

PART 1 - GENERAL

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| 1.1 Description | .1 | 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 specified locations. |
| 1.2 Related Work | .1 | Refer to Environmental Procedures - Section 01 35 44 for related information. |
| 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, quicksand, 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 | Square Metres: area is square metres projected horizontal. |
| | .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. |

- .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 Normal 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 CEPA: Canadian Environmental Protection 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 10 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 cubic 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.

.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 Prior to any removal/reinstallation of navigational aids/buoys, contact Canadian Coast Guard Superintendent, Aids to Navigation in Dartmouth, NS at 1(902)426-3151.
- .6 Keep Canadian Coast Guard informed of dredging operations, in order that necessary Notices to Shipping can be issued.
- .7 Be responsible for damage to buoys or other navigation markers caused 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/folios/00020/docs/CanadianAidsNavigationSystem2011-eng.pdf>

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 Canadian Coast Guard 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. In any case of conflict or discrepancy, the more stringent requirements will apply.
- .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 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
- .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 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 Ross sounder sweep system using a 190-210 kHz transducer frequency positioned by DGPS Trimble R7 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 limits 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 quantity will take place accordingly if the dredge limits are 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 dredge grade depths where indicated on the plan.

The Contractor will re-dredge 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 and removals will be measured in accordance with Section 01 29 10.

.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 an "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 post-dredge 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 locations and in manners specified.
- .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, mechanical or weather-related.
- .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 disposal location.
- .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 It will be the Contractor's responsibility to gain access to the dredge area. The construction of causeways, roads, etc., will be at the Contractor's expense and will be removed at the completion of the project. Any derricks, power lines, etc., which will require removal will be done so at the Contractor's expense and will be replaced to satisfaction of the *Departmental Representative*. Contractor to advise *Departmental Representative* of his proposed method to carry out dredging and disposal of the material.
- .14 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.
- .15 Provide dump scows capable of maintaining dredge materials within hoppers until delivery to disposal site. The *Departmental Representative* has the right to order removal of dump scows from the site where leakage from the dump scows is deemed to be excessive.
- .16 Arrange and pay for berthing and mooring facilities for dredge plant and other floating equipment.

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 without blasting. Immediately identify these areas with UTM coordinates and provide information to *Departmental Representative*.

3.3 Rock Removal

- .1 If rock or boulders are to be removed by blasting, submit to *Departmental Representative* for review, two weeks before removal, details of

proposed blasting operations showing types and quantities of explosives, loading charges and patterns, type of caps, blasting techniques, blast protection measures, time of blasting and other pertinent details. Submit subsequent charges to Departmental Representative before proceeding.

3.4 Existing

Navigation Buoys

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

3.5 Disposal of

Dredge Materials

- .1 Refer to Environmental Procedures - Section 01 35 44 for related information.

The Contractor shall dispose of dredged material by depositing in the disposal area as identified in Section 01 35 44 and in such a manner as approved by *Departmental Representative*.

- .2 All materials deposited on private or public roads or properties in vicinity of site or as a result of trucking material to dump site will be removed by Contractor to satisfaction of owners involved at no additional cost to Department.
- .3 The contractor shall ensure that trucks used in the transportation of spoils are roadworthy and have tight fitting gates to prevent spoils spilled on the road. Trucks not meeting this criterion may be removed from the project by the *Department Representative*.
- .4 Clean truck boxes and wheels of dredge spoils before moving onto provincial roads. Vehicle wash down stations may be required at both the loading and offloading sites to ensure the above requirements are met.
- .5 Allow the *Departmental Representative* or Inspector access to record the position of disposal of each dumping operation.
- .6 Timber, logs and cable must not be disposed of at the dumpsites. This debris must be disposed of ashore at an appropriate landfill other than the containment facility. This debris and its disposal

will not be measured for payment but is incidental to dredging.

3.6 Operations in Vicinity of Structures

- .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*.
- .3 Dredging operations are not to undermine the existing breakwaters.
- .4 Protect existing structures during dredging operations. Ensure the shore protection slope is not disturbed. Contractor will be responsible for repairs to the slope protection should damage occur.

3.7 Cooperation and Assistance to *Departmental Representative*

- .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.

Provide approved duty boat to transport inspectors to and from dredge, at beginning and end of each inspection shift. Inspection shifts will be 8 hours in duration. 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 adequate, weather-tight, heated workspace for exclusive use by the *Departmental Representative* and inspection staff, on board the dredge or dredges

used to carry out dredging under this contract. Equip with 1 X 2 m table, 3 chairs, one 3 drawer filling cabinet, and maintain in clean condition. The workspace is to be for the sole use of the Departmental Representative and inspection staff. Workspace shared with Contractor's staff will not be permitted.

- .4 Provide *Departmental Representative* or inspector with copies of, or access to, daily records of dredging activity, including areas 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*.

END OF SECTION

PART 1 - GENERAL

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| 1.1 | Description | .1 | This section specifies requirements for construction of a rubblemound shore protection consisting of component layers, including corestone, filterstone, rip rap and armourstone, and to dimensions indicated. |
| 1.2 | Reference Standards | .1 | ASTM C127 (latest edition) Specific Gravity and Absorption of Coarse Aggregate. |
| | | .2 | AASHTO T85 (latest edition) Specific Gravity and Absorption of Coarse Aggregate. |
| 1.3 | Related Work | .1 | Refer to other Specification Sections for related information. |
| 1.4 | Source Sampling | .1 | Inform <i>Departmental Representative</i> 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 | 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: <ul style="list-style-type: none"> .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 10. |
| | | .2 | Filterstone will be measured in accordance with Section 01 29 10. |

- .3 Armourstone will be measured in accordance with Section 01 29 10. Toe-in of armourstone by 1 metre will be incidental to work.
- .4 Rip rap will be measured in accordance with Section 01 29 10.
- .5 Mobilization and demobilization will be considered incidental to work.
- .6 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.
- .7 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.
- .8 Clearing, grubbing and stripping of quarries to be incidental to the work.
- .9 Making good to the satisfaction of the Departmental Representative, any damage to the existing structures will be considered incidental to the work.
- .10 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, Filterstone and Rip Rap to meet the following requirements:
 - .1 Specific Gravity minimum 2.65
 - .2 Absorption maximum 2.0%.
 - .3 Slate, sandstone, shale and stone containing mica not acceptable for armourstone, filterstone, or rip rap.
 - .4 Corestone (Rock Fill) 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 or absorptions not meeting the specifications will be rejected.
- .2 Corestone (Rock Fill):
 - .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 meet the following gradation requirements:
 - .1 Mass range: 100 to 200 kg
 - .2 W₅₀: 150 kg
- .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 meet the following gradation requirements:

- .1 Mass range: 1 to 2 tonnes
- .2 W₅₀: 1.5 tonnes

- .5 Rip Rap (Scour Protection):
 - .1 Greatest dimensions of each stone not to exceed two times least dimension.
 - .2 Rip rap to be quarried or field stone, rough and angular in shape.
 - .3 Filterstone shall meet the following gradation requirements:
 - .1 Mass range: 100 to 200 kg
 - .2 W₅₀: 150 kg

PART 3 - EXECUTION

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| 3.1 Toe Protection | | <ul style="list-style-type: none"> .1 Provide toe protection as shown on Contract drawings. .2 Excavate harbour bottom material as necessary to provide protection as shown on Contract drawings. |
| 3.2 Corestone (Rock Fill) | | <ul style="list-style-type: none"> .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 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 shore protection 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 <i>Departmental Representative</i> before proceeding with overlaying filter layer. |
| 3.3 Filterstone | | <ul style="list-style-type: none"> .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 contract drawings. .3 Do not extend filter material 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 contract drawings.
- .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 Rip Rap Scour Protection)

- .1 Shape existing shore material and rock fill to slope indicated and place rip rap in layers on top.
- .2 Place each rip rap stone individually using mechanical means to the lines, grades and dimensions shown on the plan. Do not dump rip rap units into place. Commence placement at toe of slope and proceed up the slope towards the crest. Place each stone 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.
- .3 Grades, lines, dimensions, slopes and quantity of rip rap to be reviewed and approved by *Departmental Representative*. Ensure rip rap does not extend significantly into mooring basin beyond limits shown on contract drawings.

3.6 Tolerances

- .1 Completed component layers to be within following tolerances of line and grades indicated:

- .1 Core: +50 mm
- .2 Filter/Rip rap: +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 shore protection 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 shore protection 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:

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.

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| 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 |
| | | .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. |

END OF SECTION

PWGSC	MISCELLANEOUS ITEMS	SECTION 35 70 00
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PART 1 - GENERAL

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|-----|------------------------|----|---|
| 1.1 | Description
of Work | .1 | This section specifies requirements for the following items:
.1 Mooring cleats
.2 Ladders
.3 Fenders |
| 1.2 | Reference
Standards | .1 | ASTM A48/A48M-03 (R2016) (or latest edition), Standard Specification for Grey Iron Castings. |
| | | .2 | ASTM A123 / A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products. |
| | | .3 | ASTM A153/A153M-16a, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware. |
| | | .4 | ASTM F1554-20, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105 ksi Yield Strength. |
| | | .5 | ASTM A307-14 (or latest edition), Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength. |
| | | .6 | CAN/CSA G40.20-13/G40.21-13 - General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel |
| | | .7 | CSA G164-18 (or latest edition), Hot Dipped Galvanizing of Irregularly Shaped Articles. |
| | | .8 | CSA W59-13, Welded Steel Construction (Metal Arc Welding). |
| | | .9 | CAN/CGSB-1.61-2004 - Exterior and Interior Marine Alkyd Enamel. |
| 1.3 | Related Work | .1 | Refer to other Specification Sections for related information. |
| 1.4 | Submissions | .1 | Shop Drawings:
.1 Clearly indicate the following items:
.1 General arrangements, dimensions, clearance locations and directions of assemblies as installed on structures.
.2 Locations, sizes and installation tolerances of anchor bolts and embedded parts.
.3 Types of materials 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 Submissions
 - .1 Provide submissions in accordance with Section 01 33 00.

1.5 Measurement for Payment

- .1 Supply and installation of mooring cleats, including fastenings and grout, will be measured in accordance with Section 01 29 00.
- .2 Supply and installation of ladders, including timber, rungs, and fasteners and holdfasts will be measured in accordance with Section 01 29 00.
- .3 Supply and installation of timber fenders will not be measured separately and is to be included in the payment item for timber cribwork.

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, nuts, washers to ASTM A307.
 - .2 Anchor bolts to ASTM F1554 Grade 36 with standard F436 washers and heavy hex nuts.
 - .3 Steel plates, ladder rungs, holdfasts and miscellaneous steel: to CSA G40.21, Grade 300W.
 - .4 Mooring cleats: Type "B1" Cleat, cast iron to ASTM A48, Class 30, with approximate weight of 41kg (90 lb.) each.
 - .5 Do not use items manufactured or fabricated from scrap steel of unknown chemical composition or physical properties.
 - .6 Hot dip galvanize pipe sleeves, steel sections, steel plates, rungs, holdfasts U-bolts and any other miscellaneous steel to ASTM A123 or CSA G164 with minimum zinc coating of 610 g/m².
 - .7 Hot dip galvanize bolts, anchor bolts, nuts, washers, and any other miscellaneous hardware to ASTM A153M.

PART 3 - EXECUTION

3.1 Mooring Cleats

- .1 Install mooring cleats as shown on drawings and fasten to concrete deck and curb with anchor bolts as indicated. Allow for 25mm non-shrink grout under base.
- .2 Paint mooring cleats and bollards prior to installation with primer and (2) two coats of exterior Marine Alkyd Enamel to CAN/CGSB-1.61. Colour to Departmental Representative selection from Contractor provided samples.

- .3 Do not make alternations to any components without written permission of *Departmental Representative*.
 - 3.2 Ladders
 - .1 Assemble ladder units and install completed units and holdfasts in locations shown on drawings 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.
 - 3.3 Fenders
 - .1 Fasten fenders to timber cribwork with lag bolts, unless shown otherwise on project drawings.
 - .2 Bevel top of each fender to 4 horizontal to 1 vertical, and bottom of each is to extend 300 mm below chart datum. Treat tops per Section 06 05 73.
 - .3 Countersink bolts on exterior face of fenders.
 - 3.4 Installation General
 - .1 Boreholes for drift bolts in timber connections to be 1.5mm smaller in diameter than bolt and for full length of bolt.
 - .2 Boreholes for machine bolts to be same diameter as bolts.
 - .3 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 of the work by using containment facilities such as floating booms or screens.

END OF SECTION