
PART 1 - GENERAL

- 1.1 Description
- .1 The site of the work is Murphy's Pond Harbour Facility, Inverness County, Nova Scotia. Area to be dredged is shown on plan.
 - .2 This section specifies requirements for excavating underwater materials in areas and to dimensions and coordinates indicated on plan, and for transporting and disposing of excavated materials to a designated bdisposal site.
- 1.2 Related Work
- .1 Environmental Protection Section 01 35 44
- 1.3 Definitions
- .1 Dredging: excavating, transporting and disposing of underwater materials as specified.
 - .2 Class "A" Material: boulders or concrete debris with each unit containing 3.0 cubic metres or more, and solid rock requiring drilling and blasting or hydraulic splitting to loosen.
 - .3 Obstruction: material other than Class "A", having individual volumes of 3.0 cubic metres or more.
 - .4 Class "B" Material: loose or shale rock, sand, quick sand, mud, shingle, clay and sand, gumbo, hardpan, clay, marine clay, clay sizes, marine silt, silt and gravel, gravel, cobbles, boulders, marine shells, or any other materials not defined under Class "A" material.
 - .5 Debris: pieces of wood, wood chips, bark, logs, submerged logs, tree branches, scrap vehicle tires, concrete, steel cable, steel chain, wire rope, scrap steel, etc.
 - .6 CMPM: cubic metre place measure.
 - .7 Grade: plane or planes above which all material is to be dredged.

- .8 Estimated Quantity: volume in cubic metres of material calculated to be above dredge grade and within side slopes, unless otherwise specified.
- .9 U.T.M. Coordinates: Universal Transverse Mercator plan rectangular grid system to be used for all horizontal control of dredging operations as indicated on plan. (NAD 83)
- .10 Matrix Block: each block area is presented as a number of 1.2 X 3.0 m long blocks. Dependent on the position of the sounding a block may have 1 to 4 sounding contained within it. A blank Matrix Block will indicate that no sounding was registered for that matrix.
- .11 Minimum Mode: a mode of operation of hydrographic survey equipment where the minimum sounding over the length of travel between position updates will be retained in memory.
- .12 Least of Minimum Plan: a hydrographic survey plan in which the least sounding in that matrix block is plotted.
- .13 Instantaneous Mode: a mode of operation of hydrographic survey equipment where only the sounding observed at a predetermined distance interval is retained in memory.
- .14 Average of Instantaneous Plan: a hydrographic survey plan in which the average of instantaneous soundings in that matrix block is plotted.
- .15 Side Slope: inclined surface or plane from grade at side limit of dredging area to intersect original ground line outside of side limit and to be expressed as a ratio of horizontal to vertical. All material above side slopes is to be dredged.
- .16 Cleared Area: a dredge area that has been accepted by the Departmental Representative

as complying with plans and specifications and all material removed to grade.

- .17 Box Cut: dredging and letting the side of the excavation collapse, where possible, to an equilibrium slope.
- .18 Chart Datum: by international agreement, a plane below which the tide will seldom fall. The Canadian Hydrographic Services has adopted the plane of Lowest Norman Tide (LNT) as Chart Datum. As the rise, fall and ranges of tides varies daily, The Canadian Hydrographic Services should be consulted for tidal prediction and other tidal information relating to the work.
- .19 CEAA: Canadian Environmental Assessment Act.
- .20 Dredging Area: a rectangle or polygon, defined by coordinates in which dredging is to take place.

1.4 Location

- .1 Contract drawings indicate those areas which required dredging at the time of the most recent surveys. Actual extent of dredging within the areas may vary slightly from those indicated on the drawings.

1.5 Schedule of Work

- .1 Submit to Departmental Representative, within 5 working days after award of Contract, a schedule of work including time periods during which each operation involved in the work will be undertaken. Also submit an estimated monthly dredging production of material in square metres for each operation. At the time of submission of the schedule meet with the Departmental Representative to review the schedule.
- .2 Include in the above schedule of work a list of buoys which interfere with the progress of this work. Coordinate with the Departmental Representative arrangements to be made to relocate these buoys to avoid unnecessary delay.

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- .3 Adhere to the schedule and take immediate action to correct any slippage by effectively altering existing dredging operations or mobilizing other equipment. The Departmental Representative is to be notified of the corrective action to be taken.
- 1.6 Interference to Navigation
- .1 Be familiar with activities at dredging sites and vessel movements in areas affected by dredging operations.
- .2 Plan and execute work in a manner that will not impede navigation including movement of vessels in the channel, at any wharf site being dredged, or any other boat traffic at adjacent wharves in the harbour.
- .3 Plan and execute work in a manner that will not interfere with activities at wharf sites, or access to wharves by land or water.
- .4 The Departmental Representative or owner will not be responsible for loss of time, equipment, material or any other charges related to interference with vessels in the harbour, weather conditions, or due to other Contractor's operations.
- .5 Keep District Manager, Canadian coast Guard, Transport Canada, informed of dredging operations, in order that necessary Notices to Shipping can be issued.
- .6 Be responsible for damage to buoys or other navigation markers cause by dredging operations. If such occurs, notify Canadian Coast Guard. Assume responsibility for replacement or repairs.
- 1.7 Interface to Fishery Operations and Damage to Fishing Gear
- .1 Become familiar with fishery activities. Clearly mark dredging area, disposal areas and routes to and from dredging and disposal areas during periods when fishing gear is set

in areas adjacent to dredging operations with "Cautionary Buoys" in accordance with Coast Guard Standard TP968. ([http://www.ccg-gcc.gc.ca/eng/CCG/ATN/Aids To Navigation System](http://www.ccg-gcc.gc.ca/eng/CCG/ATN/Aids%20To%20Navigation%20System)) All buoys must be coloured cautionary yellow - CGSB # 505-108, and be equipped with radar reflectors.

Be responsible for all costs associated with the supply, installation and removal of all necessary temporary aids. The Contractor will receive approval from the District Fisheries Officer for the location of the buoys, upon review and acceptance of temporary aids by the Departmental Representative.

Keep District Manager, Canadian Coast Guard, Transport Canada, informed of buoyed corridors in order that necessary Notices to Shipping can be issued.

- .2 Execute the work to ensure damage does not occur to fishing gear and interference to fishing operations is minimized by conducting operations within the areas so marked.
- .3 Be responsible for damage to fishing gear outside marked areas, if as a result of dredging activities, and if damage occurs, assume responsibility for replacement or repair costs and cost of lost fishing opportunity.

1.8 Requirements
of Regulatory
Agencies

- .1 Perform work in accordance with the National Building Code of Canada (NBC) and any other municipal, provincial and/or national codes relating to the project including the provisions of the Canadian Environmental Assessment Act Permit issued for this project. In any case of conflict or discrepancy, the more stringent requirements will apply.

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- .2 Meet or exceed requirements of specified standards, codes and referenced documents.
 - .3 Mark floating equipment with lights in accordance with Regulations for the Prevention of Collisions, as required by Transport Canada.
 - .4 Contractor will be required to obtain prior approval from applicable regulatory agencies for any dredging outside specified dredging limits.
- 1.9 Floating Plant
- .1 Dredges or other floating plants which are to be employed on this work, must meet the requirements as specified in General Instructions R2710T.
- 1.10 Datums
- .1 Horizontal Datum: All horizontal coordinates used in this specification and contract drawings are in metres referenced to U.T.M. projection based on the North American Datum, 1983, (NAD83, Zone 19). Survey control monuments and their coordinate values are shown on Plan. Additional coordinate monument locations and values can be obtained from Land Registration and Information Service (L.R.I.S.), Surveys and Mapping Division, 120 Water Street, Summerside, Prince Edward Island, C1N 1A9, Phone: (902) 436-2107.
 - .2 Vertical Datum: All elevations and soundings used in this specification and contract drawings are in metres referenced to Chart Datum. For purposes of this contract see Section 3.1.6 for tidal data information.
- 1.11 Inspection of Site
- .1 The Contractor must visit the site of the work before tendering and make himself thoroughly familiar with the extent and nature of the work and all conditions affecting the work.
- 1.12 Site Information
- .1 Results of the most recent soundings are included on the drawings. This pre-tender

data is made available for tendering purposes only. It should be noted that this information may differ from present site conditions.

The Department will carry out a Pre-Dredging Survey to provide updated information and will provide a Pre-Dredge Plan showing the requirements for contract dredging. The Contractor should take this into consideration when submitting his tender.

- .2 It is anticipated that the following materials will be encountered within the dredging limits, but are not limited to:

Class "B" Boulders in all areas
Class "B" Materials in all areas
- .3 The Contractor shall take the necessary steps to become fully familiar with potential inclement weather and sea conditions in this area.
- .4 The Contractor will be responsible for making his own interpretation of soil conditions.

1.13 Dredging Equipment

- .1 Provide suitable lighting on the dredge for free movement of Departmental Representative to inspect work in progress during night dredging operations. Lighting to illuminate all walkways, ladders etc. to safely permit inspection of dredging operation.
- .2 The description of materials is based on small samples and is not necessarily indicative of the overall soil conditions.
- .3 On request, prove to the satisfaction of the Departmental Representative that the dredging equipment and plant are adequate to finish the work to quality, time and production rates specified. If inadequate, replace or provide additional equipment or plant as directed.

- .4 Contractor shall be responsible for ensuring that equipment can access and function at the disposal site.

1.14 Survey
Requirements

- .1 The Contractor shall provide, at his expense, a survey vessel, equipment and crew to set up and maintain survey control for the location of the dredge and dredge limits and to sound areas immediately after dredging to verify that grade depth has been attained. Areas are to be sounded with adequate coverage to provide a bathymetric printout of at least a 5 metre spacing on a UTM grid to the approval of the Departmental Representative. A copy of the Contractor's positioning and sounding records shall be provided to the Departmental Representative.

1.15 Sequence of
Acceptable Work

- .1 Pre-dredge and post-dredge surveys will be conducted by PWGSC using electronic survey equipment sounding in the instantaneous mode. Sounder will be the Navitronics MCS1 multi-transducer system using a 200 Khz transducer frequency positioned by DGPS Ashtech Z-12 system. The results will be shown on survey plan at scale of 1:500 plotting average of instantaneous depths. Other survey procedures may be approved by the Departmental Representative.
- .2 A pre-dredge survey will be carried out by the Departmental Representative prior to commencement of dredging work by the contractor. The dredge area may be revised by the Departmental Representative to accommodate the changes in bathymetry that may have occurred between the pre-dredge survey and the initial tender survey. Revision of the cubic metre place measure quantity will take place accordingly if the dredge area is revised.

- .3 No area will be dredged prior to Departmental Representative and Contractor's mutual acceptance of the pre-dredge survey for that area.
- .4 Post-dredge survey will be undertaken by the Contractor upon completion of dredging of all areas identified in pre-dredge survey. Submit results as indicated in item 1.14 above. Only when this survey shows that all soundings are at or below grade that the Departmental Representative will do a post-dredge survey. The survey will use the same type of equipment as used in the pre-dredge survey. It will be subject to weather conditions and the availability of functional survey equipment. The survey will confirm if dredging is completed as specified. Survey will be by electronic sweep equipment sounding in instantaneous mode. Survey plan at 1:500 scale plotting the average of instantaneous depths obtained in this survey will identify areas requiring reworking to obtain the elevation of -2.50m below Chart Datum.

The Contractor will redredge as necessary to remove all material within the dredge areas which is found to be above the average of instantaneous elevations as specified on post dredge survey drawings.

- .5 All additional surveys require to clear the dredge area will be undertaken by the Departmental Representative at Contractor's cost.
- .6 All surveys will be performed to Canadian Hydrographic Service Standards.

1.16 Measurement
for Payment

- .1 Dredging will be measured in accordance with Section 01 29 00.
- .2 The dredge areas are defined by coordinates and dimensions as shown on the drawings.

- .3 For the purpose of quantity computation, existing seabed elevation will be represented by and "Average of Instantaneous" sounding for each matrix block of the pre-dredge survey performed by the Departmental Representative as soon as practical after contract award. Post dredging elevations for quantity computations will be: (1) grade, or (2) THE "Average of Instantaneous" sounding for each matrix block of the postdredge survey, whichever is shallower. The method of calculation and the quantity of material removed for measurement for payment will be determined by the Departmental Representative.
- .4 No payment will be made for the Contractor's survey vessel, equipment and crew or diving services.
- .5 All operations in connection with the field positioning of dredging equipment will be considered incidental to the work and will not be measured separately for payment.
- .6 Payment for dredging shall include the disposal of dredge material at the designated disposal site.
- .7 There will be no additional payment for temporary structures used in dredging operations.
- .8 There will be no additional payment for delays caused by fishing seasons.
- .9 There will be no additional payment for delays caused by vessel traffic.
- .10 There will be no additional payment for down time.
- .11 There will be no additional payment for delays caused by navigational buoys in dredge areas.

- .12 Once designated areas have been dredged and cleared, all subsequent infilling shall be deemed as additional to the contract if removal is required.
- .13 Removal of material infilling during dredging will not be measured separately for payment.
- .14 There will be no additional payment for land disposal of debris not suitable for the designated disposal site.
- .15 There will be no additional payment for berthing or mooring facilities for the dredge plant or any other floating equipment.
- .16 The entire area of each site, at all sites, as shown on the plan, shall be fully covered during dredging.
- .17 There will be no additional payment for side slopes as they are considered incidental to this contract.
- .18 There will be no additional payment for delays or changes in dredging methods required as a result of water quality monitoring results.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.1 General

- .1 The Contractor shall do the following in executing the work:
 - .1 Mark floating equipment with lights in accordance with International Rules of Road and maintain a radio watch on board.
 - .2 Place and maintain buoys, ranges, markers and lights required to define work. The Departmental Representative

will provide the coordinate values for all dredge limits on the drawings.

- .3 Maintain and lay out work from bench marks and control points as shown on Plan and noted in the Specifications. Any additional control points and tidal reference stations required to control dredging operations are the responsibility of the Contractor. The Contractor is to maintain these control points and tidal reference stations for the duration of the project and at the Contractor's cost.
- Obtain owner's permission, in writing, to establish layout monuments and erect targets on private property and pay all associated rental costs. Provide access to layout monuments for departmental survey crews. Any damage to private property will be made good by the Contractor to the satisfaction of the Departmental Representative at no cost to the owner.
- .4 For accurate dredge control, the Contractor is to provide and maintain on the dredge electronic position fixing and distance measuring equipment with associated computer software capable of providing a printout showing dredge position. Equipment is to provide a continuous coordinated position of the dredge in the U.T.M. Coordinate Grid System with an accuracy of ± 3.0 metres or less.
- .5 All survey equipment provided on the dredge by the Contractor is to be made accessible to the Departmental Representative for his use.
- .6 Establish accurately and maintain water level gauges or tide boards in order that proper depth of dredging can be

determined. Locate gauges so as to be clearly visible at all times.

The Contractor is to provide a tidal monitoring system to read and record the tide level at a maximum of 15 minute intervals. These records are to be made available for the inspection and use of the Departmental Representative. If using an electronic tide gauge, the Contractor must check the accuracy of the gauge daily. The gauge must be accurate to ± 2 cm. The monitoring system is to be approved by the Departmental Representative.

- .7 Dredge areas to grade depths below Chart Datum where indicated on the drawing.
- .8 Dredge all side slopes to two horizontal to one vertical unless otherwise noted.
- .9 Remove all materials above specified grade depth and side slopes, within limits indicated. Material removed from below grade depth or outside specified area or side slope is not part of work and will not be measured.
- .10 Remove shoaling which occurs as a result of the work at no expense to Departmental Representative.
- .11 Remove material cast-over onto surrounding area and dispose of it as dredged material at Contractor's expense. Casting over of material is not permissible unless authorized by the Departmental Representative.
- .12 The Contractor is responsible for the removal of infilling in dredge areas which occurs prior to acceptance by the Departmental Representative.
- .13 Immediately notify the Departmental Representative upon encountering any

object which might be classified as an obstruction. By-pass the object, after clearly marking its location by coordinates and continue work.

- .14 Arrange and pay for berthing and mooring facilities for dredge plant and other floating equipment.
- .15 Water quality monitoring will be ongoing during dredging for this contract. Should suspended solids concentrations, as a result of dredging activity be above 50 mg/litre, changes to the dredging methods will be required. These changes may include, but are not limited to, dredging only during specified tidal periods, use of a silt curtain to protect sensitive resource areas, limiting dredging in sensitive areas to twelve hours per twenty-four hour period.

3.2 Encountering
Class "A"
Material

- .1 Identify areas where Class "A" material is encountered above specified dredge grade, work equipment, which may require the use of toothed buckets, over areas to remove all Class "B" material, until Departmental Representative is satisfied that further removal cannot be accomplished. Immediately identify these areas with UTM coordinates, and provide information to Departmental Representative.

3.3 Existing
Navigation Buoys

- .1 The Contractor will make arrangements with Transport Canada for the removal and reinstallation of the existing buoys, as required to carry out the dredging operations.

3.4 Disposal of

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| <u>Dredge Materials</u> | .1 | The Contractor shall dispose of dredged material at the designated disposal site as outlined on the drawings. |
| | .2 | Timber, logs and cable is not to be disposed of at the designated disposal site and is to be disposed of at an appropriate landfill site. This debris and its disposal will not be measured for payment but is incidental to dredging. |
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| 3.5 Operations in Vicinity of <u>Structures</u> | .1 | Use extreme care when dredging adjacent to existing structures. Any damage to these structures caused by dredging closer than specified to be repaired at Contractor's expense. In completing repairs, new materials are to be used. All materials and work performed to be approved by the Departmental Representative. |
| | .2 | Do not dredge material from areas lying within 5.0 metres of existing structures, unless authorized in writing by the Departmental Representative. |
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| 3.6 Cooperation and Assistance to Departmental <u>Representative</u> | .1 | Cooperate with Departmental Representative on inspection work and provide assistance requested. |
| | .2 | On request of Departmental Representative, furnish use of such boats, equipment, labour and materials forming ordinary and usual part of dredging plant as may be reasonably necessary to inspect and monitor work. The duty boat must be of adequate size and power to operate safely in conditions encountered. It must be fitted with a sufficient number of approved life jackets and hard hats for inspection staff. |
| | .3 | Provide Departmental Representative or inspector with copies of, or access to, daily records of dredging activity, including areas |
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dredged, type of material, scow measure of material dredged (daily and accumulated), hours of dredging, hours and reasons for downtime, and other information regarding dredging and disposal as requested by the Departmental Representative.

PART 1 - GENERAL

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| 1.1 | <u>Description</u> | .1 | This section specifies requirements for construction of a rubblemound breakwater consisting of component layers, including rip rap, and to dimensions indicated. |
| 1.2 | <u>Reference Standards</u> | .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 | <u>Related Work</u> | .1 | Refer to other Specification Sections for related information. |
| 1.4 | <u>Source Sampling</u> | .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 rock to be used to a testing consultant to be determined by the Departmental Representative for approval. Sample to be between 5 and 10 kg, representative of quarry and submitted minimum 2 weeks prior to starting work. |
| 1.4 | <u>Existing Conditions and Haul Road</u> | .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.

1.5 Measurement for Payment

- .1 Corestone will be measured in accordance with **Section 01 29 00.**
- .2 Filterstone (100-400 kg) will be measured in accordance with **Section 01 29 00.**
- .3 Armourstone (2-4 tonne) will be measured in accordance with **Section 01 29 00.** Toe-in of armourstone by 500mm will be incidental to work.
- .4 Transportation of material to the site and any excavation and preparation of the foundation base will not be measured for payment but will be considered incidental to the work.
- .5 No payment will be made for material used to construct and/or maintain haul roads, causeways, fills or working roadways on top of filter and armour layers.
- .6 Clearing, grubbing and stripping of quarries to be incidental to the work.
- .7 Making good to the satisfaction of the Departmental Representative, any damage to the existing structures will be considered incidental to the work.
- .8 Do not mix different categories of material in the same truckload. Only one class of material will be weighed for payment at any given time. If rocks of markedly different sizes are present, Departmental Representative reserves the right to weigh such rocks separately for payment. There will be no additional payment for weighing individual stone units which do not meet the category of material listed for the truckload.

PART 2 - PRODUCTS

2.1 Materials

.1 Rock Material

- .1 All rock materials to be tested and approved by the Departmental Representative prior to installation in the work.
- .2 All rock materials to be free from cracks, seams and other defects which may impair durability.
- .3 **Armourstone and Filterstone to meet the following requirements:**
Specific Gravity 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 Specific Gravity minimum 2.50.
 - .5 Actual Specific Gravity and absorption will be determined by testing selected samples of material being incorporated into the works. Materials with a specific gravity less than 2.65 or an absorption rate in excess of 2% will be rejected.
- .2 Corestone:
 - .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 Filterstone:
 - .1 Greatest dimension of each stone not to exceed two times least dimension.
 - .2 Filterstone shall be quarried or field stone, rough and angular in shape.
 - .3 Filterstone shall vary in size between 100 - 400kg where shown on the drawings.
- .4 Armourstone:
 - .1 Greatest dimensions of each stone not to exceed two times least dimension.
 - .2 Armourstone to be quarried or field stone, rough and angular in shape.
 - .3. Armourstone shall vary in size between 2-4 tonnes as shown on the plans.

PART 3 - EXECUTION

- 3.1 Toe Protection
 - .1 Provide toe protection by keying in armourstone 500mm.

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- .2 Excavate harbour bottom material as necessary to provide protection and dispose of material in accordance with **Section 31 11 00**.
- 3.2 Corestone
- .1 Place core material to lines, grades and dimensions indicated on the plan.
- .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.
- 3.3 Filterstone
- .1 Place filter layer material to lines, grades and dimensions indicated on the plans.
- .2 Place filter layer material in two layers as shown on plans.
- .3 Do not extend filter material for breakwater more than 10 metres beyond armourstone protection.
- .4 Place each filterstone 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 filterstone so that it is stable, secure on slope and supported by units below. Control placement of filterstone so as to produce a uniform and continuous cover over the underlying layer.

- .5 Replace filterstone 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 filterstone to be reviewed and approved by Departmental Representative before proceeding with the overlying armour layer.

3.4 Armourstone

- .1 Place armourstone in layers as shown on the plan to the lines, grades and dimensions shown on the plan.
- .2 Place each armourstone individually using mechanical means to the lines, grades and dimensions shown on the plans. Do not dump armour units into place. Commence placement at toe of slope and proceed up the slope towards the crest elevation. Place each unit so that it is stable and secure on slope and supported by units below. Control placement of armour units so as to produce a uniform and continuous cover.
- .3 Replace armourstone units broken or damaged during placement. Damaged units to be removed from the work and will not be paid for.

3.5 Existing Armour Stone Removal, Salvage and Installation

- .1 Remove the exterior layer of armour stone within the defined limits.
- .2 Salvaged armour units are to be incorporated into the 2-4 tonne new armour stone limits.

3.6 Tolerances

- .1 Completed component layers to be within following tolerances of line and grades indicated:
 - .1 Core: ± 50 mm
 - .2 Filter: ± 100 mm
 - .3 Armourstone: ± 150 mm
 - .4 Armourcrest: Minimum design elevation

3.8 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, filter, and armourstone as constructed surfaces.
 - .4 Cross-sections to be referenced to the plan view of the breakwater 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.
 - .6 After construction is complete and before the Final Certificate of Completion will be paid, Contractor to submit detailed as-built survey plan to

Departmental Representative to show that contract grades and elevations have been achieved. Provide an electronic file and two sets of prints. Divers will be required to assist with survey for elevations required below chart datum. The following minimum requirements to be met:

.1 Elevations every 10 meters along the centerline of the breakwater and every 6 meters perpendicular to the centerline, on the end cone, and top and toe of slopes.

3.9 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.

3.10 Roadways

- .1 Construction, maintenance and removal of working roadway layers to be the responsibility of the Contractor and is to be considered incidental to the work.
- .2 Construction, maintenance and removal of causeways, fills, etc. as required, to be the responsibility of the Contractor and is to be considered incidental to the work.

3.11 Temporary Navigational Buoys

- .1 The Contractor is to maintain temporary buoy's to mark the position of the outer end of the breakwater toe as construction proceeds. All buoy's are to meet the

requirements of Canadian Coast Guard Standard
TP968 and be equipped with radar reflectors.

[Http://www.ccg-gcc.gc.ca/eng/CCG/ATN_Aids_To_Navigation_System](http://www.ccg-gcc.gc.ca/eng/CCG/ATN_Aids_To_Navigation_System)

- .2 The Contractor shall coordinate the bouy
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 bouy's.