

PART 1 - GENERAL

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| <u>1.1 Related Sections</u> | .1 | Section 01 74 19 - Construction/Demolition Waste Management And Disposal. |
| <u>1.2 References</u> | .1 | Canadian Standards Association (CSA)
.1 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
.2 CAN/CSA-A23.2-00, Methods of Test for Concrete.
.3 CAN/CSA-A3000-98-A5-98, Portland Cement.
.4 CAN/CSA-G30.18-M92(R1998), Billet-Steel Bars for Concrete Reinforcement. |
| <u>1.3 Submittals</u> | .1 | Shop Drawings
.1 Submit placing drawings prepared in accordance with plans to clearly show size, shape, location and all necessary details of reinforcing.
.2 Submit drawings showing formwork and falsework design to: CAN/CSA-A23.1.
.3 Drawings to bear stamp and signature of qualified professional engineer registered or licensed in Province of New Brunswick, Canada. |
| <u>1.4 Waste Management and Disposal</u> | .1 | Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management And Disposals.
.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.
.3 Place materials defined as hazardous or toxic in designated containers.
.4 Ensure emptied containers are sealed and stored safely. |

- .5 Use trigger operated spray nozzles for water hoses.
- .6 Designate cleaning area for tools to limit water use and runoff.

PART 2 - PRODUCTS

2.1 Materials

- .1 Portland cement: to CAN/CSA-A3000-A5, Type 10.
- .2 Reinforcing bars: to CAN/CSA-G30.18, Grade 400.
- .3 Joint sealer/filler: grey, to CAN/CGSB-19.24, Type 1, Class B.
- .4 Sealer: proprietary poly-siloxane resin blend.
- .5 Other concrete materials: to CAN/CSA-A23.1.

2.2 Mixes

- .1 Proportion concrete in accordance with CAN/CSA-A23.1.
- .2 Minimum compressive strength at 35 MPa as specified by Departmental Representative.
- .3 Nominal maximum size of coarse aggregate: to CAN/CSA-A23.1.
- .4 Slump: to CAN/CSA-A23.1.
- .5 Air content: concrete to contain purposely entrained air in accordance with CAN/CSA-A23.1, Table 10.
- .6 Admixtures: to CAN/CSA-A23.1.

PART 3 - EXECUTION

3.1 Construction

- .1 Do concrete work in accordance with CAN/CSA-A23.1.

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| <u>3.2 Inserts</u> | .1 | Cast in sleeves, ties, slots, anchors, reinforcement, frames, conduit, bolts, waterstops, joint fillers and other inserts required to be built-in. Sleeves and openings greater than 100 mm x 100 mm not indicated, must be approved by Departmental Representative. |
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| <u>3.3 Curing</u> | .1 | Cure and protect concrete in accordance with CAN/CSA-A23.1.
.1 Do not use curing compounds where bond is required by subsequent topping or coating. |
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| <u>3.4 Sealing</u> | .1 | Following curing, apply poly-siloxane resin blend sealer at 4 m ² /L. |
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| <u>3.5 Site Tolerances</u> | .1 | Concrete finishing tolerance in accordance with CAN/CSA-A23.1. |
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| <u>3.6 Field Quality Control</u> | .1 | Concrete testing: to CAN/CSA-A23.2 by testing laboratory designated and paid for by Departmental Representative. |

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| <u>1.1 Measurement Procedures</u> | .1 | No measurement will be made under this Section. Include costs in items of work for which concrete formwork is required. |
| <u>1.2 References</u> | .1 | Canadian Standards Association (CSA) |
| | .1 | CAN/CSA-A23.1-94, Concrete Materials and Methods of Concrete Construction. |
| | .2 | CAN/CSA-S269.3-M92, Concrete Formwork. |
| <u>1.3 Shop Drawings</u> | .1 | Submit shop drawings for formwork and falsework in accordance with Section 01 33 00 - Submittal Procedures. |
| | .2 | Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, ties, and locations of temporary embedded parts. Comply with CAN/CSA-S269.3 for formwork drawings. |
| | .3 | Indicate formwork design data, such as permissible rate of concrete placement, and temperature of concrete, in forms. |
| | .4 | Each shop drawing submission shall bear stamp and signature of qualified professional engineer registered or licensed in Province of New Brunswick, Canada. |
| <u>1.4 Waste Management and Disposal</u> | .1 | Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management And Disposal and the Waste Reduction Work plan. |
| | .2 | Place materials defined as hazardous or toxic waste in designated containers. |

- .3 Ensure emptied containers are sealed and stored safely for disposal away from children.
- .4 Use sealers, form release and stripping agents that are non-toxic, biodegradable and have zero or low VOC's.

PART 2 - PRODUCTS

2.1 Materials

- .1 Formwork materials:
 - .1 For concrete, use wood and wood product formwork materials to CAN/CSA-086.1.
- .2 Form ties:
 - .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
- .3 Form release agent: non-toxic.
- .4 Form stripping agent: colorless mineral oil, non-toxic.
- .5 Falsework materials: to CSA-S269.1.

PART 3 - EXECUTION

3.1 Fabrication and Erection

- .1 Verify lines, levels and centers before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Obtain Departmental Representative's approval for use of earth forms framing openings not indicated on drawings.
- .3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .4 Fabricate and erect falsework in accordance with CSA

S269.1 and COFI Exterior Plywood for Concrete Formwork.

- .5 Do not place shores and mud sills on frozen ground.
- .6 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .7 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1.
- .8 Align form joints and make watertight. Keep form joints to minimum.
- .9 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners , joints, unless specified otherwise.
- .10 Form chases, slots, openings, recesses, expansion and control joints as indicated.
- .11 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

PART 1 - GENERAL

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| <u>1.1 DESCRIPTION</u> | .1 | This section specifies the requirements for the supply and installation of reinforcing steel for structural concrete. |
| <u>1.2 RELATED WORK</u> | .1 | Cast-In-Place Concrete: Section 03 30 00 |
| <u>1.3 REFERENCE STANDARDS</u> | .1 | Do concrete reinforcement work in accordance with CAN3-A23.1-M94 except where specified otherwise. Welding of reinforcement is not permitted. |
| <u>1.4 SOURCE SAMPLING</u> | .1 | Upon request, provide Departmental Representative with certified copy of mill test of steel supplied showing physical and chemical analysis. |
| <u>1.5 SHOP DRAWINGS</u> | .1 | Submit shop drawings in accordance with Section 01 33 00. |
| | .2 | Clearly indicate bar sizes, spacing, location and quantities of reinforcement, chairs, spacers and hangers with identifying code marks to permit correct placement without reference to structural drawings; to ACI Manual of Standard Practice for Detailing Reinforced Concrete Structures. |
| | .3 | Detail placement of reinforcing where special conditions occur. |
| | .4 | Design and detail lap lengths and bar development lengths to CAN3-A23.3-M90, unless otherwise specified on drawings. |
| | .5 | Unless otherwise noted on design drawings, all reinforcing laps shall be detailed as Class C tension lap splices. |

1.6 MEASUREMENT
FOR PAYMENT

- .1 No measurement for payment will be made under this section. Reinforcing steel to be included under Cast-in-Place Concrete, Section 03 30 00.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Reinforcing steel: to CSA G30-18-M92 billet steel grade 400, deformed bars.
- .2 Wire Ties: to CSA G30.3-1972 (R1979) plain, cold drawn annealed steel wire.
- .3 Supports: to CAN3-A23.1-M90.

2.2 FABRICATION

- .1 Fabricate reinforcing steel within following tolerances:
 - .1 Sheared length: plus or minus 25 mm.
 - .2 Ties: plus or minus 12 mm.
 - .3 Other bends: plus or minus 25 mm.
- .2 Ship bundles of bar reinforcement, clearly identified in accordance with bar list.

PART 3 - EXECUTION

3.1 FIELD BENDING

- .1 Do not field bend reinforcement except where indicated or authorized by Departmental Representative.
- .2 When field bending is authorized, bend without heat, applying slow and steady pressure.
- .3 Replace bars, which develop cracks or splits.

3.2 PLACING

- .1 Accurately place reinforcing steel in positions indicated and hold firmly during placing, compacting and setting of concrete.
- .2 Reinforcement shall be placed so that it is completely isolated from embedded parts.
- .3 Tie reinforcement where spacing in direction is:
 - .1 Less than 300 mm: - tie at alternate intersections.
 - .2 300 mm or more: - tie at each intersection.
- .4 Keep reinforcement 75 mm back from edges unless otherwise noted on Plan.

3.3 CLEANING

- .1 Clean reinforcing before placing concrete.

3.4 INSPECTION

- .1 Do not place concrete until Departmental Representative has inspected and approved reinforcement work in place.

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Concrete General: Section 03 05 10
- .2 Concrete Forming and Accessories: Section 03 10 00
- .3 Concrete Reinforcing: Section 03 20 00
- .4 Miscellaneous Metals: Section 05 50 00

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 185-05, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - .2 ASTM D 1751-04, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types).
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-19.24-M90, Multicomponent, Chemical-Curing Sealing Compound.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1/A23.2-2004, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .1 CSA-A3001-03, Cementitious Materials for Use in Concrete.
 - .3 CAN/CSA-G30.18-M92 (R2002), Billet-Steel Bars for Concrete Reinforcement.

1.3 DESIGN REQUIREMENTS

- .1 Performance Prescription: in accordance with CSA-A23.1.

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit placing drawings prepared in accordance with plans to clearly show size, shape, location and all necessary details of reinforcing.
 - .2 Submit drawings showing formwork and falsework design to: CSA-A23.1.
 - .3 Drawings to bear stamp and signature of qualified professional engineer registered or licensed in Province of New Brunswick, Canada.
- .3 At least 4 weeks prior to beginning Work, submit to Departmental Representative samples of following materials proposed for use: curing compound, joint filler, waterstops.

1.5 QUALITY ASSURANCE

- .1 Submit to Departmental Representative, 4 weeks prior to starting concrete work, valid and recognized certificate from plant delivering concrete.
- .2 Quality Control Plan: submit written report to Departmental Representative verifying compliance that concrete in place meets performance requirements.
- .3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 28 - Health and Safety Requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Concrete hauling time: maximum allowable time limit for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.
 - .1 Modifications to maximum time limit must be agreed to by the Departmental Representative and concrete producer as described in CSA A23.1.
 - .2 Deviations to be submitted for review by the Departmental Representative.

- .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.
- .2 Ensure emptied containers are sealed and stored safely.
- .3 Divert unused concrete materials from landfill to local approved facility as reviewed by Departmental Representative.
- .4 Provide appropriate area on job site where concrete trucks and be safely washed.
- .5 Divert admixtures and additive materials from landfill to approved official hazardous material collections site as reviewed by Departmental Representative.
- .6 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Cement: to CAN/CSA-A3001, Type GU10.
- .2 Water: to CSA-A23.1.
- .3 Reinforcing bars: to CAN/CSA-G30.18, Grade 400.
- .4 Premoulded joint filler:
 - .1 Bituminous impregnated fibreboard: to ASTM D 1751.
- .5 Joint sealer/filler: grey to CAN/CGSB-19.24, Type 1, Class B.

- .6 Sealer: boiled linseed oil to ASTM D 260, mixed with mineral spirits 1:1 proprietary poly-siloxane resin blend.
- .7 Other concrete materials: to CSA-A23.1.

2.2 MIXES

- .1 In accordance with CAN/CSA-A23.1.
 - .1 Provide concrete mix to meet following plastic state requirements:
 - .1 Uniformity:.
 - .2 Placeability:.
 - .3 Workability: free of surface blemishes, loss of mortar, colour variations, segregation.
 - .4 Finishability: amount of bleeding.
 - .5 Set time:.
 - .2 Provide concrete mix to meet following hard state requirements:
 - .1 Durability and class of exposure: C-XL.
 - .2 Minimum compressive strength at 56 age: 35 MPa.
 - .3 Intended application: structural.
 - .4 Volume stability: acceptable volume change range due to shrinkage, creep and freeze thaw cycle.
 - .3 Provide concrete supplier's certification.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Provide Departmental Representative 48 hours notice before each concrete pour.
- .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .3 During concreting operations:
 - .1 Development of cold joints not allowed.
 - .2 Ensure concrete delivery and handling facilitates placing with minimum of rehandling, and without damage to existing structure or Work.
- .4 Protect previous Work from staining.

- .5 Clean and remove stains prior to application of concrete finishes.

<u>3.2 CONSTRUCTION</u>	.1	Perform cast-in-place concrete work in accordance with CSA-A23.1.
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<u>3.3 INSERTS</u>	.1	Cast in sleeves, ties, slots, anchors, reinforcement, frames, conduit, bolts, waterstops, joint fillers and other inserts required to be built-in. .1 Sleeves and openings greater than 100 mm x 100 mm not indicated, must be reviewed by Departmental Representative.
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<u>3.4 FINISHES</u>	.1	Formed surfaces exposed to view: sack rubbed finish in accordance with CSA-A23.1.
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<u>3.5 CURING</u>	.1	In accordance with CSA-A23.1.
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<u>3.6 SITE TOLERANCES</u>	.1	Finishing tolerance in accordance with CSA-A23.1.
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<u>3.7 FIELD QUALITY CONTROL</u>	.1	Concrete testing: to CSA-A23.1 by testing laboratory designated and paid for by Departmental Representative.
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<u>3.8 CLEANING</u>	.1	Use trigger operated spray nozzles for water hoses.
	.2	Designate cleaning area for tools to limit water use and runoff.
	.3	Cleaning of concrete equipment to be done in accordance with Section 01 35 43: Environmental Procedures.