1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 03 20 00 - Concrete Reinforcing

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

1.02 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete
- .2 CSA-O86S1-05, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood
- .3 CSA O151-04, Canadian Softwood Plywood
- .4 CSA S269.1-1975(R2003), Falsework for Construction Purposes
- .5 CAN/CSA-S269.3-M92(R2003), Concrete Formwork, National Standard of Canada

.2 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit shop drawings for formwork and falsework.
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

.3 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures.

.4 Indicate method and schedule of construction, materials, arrangement of joints, ties, and liners. Comply with CSA S269.1, for falsework drawings. Comply with CAN/CSA-S269.3 for formwork drawings.

.5 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.

1.04 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:
- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

2 PRODUCTS

2.01 MATERIALS

.1 Formwork materials:
  .1 For concrete without special architectural features, use wood and wood product formwork materials to CAN/CSA-O86.

.2 Form ties:
  .1 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, biodegradable, low VOC.

.4 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 15 to 24 mm^2/s at 40 degrees C, flashpoint minimum 150 degrees C, open cup.

.5 Falsework materials: to CSA-S269.1.

3 EXECUTION

3.01 FABRICATION AND ERECTION

.1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.

.2 Align form joints and make watertight.

.3 Keep form joints to minimum.

.4 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

3.02 REMOVAL AND RESHORING

.1 Leave formwork in place for a minimum of 7 days after placing concrete.

.2 Remove formwork when concrete has reached 80% of its design strength or minimum period noted above, whichever comes later.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 03 10 00 Concrete Forming And Accessories

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

1.02 REFERENCES

.1 CSA International
- .1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete
- .2 CAN/CSA-A23.3-14, Design of Concrete Structures
- .3 CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement
- .4 CSA-G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel

.2 Reinforcing Steel Institute of Canada (RSIC)
- .1 RSIC-[2004], Reinforcing Steel Manual of Standard Practice

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice.

.3 Shop Drawings:
- .1 Indicate placing of reinforcement and:
  - .1 Lists.
  - .2 Quantities of reinforcement.
  - .3 Sizes, spacings, locations of reinforcement
- .2 Detail lap lengths and bar development lengths to CAN/CSA-A23.3, unless otherwise indicated.
  - .1 Provide type B tension lap splices where indicated, unless otherwise indicated.

1.04 QUALITY ASSURANCE

.1 Submit in accordance with Section 01 45 00 - Quality Control and as described in PART 2 - SOURCE QUALITY CONTROL.
- .1 Mill Test Report: upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel.
- .2 Upon request submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

1.05 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Storage and Handling Requirements:

.1 Store materials in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 MATERIALS

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

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

.3 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.

2.02 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.2 Ship bundles of bar reinforcement, clearly identified in accordance with bar lists.

2.03 SOURCE QUALITY CONTROL

.1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis,

.2 Upon request inform Departmental Representative of proposed source of material to be supplied.

3 EXECUTION

3.01 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.

.2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

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

3.02 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance

with Section 01 74 21 - Construction/Demolition Waste Management and Disposal

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 03 10 00 Concrete Forming and Accessories

.2 Section 03 20 00 Concrete Reinforcing

1.02 REFERENCES

.1 Abbreviations and Acronyms:
- .1 Portland Cement:
  - .1 Type GU - General use cement

.2 Reference Standards:
- .1 ASTM International
  - .1 ASTM C 260/C 260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete
- .2 CSA International
  - .1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete
  - .2 CSA A283-06, Qualification Code for Concrete Testing Laboratories
  - .3 CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005)

1.03 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Provide copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.04 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

.2 Provide Departmental Representative, minimum 2 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.

.3 Minimum 2 weeks prior to starting concrete work, provide proposed documents for review by Departmental Representative on following items:
- .1 Concrete mix design

.4 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

1.05 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:
- .1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.

.1 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2.
.2 Deviations to be submitted for review by Departmental Representative.

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

2 PRODUCTS

2.01 DESIGN CRITERIA

.1 Performance: to CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

2.02 MATERIALS

.1 Portland Cement: to CSA A3001, Type GU.

.2 Water: to CSA A23.1.

.3 Aggregates: to CSA A23.1/A23.2.

.4 Admixtures:
.1 Air entraining admixture: to ASTM C 260.
.2 Chemical admixture: to ASTM C 494 Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

2.03 MIXES

.1 Prescriptive Method for specifying concrete: concrete mix to CSA A23.1, Type F-2
.1 Ensure materials used in concrete mix have been submitted for testing and meet requirements of CSA A23.1.

3 EXECUTION

3.01 PREPARATION

.1 Obtain Departmental Representative's written approval before placing concrete.
.1 Provide 24 hours minimum notice prior to placing of concrete.

.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 re-handling, and without damage to existing structure or Work.

.4 Pumping of concrete is permitted only after approval of equipment and mix.

.5 Ensure reinforcement and inserts are not disturbed during concrete placement.

.6 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing.

.7 Protect existing surfaces from staining.

.8 Clean and remove stains prior to application for concrete finishes.

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

.10 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.
- .1 Place steel dowels and pack solidly with adhesive to anchor and hold dowels in positions as indicated.

.11 Do not place load upon new concrete until authorized by Departmental Representative.

3.02 INSTALLATION/ APPLICATION

.1 Do cast-in-place concrete work to CSA A23.1/A23.2.

.2 Finishing and curing:
- .1 Finish concrete to CSA A23.1/A23.2.

3.03 FIELD QUALITY CONTROL

.1 Site tests: conduct tests as follows in accordance with Section 01 45 00 - Quality Control and submit report.
- .1 Concrete pours.
- .2 Slump.
- .3 Air content.
- .4 Compressive strength at 7 and 28 days.
- .5 Air and concrete temperature.

.2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Departmental Representative for review to CSA A23.1/A23.2.
- .1 Ensure testing laboratory is certified to CSA A283.

.3 Departmental Representative will pay for costs of tests as specified in Section 01 00 10 – General Instructions.

.4 Departmental Representative will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

.5 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.

.6 Inspection or testing by consultants will not augment or replace contractor quality control nor relieve Contractor of his contractual responsibility.

3.04 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION