

Breakwater Construction and
Floating Docks
Petite Forte, NL
P/N: R.714115

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PART 1 - GENERAL

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|-----------------------------|----|---|
| <u>1.1 DESCRIPTION</u> | .1 | This section specifies requirements for supply, placing, finishing, protecting and curing cast-in-place concrete for anchor blocks. The blocks may be cast on site and allowed to cure before placing on location, or alternatively shipped to the site as pre-cast units. |
| <u>1.2 RELATED SECTIONS</u> | .1 | Section 03 10 00 - Concrete Forming and Accessories. |
| | .2 | Section 03 20 00 - Concrete Reinforcing. |
| <u>1.3 REFERENCES</u> | .1 | American Society for Testing and Materials (ASTM)
.1 ASTM C109/C109M-08, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 mm Cube Specimens).
.2 ASTM C260/260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.
.3 ASTM C494/C494M-10a, Standard Specification for Chemical Admixtures for Concrete. |
| | .2 | Canadian Standards Association (CSA)
.1 CAN/CSA-A23.1-09, Concrete Materials and Methods of Concrete Construction.
.2 CAN/CSA-A23.2-09, Methods of Test for Concrete.
.3 CSA-A283-06, Qualification Code for Concrete Testing Laboratories.
.4 CAN/CSA-A3000-08, Cementitious Materials Compendium (consists of A3001, A3002, A3003, A3004 and A3005).
.1 CSA-A3001-08, Cementitious |

Materials for Use in Concrete.

1.4 CERTIFICATES

- .1 Submit certificates in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Minimum 2 weeks prior to starting concrete work submit to Departmental Representative manufacturer's test data and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements:
 - .1 Portland cement.
 - .2 Blended hydraulic cement.
 - .3 Supplementary cementing materials.
 - .4 Grout.
 - .5 Admixtures.
 - .6 Aggregates.
 - .7 Water.
- .3 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CAN/CSA-A23.1.
- .4 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CAN/CSA-A23.1.

1.5 STORAGE OF
MATERIALS

- .1 Store materials to prevent contamination or deterioration.
- .2 Provide adequate storage facilities for materials to ensure a continuous supply of these materials during batching operations.
- .3 Store cement in weathertight facility.

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1.6 QUALITY
ASSURANCE

- .1 Minimum 2 weeks prior to starting concrete work, submit proposed quality control procedures to Departmental Representative for the following items:
 - .1 Cold weather concrete.
 - .2 Curing.
 - .3 Finishes.

1.7 WASTE
MANAGEMENT AND
DISPOSAL

- .1 Use trigger operated spray nozzles for water hoses.
- .2 Designate a cleaning area for tools to limit water use and runoff.
- .3 Carefully coordinate the specified concrete work with weather conditions.
- .4 Ensure emptied containers are sealed and stored safely for disposal away from children.
- .5 Prevent plasticizers, water-reducing agents and air-entraining agents from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with an inert, noncombustible material and remove for disposal. Dispose of all waste in accordance with applicable local, provincial and national regulations.
- .6 Choose least harmful, appropriate cleaning method which will perform adequately.

1.8 MEASUREMENT
FOR PAYMENT

- .1 Concrete Anchor Blocks: Supply and installation of reinforced concrete anchor blocks to be measured by the unit. Contractor to provide all plant, equipment, material, and labour including concrete, reinforcing steel, steel lifting

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bars, shackles, chains (including
connections to floating docks).

- .2 No separate payment will be made for any other ingredient or feature of concrete work, and all factors, including cold weather placement, reinforcing steel, lifting bars, divers for install, cement, plant and labour will be considered as being included in the unit price for item.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Cement to CAN/CSA-A3001, Type TerC-3.
- .2 Supplementary cementing materials: to CAN/CSA-A3001.
- .3 Cementitious hydraulic slag: to CAN/CSA-A3001.
- .4 Water: to CAN/CSA-A23.1.
- .5 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density.
- .6 Air entraining admixture: to ASTM C260.
- .7 Chemical admixtures: to ASTM C494/C494M. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .8 Concrete retarders: to ASTM C494/C494M. Do not allow moisture of any kind to come in contact with the retarder film.
- .9 Curing compound: curing compounds are not to be used.

2.2 MIXES

- .1 Proportion concrete in accordance with

CAN/CSA-A23.1, Clause 4.3.

- .2 Proportion concrete to comply with Alternate 1, Table 2 in CAN/CSA-A23.1 and following requirements:
 - .1 Cement:
 - .1 Type TerC-3 Portland cement.
 - .2 Minimum compressive strength: 35 MPa at 28 days.
 - .3 Class of exposure: C1.
 - .4 Minimum cement content: 385 kg/m³ of concrete.
 - .5 20 mm nominal size coarse aggregate.
 - .6 Air content 5% to 8%.
 - .7 Density of air-dry concrete in range of 2240 kg/m³ to 2400 kg/m³.
 - .8 Slump at time and point of discharge 50 mm to 100 mm.
- .3 When the Contractor wishes to purchase concrete from a ready mix concrete supplier, submit a letter from the supplier certifying the following:
 - .1 That plant and equipment is certified and all materials to be used in the concrete comply with the requirements of CAN/CSA-A23.1.
 - .2 That the mix proportions selected will produce concrete of the specified quality and yield. Indicate mix proportions and sources of all materials.
 - .3 That the strengths will comply with the strengths specified herein.
- .4 When the Contractor wishes to mix concrete on site, identify the source of aggregates and submit samples of fine and coarse aggregates to a testing laboratory for testing and trial mixes in order to determine a suitable mix design. The testing laboratory, at Contractor's cost, will test the trial mix for slump, air

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content, density and strength. The results of these tests will be submitted to the Departmental Representative to be reviewed for compliance with the specification. This review must be completed before permission to place concrete is given.

.1 The sand, gravel, water and air entraining agent should be mixed prior to the addition of cement and water reducer.

.5 Weigh aggregates, cement, water and admixture when batching. No alternative methods of measuring will be permitted.

.6 Do not use calcium chloride.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Obtain Departmental Representative's approval before placing concrete. Provide 24 hours notice prior to placing of concrete.
- .2 Pumping of concrete is permitted only after approval of equipment and mix.
- .3 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .4 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .5 Do not place anchor blocks on location until authorized by Departmental Representative.

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3.2 CONSTRUCTION

- .1 Comply with additional requirements of CAN/CSA-A23.1, Clause 4.1.1.5, for concrete exposed to seawater environments.
- .2 Minimum concrete cover over reinforcing steel bars to be 75 mm.
- .3 Place concrete in hot weather to CAN/CSA-A23.1.
- .4 Place concrete in cold weather to CAN/CSA-A23.1.
- .5 Keep concrete surfaces moist continually during protection stage.
- .6 Place, consolidate, finish, cure and protect concrete to CAN/CSA-A23.1.
- .7 Do not commence placing concrete until Departmental Representative has inspected and approved forms, foundations, reinforcing steel, joints, conveying, spreading, consolidation and finishing equipment and curing and protective methods.

3.3 FORMWORK

- .1 Install and strip formwork to CAN/CSA-A23.1 and Section 03 10 00.

3.4 INSERTS

- .1 Position and secure anchor bolts and lifting hooks in formwork to maintain line and grades.

3.5 PLACING
CONCRETE

- .1 Place and consolidate concrete to CAN/CSA-A23.1.

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- 3.6 FINISHING .1 All work is to be finished to CAN/CSA-A23.1, and as specified below.
- 3.7 PROTECTION AND CURING .1 Cure to CAN/CSA-A23.1.
- 3.10 TESTING
- .1 Departmental Representative will appoint a concrete testing company to test all work under this section of specification as per CAN/CSA-A23.1.
 - .2 Cost of compressive strength tests shall be paid for by the Departmental Representative.
 - .3 Testing company shall issue reports to Departmental Representative on quality of test cylinders.
 - .4 Notify Departmental Representative at least 7 days prior to start of placing concrete. Provide for testing purposes an adequate quantity of approved test cylinders.
 - .5 Crate cylinders and deliver to the testing laboratory within 48 hours after casting in accordance with CAN/CSA-A23.1. Contractor will pay for crating and delivery of cylinders to the laboratory.
 - .6 If strength tests of test cylinder for any portion of the work falls below the specified compressive strength at 28 days, the Departmental Representative reserves the right to determine the acceptability of the concrete by performing additional field testing as outlined in CAN/CSA-A23.1. If concrete does not conform to drawings or specifications, take measures

CAST-IN-PLACE
CONCRETE

Section 03 30 00

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as directed to correct the deficiency. All
costs of correctional measures will be at
the expense of the Contractor.