

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)<br>.1 CAN/CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction.<br>.2 CAN/CSA A23.3-14, Design of concrete structure.<br>.3 CAN/CSA-G30.18-09, Billet-Steel Bars for Concrete Reinforcement.<br>.4 CSA W186-M1990 (R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.<br>.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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| <u>2.2 Fabrication</u>            | .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.  |
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| <u>2.3 Source Quality Control</u> | .1 | Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis.      |

PART 3 - EXECUTION

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| <u>3.1 Field Bending</u>         | .1 | Do not field bend or field weld reinforcement.  |
|                                  |    |   |
| <u>3.2 Placing Reinforcement</u> | .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.   |
|                                  |    |   |
| <u>3.3 Splicing</u>              | .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/m<sup>3</sup> 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><br>(Cont'd)       | .6 | Do not place load upon new concrete until authorized by Engineer .   |
| <br>                                     |    |  |
| <u>3.2 Construction</u>                  | .1 | Do cast-in-place concrete work in accordance with CAN/CSA-A23.1.   |
| <br>                                     |    |  |
| <u>3.3 Finishing</u>                     | .1 | Finish concrete in accordance with CAN/CSA-A23.1.<br>.1 Float surfaces with wood or metal floats or power finishing machines and bring surfaces to true grade or dimensions.<br>.2 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible. |
| <br>                                     |    |  |
| <u>3.4 Site Tolerance</u>                | .1 | Concrete tolerance in accordance with CAN/CSA-A23.1.   |
| <br>                                     |    |  |
| <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.  |
| <br>                                     |    |  |
| <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 <sup>3</sup> of concrete.   |