 300W.
 - .3 Mooring cleats: cast iron to ASTM A48, Class 25, with approximate weight of 41kg (90 lb) each.
 - .4 Do not use items manufactured or fabricated from scrap steel of unknown chemical composition or physical properties.
 - .5 Hot dip galvanize bolts, anchor bolts, nuts, washers, pipe sleeves, steel plates, fenders, holdfasts, and any other miscellaneous steel to CSA G164 with minimum zinc coating of 600 g/m².

PART 3 - EXECUTION

3.1 Ladders

- .1 Assemble ladder units and install completed units in locations shown on plan or as indicated by Departmental Representative.
- .2 Countersink bolts on exterior face of ladder.
- .3 Apply preservative to areas of unprotected wood exposed during course of work in accordance with Section 06 05 73.

3.2 Sheathing

- .1 Install sheathing at locations shown on plan or as indicated by Departmental Representative.
- .2 Countersink bolts on exterior face of fender.
- .3 Apply preservative to areas of unprotected wood exposed during course of work in accordance with Section 06 05 73.

3.3 Mooring Cleats

- .1 Install mooring cleats as shown on drawings and fasten to concrete deck and curb using anchor bolts as indicated. Allow for 25 mm of grout under base.
- .2 Do not make alteration to any components without written permission of Departmental Representative.

3.4 Installation
General

- .1 Boreholes for drift bolts to be 1.5mm smaller in diameter than bolt and 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.
- .2 Contain all debris and leachates (films on water surface) within the area the work by using containment facilities such as floating booms or screen