Part 1 General

1.1 RELATED SECTIONS

.1 Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

.2 Section 03 30 00 - Cast-in-Place Concrete.

1.2 REFERENCES

.1 National Building Code of Canada 2015.

.2 American Concrete Institute (ACI) ACI 315R-04, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

.3 American National Standards Institute/American Concrete Institute (ANSI/ACI), ANSI/ACI 315-99, Details and Detailing of Concrete Reinforcement.

.4 "Reinforcing Steel Manual of Standard Practice" by Reinforcing Steel Institute of Canada (RSIC).

.5 Canadian Standards Association (CSA)
- .1 CAN/CSA-A23.1-14, Concrete Materials and Methods of Concrete Construction.
- .2 CAN3-A23.3-14, Design of Concrete Structures for Buildings.
- .3 CSA G30.3-M1983(R1998), Cold Drawn Steel Wire for Concrete Reinforcement.
- .4 CSA G30.5-M1983(R1998), Welded Steel Wire Fabric for Concrete Reinforcement.
- .5 CSA G30.14-M1983(R1991), Deformed Steel Wire for Concrete Reinforcement.
- .6 CSA G30.15-M1983(R1998), Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
- .7 CAN/CSA-G30.18-09(R2014), Billet-Steel Bars for Concrete Reinforcement.
- .8 CAN/CSA-G40.21-13, Structural Quality Steels.
- .9 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .10 CSA W186-M1990(R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.3 SHOP DRAWINGS

.1 Submit shop drawings and bar lists in accordance with Section 01 33 00 – Submittal Procedures. Allow ten working days for shop drawing review before commencing fabrication.

.2 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacing, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacing and locations of chairs, spacers and hangers. Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada. ANSI/ACI 315 and ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

.3 Indicate (and detail) all proposed construction joints.

.4 Show reinforced concrete and reinforced masonry walls and beams in full elevation and detail all bars. When requested, show top and bottom layer slab reinforcing on separate plans. Detail sections to fully illustrate bar placement at dowels, curbs, openings, changes of elevation, beams, stairs, and areas of congested steel, and wherever else required.

.5 Design and detail lap lengths and bar development lengths to CAN/CSA-A23.1 and CAN3-A23.3, unless otherwise specified on drawings. Use Class "B" tension splices unless otherwise noted.

.6 Indicate details for placement of dowels.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal; and the Waste Reduction Workplan.

Part 2 Products

2.1 MATERIALS

.1 Substitute different size bars only if permitted in writing by Departmental Representative.

.2 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.

.3 Reinforcing steel: weldable low alloy steel deformed bars to CAN/CSA-30.18.

.4 Cold-drawn annealed steel wire ties: to CSA G30.3.

.5 Deformed steel wire for concrete reinforcement: to CSA G30.14.

.6 Welded steel wire fabric: to CSA G30.5. Provide in flat sheets only.

.7 Welded deformed steel wire fabric: to CSA G30.15. Provide in flat sheets only.

.8 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.

.9 Mechanical splices: subject to approval of Departmental Representative.

.10 Plain round bars: to CAN/CSA-G40.21.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1, ANSI/ACI 315, and RSIO/RSIC unless indicated otherwise.

.2 Obtain Departmental Representative's approval for locations of reinforcement splices other than those shown on placing drawings.

.3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

.5 Discard and re-fabricate bars having extra bends, cracks, splits, kinks or excessive rust.

2.3 SOURCE QUALITY CONTROL

.1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel to be supplied, showing physical and chemical analysis, corresponding to identification tagging of material at the fabrication plant, at least 4 weeks prior to commencing reinforcing work.

.2 Inform Departmental Representative of proposed source of material to be supplied. Unidentified reinforcement shall not be allowed.

Part 3 Execution

3.1 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.

.2 When field bending is authorized, bend without heat, applying a slow and steady pressure.

.3 Replace bars which develop cracks or splits during field bends.

3.2 PLACING REINFORCEMENT

.1 Place reinforcing steel to CAN/CSA-A23.1 and as indicated on reviewed shop drawings. Set tie wires so that ends are directed into concrete, not toward exposed concrete surfaces. Un-coated metal tie wires shall not project more than 5mm into the concrete cover.

.2 Do not tack weld reinforcing unless shown on the Structural Drawings, or approved by the Departmental Representative.

.3 Do not displace reinforcing to accommodate sleeves, inserts, waterstops, reglets, or other cast-in hardware.

.4 Arrange for reinforcing steel personnel to be present at all times concrete is poured to ensure that reinforcing remains in place as tied, and to take remedial action as required.

.5 Maximum chair spacing unless otherwise required by the Drawings or by "Reinforcing Steel Manual of Standard Practice":

Bar Size	Chair Spacing
10M	600mm
15M	1200mm
20M	1600mm
25M	2000mm

Provide additional chairs and support bars as deemed necessary by the Departmental Representative.

.6 Place welded wire fabric in as long lengths as practical lapping at least one mesh, (200mm minimum) and tie, unless noted on the Drawings.

.7 Obtain Departmental Representative's approval of reinforcing steel and position before placing concrete. Give 24 hours notice prior to the time at which approval is required. Ensure that one side of formwork is left open for inspection of reinforcing steel.

.8 Ensure that all steel is in place, and tied, at the time at which the Departmental Representative's approval has been requested, and prior to the start of concrete placing.

.9 Clean reinforcing and forms before placing concrete, and adjust reinforcing and forms immediately before concrete is poured, as required, to ensure bars and inserts are placed correctly.

.10 Obtain approval from Departmental Representative for all construction joint locations. Ensure additional reinforcement at construction joints is available before commencing pour.

.11 Do not force reinforcing steel inserts or anchor bolts into fresh or semi-hardened concrete.

.12 Ensure cover to reinforcement is maintained during concrete pour.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 03 20 00 - Concrete Reinforcement.

1.2 REFERENCES

.1 National Building Code of Canada 2015

.2 American Society for Testing and Materials (ASTM).

.1 ASTM C 260/C 260M-10 (2016), Specification for Air-Entraining Admixtures for Concrete.

.2 ASTM C494/C494M-16, Specification for Chemical Admixtures for Concrete.

.3 ASTM D 1751-04(2013)e1, Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.4 ASTM C1017/C1017M-13e1, Standard Specification for Chemical Admixtures for use in Producing Flowing Concrete.

.3 Canadian Standards Association (CSA)

.1 CAN/CSA-A23.1-14, Concrete Materials and Methods of Concrete Construction.

.2 CAN/CSA-A23.2-14, Methods of Test for Concrete.

.3 CAN/CSA A363-03, Cementitious Hydraulic Slag.

.4 CAN/CSA A3000-13, Cementitious Materials Compendium.

Part 2 Products

2.1 MATERIALS

.1 Portland cement: to CAN/CSA-A3000, Type GU (Type 10).

.2 Slag cement: cementitious hydraulic slag, to CAN/CSA-A363.

.3 Water, fine aggregates, normal density coarse aggregates: to CAN/CSA-A23.1.

.4 Air entraining admixture: to ASTM C260.

.5 Chemical admixtures: to ASTM C494.

.6 Pozzolanic mineral admixtures: to ASTM C1017.

.7 Superplasticizing admixtures: to ASTM C494.

.8 Non-shrink grout: premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents, of pouring consistency, capable of developing compressive strength of 50 MPa at 28 days.

.9 Dry Pack: compound consisting of non-metallic aggregate, cement and sufficient water for the mixture to retain its shape when made into a ball by hand and capable of developing compressive strength of 35 MPa at 28 days.

2.2 CONCRETE MIXES

.1 Proportion normal density concrete to CAN/CSA-A23.1, Clause 4, to give the following properties:

LOCATION	28 DAY STRENGTH	SLUMP	CLASS OF EXPOSURE
Footings, walls & slab on grade	25 MPa	75	N

.2 Provide certification that plant, equipment, and all materials to be used in concrete comply with requirements of CAN/CSA-A23.1.

.3 Provide certification that mix proportions selected will produce concrete of specified quality and yield and that strength will comply with CAN/CSA-A23.1.

.4 Slag cement in combination with normal Portland cement to a maximum of 25% may be used, except in suspended slabs, upon approval of Departmental Representative.

.5 Obtain Departmental Representative's consent before using chemical admixtures.

.6 Use of calcium chloride not permitted.

Part 3 Execution

3.1 WORKMANSHIP

.1 Do cast-in-place concrete work in accordance with CAN/CSA-A23.1, and testing in accordance with CAN/CSA-A23.2, except where specified otherwise.

.2 Obtain Departmental Representative's review of reinforcing placement before placing concrete. Provide 24 hours notice prior to placing of concrete.

.3 Ensure that reinforcement and inserts are not disturbed during concrete placement.

.4 Prior to placing of concrete in adverse weather, obtain Departmental Representative's review of proposed method for protection during placing and curing.

.5 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

3.2 INSERTS

.1 Set sleeves, ties, anchor bolts, pipe hangers and other inserts, as required by other trades.

.2 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain agreement for all modifications from Departmental Representative before placing of concrete.

3.3 GROUTING

.1 Grout underside of steel column and beam bearing plates with non-shrink type grout to manufacturer's instructions, which results in 100% contact over grouted area.

3.4 FINISHING

.1 Finish concrete to CAN/CSA-A23.1.

.2 Rub exposed sharp edges of concrete with carborundum to produce 3mm radius edges unless otherwise detailed.

3.5 DEFECTIVE CONCRETE

.1 Remove defective concrete, blemishes and embedded debris and repair as directed by Departmental Representative.

3.6 INSPECTION AND TESTING

.1 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Departmental Representative, in accordance with CAN/CSA-A23.1, Clause 4.4.

.2 Costs of tests will be paid as per Section 01 45 00 – Quality Control.

.3 Ship prepaid 3 test cylinders from each pour or 60 cubic meters (max.) of concrete placed to designated testing laboratory.

.4 Prepare one additional test cylinder during cold weather concreting. Cure cylinder on job site under same conditions as concrete it represents.

3.7 WINTER PROTECTION

.1 Carry out winter concreting in strict accordance with CAN/CSA-A23.1, Clauses 5 and 7.

.2 Do not use unvented heaters.

3.8 HOT WEATHER PROTECTION

.1 Carry out hot weather concreting in accordance with CAN/CSA-A23.1, Clauses 5 and 7, including use of approved moisture retention film, if applicable.

End of Section