

PART 1 - GENERAL

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| <u>1.1 Related Sections</u> | .1 | Section 03 30 00 - Cast-in-Place Concrete. |
| <u>1.2 Measurement Procedures</u> | .1 | No measurement will be made under this section. Include costs in items of concrete work for which reinforcement is required. |
| <u>1.3 References</u> | .1 | Canadian Standards Association (CSA)
.1 CAN/CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction.
.2 CAN/CSA A23.3-14, Design of concrete structure.
.3 CAN/CSA-G30.18-09, Billet-Steel Bars for Concrete Reinforcement.
.4 CSA W186-M1990 (R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.
.5 ASTM A82-07, Standard specification for Steel Wire, Plain, for Concrete Reinforcement. |

PART 2 - PRODUCTS

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| <u>2.1 Materials</u> | .1 | Substitute different size bars only if permitted in writing by Departmental Representative. |
| | .2 | Reinforcing steel: billet steel, having a yield stress of 400 MPa, deformed bars to CAN/CSA-G30.18-09, unless indicated otherwise. |
| | .3 | Cold-drawn annealed steel wire ties: to ASTM A82. |
| | .4 | Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1. |
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- 2.2 Fabrication .1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Obtain Departmental Representative's approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.
- 2.3 Source Quality Control .1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis.

PART 3 - EXECUTION

- 3.1 Field Bending .1 Do not field bend or field weld reinforcement.
- 3.2 Placing Reinforcement .1 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CAN/CSA-A23.1.
- .2 Prior to placing concrete, obtain Departmental Representative's review of reinforcing material and placement.
- .3 Ensure cover to reinforcement is maintained during concrete pour.
- 3.3 Splicing .1 Where splicing of rebar is allow, the minimum splice length will be 40 times the rebar size diameter.

PART 1 - GENERAL

1.1 Related
Sections

- .1 Section 03 20 00 - Concrete Reinforcing.

1.2 Measurement
Procedures

- .1 Concrete Block for Navigation Light:
cast-in-place reinforced concrete Anchor Block
will constitute a fixed price. All work as
shown on drawings will be considered
incidental to this item.
- .2 Formwork and falsework will not be measured
but considered incidental to the work.
- .3 No deductions will be made for volume of
concrete displaced by reinforcing steel.
- .4 Heating of water and aggregates and providing
cold weather protection will not be measured
but considered incidental to the work.
- .5 Cooling of concrete and providing hot weather
protection will not be measured but considered
incidental to the work.
- .6 Concrete used in the casting of concrete
cylinders for testing and other
miscellaneous concrete fill-in of voids will
not be measured but will be considered
incidental to the work.
- .7 Supply and installation of concrete additives
as recommended by the supplier will not be
measured but considered incidental to the
work.
- .8 Reinforcing steel will not be measured but
considered incidental to the work.

1.3 References

- .1 Canadian Standards Association (CSA)
.1 CSA-A23.1/A23.2-14, Concrete Materials
and Methods of Concrete Construction/Methods
of Test and Standard Practices for Concrete.
.2 CSA A283-00 (R2011), Qualification Code
for Concrete Testing Laboratories.
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- 1.3 References (Cont'd)
- .1 (Cont'd)
 - .3 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .2 American Society for Testing and Materials (ASTM)
 - .1 ASTM C260/C260M 10a, Specification for Air-Entraining Admixtures for Concrete.
 - .2 ASTM C494/C494M 11, Standard Specification for Chemical Admixtures for Concrete.
 - .3 ASTM C1116-03, Standard Specification for Fibre Reinforced Concrete.
- 1.4 Certificates
- .1 Submit certificates in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 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 Blended hydraulic cement.
 - .2 Supplementary cementing materials.
 - .3 Admixtures.
 - .4 Aggregates.
 - .5 Water.
 - .6 Synthetic fiber reinforcement.
 - .3 Provide mix design and 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 Waste Management and Disposal
- .1 Designate a cleaning area for concrete trucks off site, at a company owned site for such a purpose (meeting all federal and provincial requirements)
 - .2 Use trigger operated spray nozzles for water hoses.
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| <u>1.5 Waste Management and Disposal (Cont'd)</u> | .3 | Designate a cleaning area for tools to limit water use and runoff. |
| | .4 | Carefully coordinate the specified concrete work with weather conditions. |
| | .5 | Prevent plasticizers, water-reducing agents and air-entraining agents from entering drinking water supplies or waterways. Using appropriate safety precautions, collect liquid or solidify liquid with an inert, noncombustible material and remove for disposal. |
| | .6 | Choose least harmful, appropriate cleaning method which will perform adequately. |

PART 2 - PRODUCTS

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| <u>2.1 Materials</u> | .1 | Blended hydraulic cement: Type GUB-F/SF to CAN/CSA-A3000. |
| | .2 | Supplementary cementing materials: to CAN/CSA-A3000. |
| | .3 | Water: to CAN/CSA-A23.1. |
| | .4 | Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density. |
| | .5 | Air entraining admixture: to ASTM C 260. |
| | .6 | Chemical admixtures: to ASTM C 494/C 494M. Engineer to approve accelerating or set retarding admixtures during cold and hot weather placing. |
| | .7 | Concrete retarders: to ASTM C 494/C 494M water based,, low VOC, solvent free. Do not allow moisture of any kind to come in contact with the retarder film. |

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| <u>2.2 Mixes</u> | .1 | Proportion normal density concrete in accordance with CAN/CSA-A23.1, Alternative 1. |
| | .1 | Portland Cement: GUB-F/SF. |
| | .2 | Minimum compressive strength at 28 days: 35 MPa. |

- 2.2 Mixes .1 (Cont'd)
- (Cont'd)
- .3 Minimum cement content: 385 kg/m³ of concrete.
- .4 Maximum water/cement ratio: 0.4
- .5 Class of exposure: C1.
- .6 Nominal size of coarse aggregate: 5-20 mm.
- .7 Slump at time and point of discharge: 50 to 100 mm.
- .8 Air content: 5 to 8 %.

- 2.3 Synthetic Fiber Reinforcement .1 Fibermesh 150, 100 percent homopolymer polypropylene multifilament fibers.
- .2 Conformance to ASTM C1116, Type 3.
- .3 Single cut Fiber lengths.
- .4 Alkali proof.
- .5 Absorption: nil.
- .6 Specific gravity: 0.91.
- .7 Melt point: 162 degrees C.

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 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .4 Prior to placing of concrete inform Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .5 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

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| <u>3.1 Preparation</u>
(Cont'd) | .6 | Do not place load upon new concrete until authorized by Engineer . |
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| <u>3.2 Construction</u> | .1 | Do cast-in-place concrete work in accordance with CAN/CSA-A23.1. |
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| <u>3.3 Finishing</u> | .1 | Finish concrete in accordance with CAN/CSA-A23.1.
.1 Float surfaces with wood or metal floats or power finishing machines and bring surfaces to true grade or dimensions.
.2 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible. |
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| <u>3.4 Site Tolerance</u> | .1 | Concrete tolerance in accordance with CAN/CSA-A23.1. |
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| <u>3.5 Field Quality Control</u> | .1 | Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Departmental Representative in accordance with CAN/CSA-A23.1/A23.2 and Section 01 45 00. |
| | .2 | Departmental Representative will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent. |
| | .3 | Non-destructive Methods for Testing Concrete shall be in accordance with CAN/CSA-A23.2. |
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| <u>3.6 Synthetic Fiber Reinforcement</u> | .1 | Add synthetic fiber reinforcement to concrete in accordance with manufacturer's instructions. |
| | .2 | Add synthetic fiber reinforcement at standard rate of 1.0 kg/m ³ of concrete. |
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