S E C T I O N 8

CURBS AND SIDEWALKS

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S E C T I O N 8

CURBS AND SIDEWALKS

DESIGN

8.l SCOPE

8.l.l For the purpose of this specification the following definitions shall apply:

(a) **Curbs** refer to concrete curbs with or without integral gutters unless otherwise noted.

(b) **Sidewalk** refers to concrete sidewalks adjacent to a street or curb and located within a road right-of-way unless otherwise noted.

(c) **Walkway** refers to asphalt paved sidewalks located outside of road right-of-ways unless otherwise noted.

8.1.2 Unless otherwise approved by the Engineer, all developed streets require a minimum of one sidewalk.

8.1.3 Curbs, sidewalks and walkways shall be designed in accordance with the following design Criteria.

8.2 RIGHT-OF-WAY AND PAVEMENT WIDTHS

8.2.l Sidewalk pavement widths shall be l.5 m in width unless otherwise specified by the Engineer.

8.2.2 A minimum of l.0 m of unobstructed width is required on all sidewalks and walkways.

8.2.3 Walkway pavement widths shall be a minimum of 2.0 m.

8.2.4 Walkway right-of-ways shall be a minimum of 3.0 m.

8.3 CURBS - GENERAL

8.3.l Curbs shall be:

(a) non-mountable type in:

(i) commercial areas
(ii) multifamily residential areas
(iii) industrial areas
(iv) existing residential areas where driveways are established
(v) other areas as required by the Engineer.

(b) mountable type in new single family residential areas on local and cul-de-sac streets.

8.3.2 Where intersecting streets have both mountable and non-mountable curbs, non-mountable curbs shall be required for the curb returns and along the tangent to the first driveway or lane crossing located in accordance with Section 8.6.

8.3.3 Curbs within driveway or lane crossings in industrial and commercial areas require an additional concrete footing as shown on Standard Drawing C2.

8.3.4 Minimum radius of curb returns at street intersections shall be 9.0 m for residential areas on arterial, collector and cul-de-sac streets and l2 m for industrial/commercial areas on major arterial and arterial streets.

8.3.5 The radius of curb returns at street intersections shall be governed by the wider of the intersecting streets.

8.4 WALKWAY VEHICLE BARRICADES

Walkway barricades shall be provided at the entrance to walkways to prevent the passage of motor vehicles unless otherwise authorized by the Engineer. See Standard Drawings for details.

8.5 DRIVEWAY AND LANE CROSSINGS

8.5.l Driveway and lane crossings shall be provided in sidewalks constructed where non-mountable curbs are used.

8.5.2 Driveway and lane crossings shall be constructed in accordance with the standard drawings.

8.6 STANDARD LONGITUDINAL GRADE

8.6.l	Concrete gutter (minimum)	0.50%
	Curb return (minimum)	1.0%
	Sidewalks (minimum)	0.50%
	Walkways (minimum)	0.50%
	Walkways (maximum)	l2.0%

8.6.2 The longitudinal grade for sidewalks shall follow road grades.

8.6.3 Curb return grades shall provide a smooth transition between intersecting gutter grades.

8.7 SIDEWALK AND WALKWAY CROSSFALL GRADE

8.7.1	Minimum	l.0%
	Recommended	2.0%
	Maximum	4.0%

8.7.2 Crossfall grades in excess of 4.0% shall only be permitted for short sections at driveway or lane crossings subject to approval by the Engineer.

8.7.3 In no case shall the crossfall grades exceed 6.0%.

8.7.4 The sidewalk shall slope down to the curb as shown on the standard drawings.

8.8 SIDEWALK AND WALKWAY THICKNESS

8.8.l Minimum concrete sidewalk thickness shall be l50 mm.

8.8.2 Sidewalk thickness may be reduced to l00 mm in residential areas, excluding driveway and lane crossings, where the sidewalk is adjacent to a non-mountable curb.

8.8.3 Walkways shall be paved with asphaltic concrete a minimum 50 mm thick or constructed of concrete in accordance with the requirements for sidewalks.

8.9 CURB, SIDEWALK AND WALKWAYS - MINIMUM BASE AND SUB-BASE

8.9.1 The minimum base and sub-base requirements for curbs and sidewalks shall be the same as that required for the adjacent street and in accordance with Section 7A.6.

8.9.2 Walkways shall have a minimum compacted thickness of:

Sub-base	l50 mm
Base	50 mm

8.l0 PEDESTRIAN SIDEWALK RAMPS

8.10.l Pedestrian sidewalk ramps shall be provided:

(a) in sidewalks at every pedestrian road crossing

(b) in raised traffic islands where they form a continuation of a sidewalk network across a road intersection.

8.l0.2 The design of pedestrian sidewalk ramps shall be in accordance with the standard drawings.

8.ll SIDEWALKS IN CUL-DE-SACS

The location of sidewalks in cul-de-sacs shall be as shown on the standard drawings for cul-de-sacs contained in Section 7 "Streets".

8.l2 TERMINATION OF SIDEWALKS

8.l2.l Sidewalks shall be terminated in a manner that is safe for pedestrians and as follows:

(a) At the beginning of the curb return if construction of the intersection is not required.

(b) At the end of the curb return if construction of the intersection is required.

(c) At the end of the development phase or property line.

(d) At other specified locations as required by the Engineer.

8.13 CONCRETE STAIRWAYS

8.13.1 Where walkway grades exceed 12%, stairways shall be installed to suit adjacent topography.

8.13.2 Walkways requiring stairways shall have a minimum of three stairs and landings at all entrances to the walkway.

8.13.3 Walkway barriers, as per standard drawings, shall be required at all entrances to walkways containing a stairway. Barriers shall be installed a minimum of 1.2 m from the last stair.

8.13.4 Concrete stairways shall be designed in accordance with the standard drawings.

8.13.5 Concrete landings, at a 2% grade, are required at the top and bottom of all stairways. Stairways shall have a maximum of 12 risers between landings.

8.14 SIDEWALK/RETAINING WALL HANDRAIL

8.14.1 Sidewalks or walkways adjacent to retaining walls or other vertical drops exceeding a slope of 30% shall require a handrail.

8.14.2 Other unsafe areas, as determined by the Engineer, may also require installation of a handrail.

SPECIFICATIONS

8.20 SCOPE

8.20.1 This specification refers to concrete curb and gutter, concrete sidewalks and asphalt walkways.

8.20.2 Only those products approved by the Engineer will be accepted for installation.

8.2l CONCRETE

8.2l.1 Concrete shall be as specified under Section l0. entitled Concrete, except as modified herein.

(a) Mix Design:

Mix design shall conform to the following:

(i) Hand Formed Curb and Gutter and Sidewalks:

Slump: 80 mm
Air Entrainment: 5% - 8%
Maximum aggregate size: 20 mm
Minimum cement content: 335 Kg/m3
Minimum 28 day compressive strength: 32 MPa

(ii) Extruded Curb and Gutter

Exposure Class: C-2
Slump: 0 - 25 mm
Air Entrainment: 6% - 9%
Fineness modulus: 2.2 to 3.1
Maximum aggregate size: 12.5 mm
Minimum cement content: 335 Kg/m3
Minimum 28 day compressive strength: 32 MPa

(b) Admixtures:

Admixtures for the prevention of freezing shall not be used. Use of other admixtures shall require the approval of the Engineer.

8.22 CURING COMPOUND

Curing compound shall be spray-applied, liquid type conforming to ASTM C309 containing a fugitive dye.

8.23 CURB AND SIDEWALK EXPANSION JOINTS

Preformed bituminous impregnated fibre board for expansion joints shall conform to ASTM D-l75l with the same shape as the concrete cross sections and having a minimum thickness of l3 mm.

8.24 CURB AND SIDEWALK ISOLATION JOINTS

Longitudinal joints shall consist of 6 mm thick preformed bituminous impregnated fibre board material conforming to ASTM D-l75l, precut to the required section. Joints around poles and structures in the concrete section shall be made with rubberoid roofing material.

8.25 REINFORCING STEEL

Reinforcing steel shall be intermediate grade steel conforming to CSA G30.l2, Grade 40. Steel shall be free of excessive rust, scale or other coatings that will adversely affect the bond.

8.26 SUBGRADE, SUB-BASE AND BASE

8.26.1 Subgrade and sub-base preparation shall be as detailed above in Section 7B.6 to the cross-sections shown on the detail drawings.

8.26.2 Crushed gravel shall be placed and compacted to a depth shown on the detail drawings before placing any concrete. The gravel shall be rolled and compacted to produce a uniform bearing capacity through the entire width and length of the work.

8.27 FORMS

8.27.1 Forms may be either steel or wood.

8.27.2 Wood forms shall be of select dressed lumber, well seasoned, straight, free from defects, thoroughly cleaned not less than 40 mm thick, and not less than 5 m long.

8.27.3 Steel forms shall be thoroughly cleaned and free of twists and warps.

8.27.4 Flexible forms shall be used for all curves having a radius of less than 60 m.

8.27.5 Forms shall be to the shape, lines and full dimensions of the work being formed.

8.27.6 Form release agents shall be non-staining with a chemically active release agent that contains compounds that react with free lime to provide water soluble soap.

8.28 EXTRUDING MACHINE

8.28.l The extruding machine shall require approval by the Engineer. The machine shall be fitted with a template for the curb specified on the construction drawings and consistent with the cross-sections shown on the standard drawings.

8.28.2 Rails for the extruding machine shall be rigid enough to ensure no deflection from established line and grade occurs.

8.29 ASPHALT

8.29.l Asphalt pavement for walkways shall be as specified under Section l1 entitled "Asphaltic Concrete Paving" except as modified herein:

Marshall stability at 60 deg. C - 227 kg minimum 50 blows
Percent voids total mix - 3% - 5%
Maximum aggregate size - l3 mm

8.29.2 The above properties are to be determined in accordance with the appropriate requirements of ASTM D-l559. Voids are to be calculated using the Vacuum Saturated Specific Gravity method.

8.30 WALKWAY BARRIERS

Unless otherwise approved by the Engineer, walkway barriers shall be as specified in the standard drawings.

INSTALLATION

8.40 COMMON EXCAVATION

Common excavation shall be carried out such that curb and gutter and sidewalks can be constructed to the line and grade shown on the drawings.

8.4l SUBGRADE, SUB-BASE AND BASE PREPARATION

8.41.1 Subgrade, sub-base and base installation shall be in accordance with Section 7B Streets – Construction.

8.4l.2 The subgrade, sub-base and base shall be approved by the Engineer prior to placement of forms and/or guides.

8.42 CROSS-SECTION

The cross-sections of the curb, gutter and sidewalk shall conform to the cross-sections as detailed on the standard drawings.

8.43 PLACING CONCRETE

8.43.l The base, forms and/or rails shall be approved by the Engineer prior to the placement of concrete.

8.43.2 Concrete shall be placed within l.5 hours of batching time into approved preset forms or an approved extruding machine.

8.43.3 Successive batches shall be deposited in a continuous operation. Under no circumstances shall partially set concrete be used.

8.43.4 Concrete shall not be placed during wet weather, on ponded water, on a frozen base, or when it appears likely that the air temperature will fall below 5 deg C within 24 hours. Concrete shall be

kept at a temperature of not less than l3 deg. C for at least 72 hours after placing.

8.43.5 Concrete damaged by freezing shall be removed from the site and replaced with new concrete.

8.43.6 The concrete placing operation shall be timed to permit edging and finishing in daylight hours.

8.43.7 Granular base shall be moistened prior to placement of concrete.

8.43.8 Concrete placement shall only be discontinued at expansion, construction or isolation joints.

8.44 HAND FORMED CONCRETE SECTIONS

8.44.l The base shall be approved by the Engineer prior to placement of the forms.

8.44.2 Forms shall produce a true line free from waves or irregularities in line or grade. Forms shall be thoroughly cleaned and freshly oiled with form oil before concrete is placed. After forms have been set to line and grade, they shall be adequately braced, tied, and checked with a template to ensure proper setting. Concrete shall not be placed until the forms have been inspected and approved by the Engineer.

8.44.3 A mechanical pencil vibrator not exceeding 50 mm in diameter or a power screed shall be used as the concrete is being placed to produce a dense concrete. The use of a vibrator shall not exceed fifteen seconds in any one location.

8.44.4 Face forms shall be removed as soon after pouring as is possible without resulting in damage to the curb in order to permit finishing. Under no circumstances shall the face forms remain in place overnight.

8.45 EXTRUDED CONCRETE SECTIONS

8.45.l The base shall be approved prior to placement of concrete.

8.45.2 Guides for the extruding machine shall produce a true line free from waves or irregularities in line or grade and be sufficiently supported to ensure no deflection occurs.

8.45.3 Concrete shall not be placed until guides have been approved by the Engineer.

8.45.4 Extruded sections shall conform with cross-sections shown on the standard drawings.

8.45.5 Where the Engineer is not satisfied with the extruded product, defective sections shall be removed and the replacement of defective sections and all remaining sections shall be completed by hand placement procedures.

8.46 CURB AND SIDEWALK EXPANSION JOINTS

8.46.1 Transverse expansion joints for curb and gutter shall be formed at both sides of lanes and driveway crossings, at both ends of all curb returns, and both sides of catchbasins l m from the centreline of the catchbasin and at all other locations designated by the Engineer. Maximum distance between transverse expansion joints for curb and gutter shall be 9 metres.

8.46.2 Transverse expansion joints for sidewalks shall be formed at both sides of lanes and driveway crossings, at both ends of curb returns, at both sides of manholes, 0.75 m from the centre line of the manhole and at all other locations designated by the Engineer. Maximum distance between transverse expansion joints for sidewalks shall be 9 metres.

8.46.3 Extend joint through full depth of concrete. Fill joint with expansion joint material.

8.47 CURB AND SIDEWALK CONTRACTION JOINTS

8.47.l Contraction joints shall be constructed at maximum l.5 m intervals for sidewalks and 3 m intervals for curb and gutter by cutting a groove through the surface of the concrete to a minimum of l/2 of the depth of the concrete section at the point of cut.

8.47.2 Contraction joints for abutting curb and sidewalks shall be cut to match. Sidewalk slabs shall be uniform in size, and cut square where possible.

8.48 CURB AND SIDEWALK ISOLATION JOINTS

8.48.1 Isolation joints shall be fabricated around telephone poles, light poles, hydrants, manholes, and all other structures located in the concrete section by wrapping and securing 4 thicknesses of 4 mm rubberoid roofing materials (or approved equivalent) around the structure.

8.48.2 Longitudinal isolation joints shall be formed between sidewalk and existing curbing and where sidewalk is installed directly against a wall or other structure.

8.48.3 Bond break compound may be used in lieu of the isolation joint between sidewalk and abutting curb where approved by the Engineer.

8.49 CURB AND SIDEWALK EDGING AND FINISHING

8.49.l Concrete Curb and Gutter

(a) Concrete curb and gutter shall have a steel trowel finish. The surface shall have a smooth even dense texture free from blemishes.

(b) The finish on curb and gutter sections shall be within 6 mm of the design grade and cross-section, but not uniformly high or low when measured with a 3 m straightedge placed anywhere along the curb and gutter.

8.49.2 Sidewalks

(a) Finish sidewalks to a smooth surface with a magnesium or wood float trowel.

(b) The surface of concrete sidewalks shall be finished prior to final set with a broom finish to provide a uniform, non-skid surface and finishing both sides of all joints and edges with steel edging trowel in accordance with the patterns shown on the standard drawings.

(c) Under no circumstances shall the concrete be overworked by trowelling, dusted with dry cement, or finished with a mortar coat.

(d) Finish driveway and lane crossings and sidewalk ramps as shown on the standard drawings.

(e) The finish grade surface of concrete sidewalks shall be 0 - 6 mm above the finish elevations of structures, including but not limited to, manholes, valves, service boxes and survey monuments.

(f) Finished surfaces shall be within 6 mm of the design grade and cross-section, but not uniformly high or low when measured with a 3 m straight edge placed anywhere on the surface.

8.50 CURING CONCRETE

As soon as the concrete has obtained its initial set, it shall be sprayed with 2 coats of membrane curing compound as specified in Section 8.22. Other methods of curing require approval by the Engineer prior to placing concrete.

8.5l PROTECTING CONCRETE

8.51.1 Tarpaulins shall be used to protect freshly finished concrete from dust, rain or frost. Protective coverings used for heating purposes shall be kept clear of the concrete to permit unimpeded circulation of air.

8.5l.2 Suitable traffic barriers shall be erected to protect concrete from equipment, vehicles and pedestrian traffic.

8.5l.3 Supervision, as required, shall be provided to prevent damage by vandalism until the concrete has set.

8.5l.4 No construction equipment shall be worked adjacent to the curb until the concrete has attained adequate strength. This shall be for at least 7 days or as directed by the Engineer.

8.52 DAMAGED CONCRETE

Where concrete shows evidence of damage or freezing, as determined by the Engineer, the entire section lying between consecutive contraction joints shall be removed and replaced at the Contractor's expense.

8.53 ASPHALT WALKWAYS

8.53.l Asphalt walkways shall be installed in accordance with Section ll - Asphaltic Concrete Paving.

8.53.2 The base shall be approved prior to placement of asphalt.

8.53.3 Any segregated coarse aggregate shall be removed from the surface. Walkway shall be finish rolled with a steel wheel roller. Completed walkway shall have a tight, fine finished surface, free from depressions.

8.53.4 The surface of the finished walkway shall be within l0 mm of the design grade and cross section when measured with 3 meter straightedge placed anywhere on the surface.

8.53.5 Compaction requirements shall be a minimum of 95% of modified proctor density. (ASTM 1557)

8.53.6 Boulevards within the statutory rights-of-way shall be graded towards the walkway and be finished with a l00 mm thick layer of topsoil including grass seeding or sod as directed by the Engineer and in accordance with the standard drawings.

8.54 CATCH BASINS AND MANHOLES

Catch basin and manhole frames shall be adjusted horizontally and vertically as necessary to match the finished alignment and grade prior to or at the time of concrete placement.

8.55 WALKWAY BARRIERS

Unless otherwise approved by the Engineer walkway barriers shall be constructed in accordance with the standard drawings.

8.56 BACKFILL AND CLEANUP

8.56.1 The gravel road base adjacent to the curb shall be filled tight to the curb, graded, compacted and left in a neat condition.

8.56.2 The boulevard area adjacent to the curb or sidewalk shall be cleared of construction debris and raked clear of all rock exceeding 50 mm in its largest dimension.

8.56.3 The boulevard area shall be backfilled to within 50 mm of the top of the curb for a minimum width as shown on the drawings, such that the water does not undermine the curb installation. Backfill shall be compacted to 90% of Modified Proctor Density (ASTM Dl557). It is not the intention that boulevard areas be completely filled but that they be left in a neat order and in at least as good condition as existed prior to commencement of construction.

8.56.4 Complete boulevard grading in accordance with Section 7B.8 - Boulevard Grading.

8.57 CONCRETE TESTS

8.57.1 During the progress of the work test cylinders will be made by the Consulting Engineer or a recognized Testing Laboratory appointed by the Consulting Engineer. The test cylinders shall

receive, insofar as practicable, the same protection during the first twenty-four hours as is given to the construction they represent.

8.57.2 At all times cylinders shall be handled in a manner that will provide adequate protection against damage to ensure that test results will provide a sound basis for evaluation of concrete quality.

8.57.3 One set of three test cylinders shall be taken for each l50 lineal metres (500 feet) of curb and gutter or sidewalk, with a minimum of one set per day. One cylinder shall be tested at 7 days and two at 28 days. Test cylinder shall be taken and secured in accordance with C.S.A. Specification A23.2-3c and tested in accordance with C.S.A. Spec. A23.2-9c.A copy of the test results shall be submitted to the Engineer. Additional cylinders may be cast as directed by the Engineer.

8.57.4 For every test made or as often as required by the Engineer, a slump test shall be made in accordance with C.S.A. Specification A23.2-5c and an air test in accordance with C.S.A. Specifications A23.2-4c, 7c.

8.57.5 The cost of testing an inspections of the work shall be borne by the Developer with a report on the concrete tests to be forwarded to the Engineer.

8.58 TESTING - SUBGRADE, SUBBASE AND BASE COURSE

Testing for curb, sidewalk and walkway subgrade, subbase and base course shall be carried out as specified in Section 7B.10 Streets - Construction.

8.59 PROOF ROLLING

Proof rolling for curbs and sidewalks shall be carried out as specified in Section 7B.11 Streets - Construction.