PART 1 - GENERAL

1.1 DESCRIPTION

.1 This section specifies requirements for supply, placing, finishing, protecting and curing cast-in-place concrete for concrete curb.

1.2 RELATED SECTIONS

.1 Section 03 20 00 - Concrete Reinforcing.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM C109/C109M-05, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 mm Cube Specimens).
- .2 ASTM C260-06, Specification for Air-Entraining Admixtures for Concrete.
- .3 ASTM C494/C494M-05a, Specification for Chemical Admixtures for Concrete.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.3 Canadian Standards Association (CSA)
- .1 CAN/CSA-A3000-031 (R2006).
- .2 CAN/CSA-A23.1-04, Concrete Materials and Methods of Concrete Construction.
- .3 CAN/CSA-A23.2-04, Methods of Test for Concrete.

1.4 CERTIFICATES

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

.2 Minimum two (2) weeks 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 Portland cement.

.2 Blended hydraulic cement.
.3 Supplementary cementing materials.
.4 Grout.
.5 Admixtures.
.6 Aggregates.
.7 Water.
.8 Waterstop.

.3 Provide 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 STORAGE OF MATERIALS

.1 Store materials to prevent contamination or deterioration.

.2 Provide adequate storage facilities for materials to ensure a continuous supply of these materials during batching operations.

.3 Store cement in weather tight facility.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Use trigger operated spray nozzles for water hoses.
.2 Designate a cleaning area for tools to limit water use and runoff.

.3 Carefully coordinate the specified concrete work with weather conditions.

.4 Ensure emptied containers are sealed and stored safely for disposal away from children.

.5 Prevent plasticizers, water-reducing agents and air-entraining agents from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with an inert, noncombustible material and remove for disposal. Dispose of all waste in accordance with applicable local, provincial and national regulations.

.6 Choose least harmful, appropriate cleaning method which will perform adequately.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Cement to CAN/CSA-A3001, Type GU.

.2 Supplementary cementing materials: to CAN/CSA-A3001.

.3 Cementitious hydraulic slag: to CAN/CSA-A3001.

.4 Water: to CAN/CSA-A23.1.

.5 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density.

.6 Air entraining admixture: to ASTM C260.

.7 Chemical admixtures: to ASTM C494/C494M. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.8 Concrete retarders: to ASTM C494/C494M. Do not allow moisture of any kind to come in contact with the retarder film.

.9 Curing compound: curing compounds are not to be used.

.10 Waterstop:

.1 Performed plastic adhesive waterstop - non-expansive single component 25mm x 25mm (16mm x 38mm installed).

.2

Appearance:	Black Strips
Hydrocarbon Content	50% to 70% (ASTM D4)
Volatile Matter	2.0% max. (ASTM D6)
Specific Gravity	1.20 to 1.35 (ASTM D71)
Ductility	5.0 min. (ASTM D113)
Softening Point	160°C (ASTM D36)
Penetration	50 to 120 (ASTM D217)
Flash Point	315°C min. (ASTM D92)
Resistance to Hydrostatic Head	20 Meters

.3 Primer: as recommended by manufacturer.

2.2 MIXES

.1 Proportion concrete in accordance with CAN/CSA-A23.1, Clause 4.3.

.2 Proportion concrete to comply with Alternate 1, Table 2 in CAN/CSA-A23.1 and following requirements:
- .1 Cement:
  - .1 Type GU Portland cement.
- .2 Minimum compressive strength: 35 MPa at 28 days.
- .3 Class of exposure: C1.
- .4 Minimum cement content: 385 kg/m^3 of concrete.
- .5 20 mm nominal size coarse aggregate.
- .6 Air content 5% to 8%.
- .7 Density of air-dry concrete in range of 2240 kg/m^3 to 2400 kg/m^3.
- .8 Slump at time and point of discharge 50 mm to 100 mm.

.3 When the Contractor purchases concrete from a ready mix concrete supplier, submit a letter from the supplier certifying the following:
- .1 That plant and equipment is certified and all materials to be used in the concrete comply with the requirements of CAN/CSA-A23.1.
- .2 That the mix proportions selected will produce concrete of the specified quality and yield. Indicate mix proportions and sources of all materials.
- .3 That the strengths will comply with the strengths specified herein.

.4 Mixing of concrete on site will not be permitted for this project.

.5 Weigh aggregates, cement, water and admixture when batching. No alternative methods of measuring will be permitted.

.6 Do not use calcium chloride.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Prepare existing concrete slab surface by cleaning with steel brush or sandblasting. Surfaces against which new concrete is to be placed must be free from standing water, mud, debris, oil, release agents, laitance, and loose or unsound material. Apply bonding agent in accordance with manufacturer's instruction.

.2 Install preformed plastic adhesive waterstop in accordance with manufacturer's recommendations.

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

.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 in adverse weather.

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

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

3.2 CONSTRUCTION

.1 Comply with additional requirements of CAN/CSA-A23.1, Clause 4.1.1.5, for concrete exposed to seawater environments.

.2 Place concrete in hot weather to CAN/CSA-A23.1.

.3 Place concrete in cold weather to CAN/CSA-A23.1.

.4 Keep concrete surfaces moist continually during protection stage.

.5 Place, consolidate, finish, cure and protect concrete to CAN/CSA-A23.1.

.6 Do not commence placing concrete until Departmental Representative has inspected and approved forms, foundations, reinforcing steel, joints, conveying, spreading, consolidation and finishing equipment and curing and protective methods.

3.3 FORMWORK

.1 Install and strip formwork to CAN/CSA-A23.1.

3.4 PLACING CONCRETE

.1 Place and consolidate concrete to CAN/CSA-A23.1.

.2 Do not place concrete on or against frozen material.

.3 Place concrete continuously from joint to joint.

.4 Place concrete in a uniform heading, normal to the centerline. Limit rate of placing to that which can be finished before beginning of initial set.

3.5 FINISHING

.1 Only ACI certified or other pre-approved concrete finishers are to be utilized in finishing all concrete works. All work is to be finished to CAN/CSA-A23.1, and as specified below.

.2 The surface will be brought to the specified level by means of darbying or bull floating which will be carried out immediately following screeding and must be completed before any bleed water is present on the surface. Surface tolerance to be 8 mm under a 3 meter straight edge.

.3 Do not bring water and fines to the surface by over trowelling.

.4 Lightly broom surface with a soft bristle broom obtaining a fine and even textured finish with a non-slip finish. All brush strokes to be parallel across paving.

3.6 PROTECTION AND CURING

.1 Cure to CAN/CSA-A23.1.

.2 Cure concrete by protecting it against loss of moisture, rapid temperature change and mechanical injury for at least seven (7) days after placement. After finishing operations have been completed, the entire surface of the newly placed concrete shall be covered by whatever curing medium is applicable to local conditions and approved by the Departmental Representative. The edges of concrete slabs exposed by removal of forms shall be protected with continuous curing treatment equal to the method selected for curing the slab and curb surfaces. Cure to CAN/CSA-A23.1. Have the equipment needed for adequate curing at hand and ready to install before actual concrete placement begins.

.3 When air temperature is at or below 5°C or when there is a probability of its falling to that limit within 24 hours of placing (as forecast by the nearest official meteorological office) cold weather protection as per CAN/CSA-A23.1 will be provided and the following:

.1 Housing - Protect concrete by a windproof shelter of canvas or other

material to allow free circulation of inside air around fresh touch formwork and provide sufficient space for removal of formwork for finishing. Supply approved heating equipment capable of keeping inside air at a constant temperature sufficiently high to maintain concrete at following curing temperatures.

.1 For initial three (3) days at a temperature of not less than 15°C nor more than 27°C at surface.

.2 Maintain concrete at 10°C for an extra four (4) days plus the initial three (3) days.

.3 In addition to the protective housing, the concrete must be cured as outlined in Clause 3.9.2 above.

3.7 TESTING

.1 Contractor will appoint and pay for a concrete testing company to test all work under this section of specification as per CAN/CSA-A23.1. Prior approval of the testing company is required from the Departmental Representative.

.2 Cost of compressive strength tests shall be paid for by the Contractor.

.3 Testing company shall issue reports to Departmental Representative on quality of test cylinders.

.4 Notify Departmental Representative at least seven (7) days prior to start of placing concrete. Provide for testing purposes an adequate quantity of approved test cylinders.

.5 At least one (1) set of three (3) cylinders each shall be taken from 25 m^3 or fraction thereof of each day's pour, whichever is less. One (1) cylinder shall be tested at seven (7) days and other two (2) tested at 28 days.

.6 Crate cylinders and deliver to the testing laboratory within 48 hours after casting in accordance with CAN/CSA-A23.1. Contractor will pay for crating and delivery of cylinders to the laboratory.

.7 If strength tests of test cylinder for any portion of the work falls below the specified compressive strength at 28 days, the Departmental Representative reserves the right to determine the acceptability of the concrete by performing additional field testing as outlined in CAN/CSA-A23.1.

.8 If concrete does not conform to drawings or specifications, take measures as directed to correct the deficiency. All costs of correctional measures will be at the expense of the Contractor.

END