



City of Estevan

Construction Specifications

SECTION 2400
CONCRETE CURBS, GUTTERS, SIDEWALKS AND CROSSINGS

1.0 GENERAL

This section governs the requirements for the construction of cast in place curbs, gutters, sidewalks and crossings.

2.0 MATERIALS

2.1 The following work items shall conform to the referenced sections of these specifications:

	Section
.1 Clearing and Grubbing	1010
.2 Sawcutting and Breakout and Removal	1020
.3 Earthworks	1030
.4 Granular Materials and Aggregates	1090
.5 Adjustment of Existing Mains and Appurtenances	1070
.6 Subgrade Preparation	2110
.7 Cast-in-place Portland Cement Concrete	1050
.8 Concrete Formwork	1051
.9 Concrete Reinforcement	1052

2.2 CURING COMPOUND

Curing compound conforming to ASTM C309, exhibiting adherence to damp concrete on horizontal or vertical surfaces, forming a continuous non-slip film when applied with a clear or translucent resinous, non-bituminous base and containing a green fugitive dye visible for at least four hours but becoming inconspicuous within seven(7) days after application. The curing compound shall not be tacky and must remain on the concrete surface under normal pedestrian traffic.

2.3 EXPANSION JOINT FILLER

Expansion joint filler shall comprise of a preformed joint filler 10cm thick, "Flexcell" or approved equal conforming to ASTM D1751 or 1752.

3.0 INSTALLATION

3.1 Carry out topsoil stripping, grubbing, clearing, sawcutting, breakout and removal of existing concrete curbs, gutters or sidewalks, and asphalt pavement in conformance with the referenced sections of these specifications within the area of the work of this section.

SECTION 2400
CONCRETE CURBS, GUTTERS, SIDEWALKS AND CROSSINGS

- 3.2 Carry out earthworks as compacted common excavation, excess common excavation, imported native fill, imported granular fill by excavation or filling in the area of the work of this section to bring the subgrade to the levels required to complete final grading and subgrade preparation. Imported native fill or imported granular fill shall only be brought to site only upon written authorization of the Engineering Services Division. Adjust utility appurtenances where required.
- 3.3 Prepare subgrade by compacting areas of unconsolidated cut or fill and remove soft, wet, spongy, excessively plastic or yielding subgrade and unconsolidated pipe or service trenches and replace with compacted granular fill. Provide adequate drainage to protect the prepared subgrade from rain. Aerate, dry and recompact prepared subgrade if it becomes wet or soft due to rain. Ensure prepared subgrade has sufficient width and sideslopes to ensure stability and working room. Scarify subgrade where required and compact to a minimum of 98% Standard Proctor Density. Trim and shape subgrade to final cross sections, levels and grades.
- 3.4 Place a 50mm thick granular base and compact to a minimum of 98% Standard Proctor Density. This requirement may be waived if approved, power operated, automatic, fine grading, trimming equipment, equipped with automatic line and grade control is used. This granular base is considered incidental to the work.
- 3.5 When directed by Engineering Services Division, proof roll the finished subgrade. Excavate and remove areas of rutting or displacement and replace with compacted native or granular fill.
- 3.6 Place and secure formwork and reinforcement. Place expansion joint filler. Formwork is not required if slip forming extruding concrete.
- 3.7 Drill and place 10M reinforcing dowels, 600mm long at 750mm on centre when constructing work to abut existing curb, gutter, sidewalk, crossings, or building structure.
- 3.8 For restoring concrete sections within underground utility trench crossings, catchbasins and hydrant leads, construction joints, etc. dowel into existing using 10M steel 600mm long reinforcing, provide 3 – 10M steel in sidewalk section and 2 - 10M steel in the curb and gutter section and as directed by Engineering Services.
- 3.9 Do not commence pouring concrete until the Engineering Services Division has inspected and approved subgrade, granular base, forms, reinforcement, dowels, expansion joints, mixing, conveying, spreading, compacting, finishing, curing and protection equipment.

SECTION 2400
CONCRETE CURBS, GUTTERS, SIDEWALKS AND CROSSINGS

3.10 CONCRETE PLACEMENT AND FINISHING

- .1 Convey concrete from the mixer to the point of placement using means and equipment which will prevent segregation. Deposit concrete in forms as close as possible and no more than 1 metre in any direction from its final position. Exercise care in placing concrete against forms and into corners to prevent voids, pockets, rough areas, honeycombing, and laitance. Do not rehandle concrete already placed inside forms.
- .2 Spread, distribute, and level concrete to facilitate strike off or screeding. Use square end shovels, metallic spreaders or concrete rakes. Do not use garden rakes.
- .3 Strike off or screed to consolidate the concrete, to remove excess concrete and bring to grade using lumber or magnesium straight edge or a vibrating screeder to tamp the concrete. Do not over-vibrate and cause bleed water to rise.
- .4 Use a platform or roller tamper to push coarse aggregate below the concrete surface, if further tamping is required for low slump concrete.
- .5 Level ridges and fill voids by floating with bull floats or darbies using wood or magnesium blades. Float concrete before bleed water appears on surface. Take care not to seal the concrete surface with mortar. Let bleed water appear on the concrete surface. Leave the concrete to set and bleed water to dissipate. Use approved methods if slip forming extruded concrete.
- .6 Using a suitable tool, mark the concrete as follows:
 - 1) each City block with the Contractor's initials and the year of construction.
 - (2) each curb box location with the letters C.C. and an arrow pointing to the curb box. Place the imprints at 150mm from the back of the sidewalk or top of curb.
- .7 After the concrete has set hand float with a wood or magnesium float to compact and remove imperfections.
- .8 Using bronze or steel edging and grooving tools, complete rounded edges and control joints. Use absolutely straight control joints to divide the structure into equal sections.
- .9 Apply a uniform brush finish and complete final edging and tooling control joints.

3.11 JOINTS

.1 EXPANSION JOINTS

Provide expansion joints at lane crossings, at curve radii returns, and at the end of each day's continuous placement of concrete. The joint shall be to full depth of structure 10mm wide and perpendicular to the length of the structure. Do not place expansion joints within 3 metres of trenches for service connections, hydrant leads or catchbasin leads. Provide expansion joints around the base of all poles, hydrants, manholes or other such installations encroaching into the concrete structure.

.2 CONTROL JOINTS

SECTION 2400
CONCRETE CURBS, GUTTERS, SIDEWALKS AND CROSSINGS

Provide tooled transverse crack control joints every 1.5 metres in sidewalks and 3 metres in curb and gutter sections with a depth at least 1/4 the depth of concrete, but not less than 30mm and a width of 6mm with edges rounded in a 10mm radius arc. Provide control joints that are perpendicular to the length of the structure and extending the full structure width. Provide tooled crack control joints around catch basins, manholes, vaults, openings, cast iron covers, curb box covers, valve boxes street lights, hydrants, poles and other structures encroaching into the structure.

3.12 REINFORCING

Reinforce all curve radii returns with two, 10M reinforcing dowels, 600mm long. Reinforce separate curb and gutter sections constructed in Commercial or Industrial Zones with two, 10M reinforcing bars along the structure's full length. Reinforce underground utility trench crossings, catchbasins and hydrant leads, construction joints, etc. dowel into existing using 10M steel 600mm long reinforcing, provide 3 – 10M steel in sidewalk section and 2 - 10M steel in the curb and gutter section and as directed by Engineering Services

3.13 CURING AND PROTECTION

- .1 After finishing concrete to its full cross section and as soon as concrete has sufficiently set, spray curing compound on all exposed concrete surfaces. Provide an even and uniform application rate. Alternatively cure by adding moisture to exposed surfaces for at least 1 day and place burlap in two prewetted layers. Keep burlap continuously wet during curing period. Allow concrete to cure for 7 days prior to backfilling or permitting vehicular traffic to drive over.
- .2 Erect barricades for at least one day after applying curing compound. Do not operate heavy construction equipment adjacent to freshly laid concrete for three to seven days. Repair any damage to concrete by pedestrians, animals or vehicles. Use canvas to protect freshly laid concrete from weather action.
- .3 Cold Weather Requirements
 Place concrete only when air temperature is 1°C and rising. Do not place concrete when air temperature is 5°C and falling. When pouring concrete thaw all surfaces in contact with concrete to a temperature above 2°C. Do not allow concrete temperature to drop below 10°C during curing period. Avoid rapid cooling at the end of the curing period. Provide cold weather protection as follows:

Ambient Air Temperature	Protective Measures
5°C - 25°C	Normal curing - no required.
Below 5°C	Adequate insulation for 7 days and if required, auxiliary forced air heating (keep concrete moist) for minimum of 36 hours.

protection

SECTION 2400
CONCRETE CURBS, GUTTERS, SIDEWALKS AND CROSSINGS

.4 Hot Weather Requirements

For the purpose of these specifications, hot weather is defined as a combination of low relative humidity, windy conditions, and high temperatures. Do not place concrete when evaporation rate exceeds 0.5 kg/m²/hr as determined from CAN/CSA A23.1 unless special measures are implemented in accordance with Article 21.2.2.3.2 Severe Conditions of CAN/CSA A23-1 if written authorization has been issued by the Engineering Services Division. Payment may not be made for concrete placed under such conditions. Surface wetting during hot weather conditions will not be permitted. Prevent fast or flash set of concrete during hot weather conditions by using set retarders.

3.14 CROSSINGS

Provide extra 25mm thickness and reinforcement as shown on standard drawings to concrete sidewalks at driveway locations in Commercial or Industrial zones and at all lane crossings. Transition the increase in thickness over 900mm at each end of crossing.

3.15 BACKFILLING

Backfill behind curb, gutter, sidewalk or crossing to design cross sections with select subgrade material compacted to 95% standard Proctor Density, promptly after removal of forms. Shape and trim all slopes.

3.16 TOLERANCES

- .1 Finished concrete surfaces shall not deviate from line or grade by more than 6mm in 3 metres and ± 10 mm from the required elevations and dimensions.
- .2 Concrete surfaces shall be free of depressions or bumps in excess of 6mm under a 3 metre long straight edge placed parallel to the length of the structure.
- .3 Deviation in alignment shall not exceed 25mm in 30 metres from that established by survey stakes.
- .4 Crossfall shall not vary more than 10mm per metre that specified.
- .5 Variation in concrete structure thickness shall not exceed 6mm and in no case shall thickness be reduced more than 12 mm. Structures with a thickness reduction between 6mm and 12mm shall be paid for at a reduced rate of 80% of the contract unit price. There will be no payment for structures with a thickness reduced by more than 12mm but not removed and replaced. No bonus will be paid for thickness in excess of that specified or shown on the standard drawings.
- .6 Curb, gutter, sidewalk or crossing structure not meeting tolerance requirements shall be removed to the nearest joint and replaced at the Contractor's cost.

SECTION 2400
CONCRETE CURBS, GUTTERS, SIDEWALKS AND CROSSINGS

4.0 MEASUREMENT AND PAYMENT

4.1 The following work item in this section shall be paid in accordance with the Contract Unit Prices which shall be deemed full compensation for all labour, materials, equipment, supplies, superintendence, overhead and profit for all work incidental to the supply, installation, completion and maintenance during warranty period of the respective items:

- .1 Compacted common excavation, imported compacted native fill, imported compacted granular fill excess common excavation, subgrade preparation within ± 150 mm of the grade line of the curb, gutter, sidewalk, or crossing as shown on the standard drawings, the cutting, breakout, removal, disposal and restoration of existing concrete and asphalt pavement to accommodate formwork or replacement and backfill behind the structure shall be deemed incidental to the construction of the respective concrete structure. No separate payment will be made for this work.
- .2 The following items shall be paid on the basis of linear metres of length of structure measured as tabulated:

Structure	Length Measured Along
(.1) Separate curb	Measured along lip of curb
(.2) Separate curb and gutter	Measured along lip of curb
(.3) Separate sidewalk	Centre line of sidewalk
(.4) Curb, gutter, monolithic sidewalk	Centre line of structure
(.5) Curb crossings or curb & gutter	Measured along lip of curb
(.6) Sidewalk crossings	Centre line of sidewalk
(.7) Transition sections	Centre line of structure

- .3 Wheel chair ramps shall be paid on the basis of their number. The Contract Unit Price shall include items in 4.1 and all work items referred to in this section and incidental to a complete installation.
- .4 Payment reductions referred to in this section shall be applied cumulatively.