

**CONSTRUCTION SPECIFICATION FOR  
CONCRETE CURB AND CONCRETE CURB AND GUTTER**

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## TS 3.50.01 SCOPE

This Specification covers the requirements for the construction of plain or reinforced cast-in-place Portland cement concrete curb, concrete curb and gutter, mountable curb and gutter and dropped curb and gutter for entrances and disability access.

## TS 3.50.02 REFERENCES

This Specification refers to the following specifications and publications:

### Ontario Provincial Standard Specifications, Construction

OPSS 180 - Management and Disposal of Excess Material	(Jan. 1994)
OPSS 919 - Formwork and Falsework	(Jan. 1995)

### City of Toronto Specifications

TS 4.50 - Construction Specification for Utility Adjustments	(June 2001)
TS 13.00 - Specification for Non-Structural Concrete	(June 2001)
TS 1010 - Amendments to OPSS 1010 – Material Specification for Aggregates Granular A, B, M, and Select Subgrade Material	(June 2001)

### City of Toronto Drawings

T-310.010-3 - Concrete Sidewalk with Retaining Curb	(June 2001)
T-216.02-5 - Utility Isolation in Composite Pavement	(June 2001)

### Canadian Standards Association (CSA)

CAN/CSA-A23.1 - Concrete Materials and Methods of Concrete Construction	(Current Edition)
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## TS 3.50.03 DEFINITIONS

For the purposes of this specification the following definitions apply:

**Base Course:** means a layer of specified or selected materials of planned thickness constructed on the subgrade for drainage and to distribute pavement loads.

**Contraction Joint:** means a cut or formed joint to regulate the location and degree of cracking in the plane of the curb or curb and gutter.

**Expansion Joint:** means a physical separation between the concrete and appurtenances, or between parts of the curb or curb and gutter, which allows both horizontal and vertical movement.

**Geotextile:** means a permeable geosynthetic comprised solely of textiles.

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**Slipform:** means the placing, consolidating and extruding of plastic concrete in a machine without the use of fixed side forms.

**Subgrade:** means the soil prepared and compacted to support a structure or pavement.

**TS 3.50.04 SUBMISSION AND DESIGN REQUIREMENTS**

**TS 3.50.04.01 General**

Any required submissions shall be in writing. All submissions shall be submitted to the Commissioner at least three weeks prior to the beginning of the work.

The requirements for submissions and design requirements are given in TS 13.00.

**TS 3.50.04.02 Materials**

Prior to starting the work, the Contractor shall supply the Commissioner with material safety data sheets (MSDS) for all the materials to be incorporated in the work.

The Contractor shall be responsible for selecting the concrete materials and for the mix design for the concrete. The concrete mix proportions shall meet the requirements of Section 14 of CAN/CSA-A23.1 and this Specification.

The concrete mix details and the certificate of ready mix facilities and/or the certificate of mobile mix concrete production facilities shall be submitted as required by TS 13.00.

Details of the method of curing and curing materials (including manufacturers' literature, where applicable) shall be submitted to the Commissioner.

One copy of the concrete delivery ticket shall be submitted to the Commissioner for each load of concrete delivered.

**TS 3.50.05 MATERIALS**

**TS 3.50.05.01 Supply of Materials**

Unless otherwise specified in the Contract, the Contractor shall supply all materials necessary for the execution and completion of the work.

**TS 3.50.05.02 Concrete**

**TS 3.50.05.02.01 General**

The materials for and the production of concrete curb and concrete curb and gutter shall meet the requirements of TS 13.00 and the following:

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(i)	Cement type	Type 10 Normal Portland
(ii)	Minimum 28 day cylinder compressive strength	32 MPa
(iii)	Class of exposure	C-2
(iv)	Nominal maximum size of coarse aggregate	19 mm
(v)	Slump at point of discharge (formed concrete)	80±30 mm
(vi)	Total air content	6.5±1.5%
(vii)	Maximum water/cementing materials ratio	0.45
(viii)	Minimum cementing materials content	335 kg/m <sup>3</sup>

### **TS 3.50.05.03            Reinforcement**

Reinforcement shall meet the requirements of TS 13.00.

Unless otherwise specified, all reinforcement detailed on the plans or ordered by the Commissioner for incorporation in the curb and concrete curb and gutter, shall be 15M bars.

### **TS 3.50.05.04            Granular Base and Curb Backfill**

Granular base and curb backfill, if required, shall be 19 mm crusher run limestone and shall meet the requirements of TS 1010.

### **TS 3.50.05.05            Expansion Joint Material**

Expansion joint material shall be bituminous fibreboard having a minimum thickness of 12 mm and shall meet the requirements of TS 13.00.

## **TS 3.50.06                EQUIPMENT**

### **TS 3.50.06.01            Forms**

Forms shall be steel, wood or metal plate forms and shall meet the requirements of OPSS 919. They shall be of sufficient cross section and strength, and so secured as to resist the pressure of the concrete when placed, and the impact and vibration of any construction equipment they support, without springing or settlement.

Forms shall be pinned or staked in place with not less than 3 pins for each 3 m length, and with a pin at each side of each form butt joint. The top surface of the formwork shall comply with the specified tolerances. The inside face of the form shall be vertical. The form shall deviate from grade by no more than 3 mm in 3 m, and in alignment by no more than 6 mm in 3 m.

Forms shall be cleaned and coated with form oil before each use.

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### **TS 3.50.06.02          Slipform Equipment**

Guidelines shall be provided at a constant height above, and at a constant horizontal distance from the edge of the proposed curb and concrete curb and gutter. The guidelines may be either wire or heavy-duty string.

The paver shall have automatic horizontal and vertical controls to be used in conjunction with at least one guideline. The equipment shall be equipped with internal vibrators of sufficient number, size and frequency to provide uniform consolidation to the entire cross section. The vibrators shall not operate while the equipment is stopped.

### **TS 3.50.06.03          Finishing Tools**

An aluminum or magnesium float shall be used to float the concrete curb and concrete curb and gutter and a small radius edger shall be used to tool the edges.

### **TS 3.50.07          CONSTRUCTION**

#### **TS 3.50.07.01          Excavation**

Excavation shall be to the lines and grades shown on the contract drawing or as specified by the Commissioner. Care shall be taken to prevent damage to appurtenances and utilities which may be in or under the proposed curb and concrete curb and gutter.

At the direction of the Commissioner, the Contractor shall make good all damage caused during the course of the work, and return the work to its initial condition.

Excavated material shall be removed from the site in accordance with OPSS 180.

#### **TS 3.50.07.02          Subgrade Preparation**

The subgrade shall be compacted to a minimum of 95 percent of the maximum dry density as determined by TS 501.

#### **TS 3.50.07.03          Granular Base Placement**

Granular base shall be placed to the required lines and depth as shown on the contract drawings or as specified by the Commissioner. The moisture content and compaction of the granular base shall be uniform and shall meet the requirements of TS 1010.

The granular base shall be moistened prior to the placement of concrete, but without any standing water. At the time of placing concrete, the base shall not be wet, soft or frozen.

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#### **TS 3.50.07.04      Utility Adjustment**

All utility adjustments shall meet the requirements of TS 4.50 and OPSS 408.

#### **TS 3.50.07.05      Utility Isolation**

Utility isolations shall be constructed in the concrete curb and concrete curb and gutter by sawcutting the curb or curb and gutter, to depth of 50 mm, at a distance of 300 mm to 400 mm from the outside edge of the frame.

#### **TS 3.50.07.06      Reinforcement**

The required reinforcement shall be placed and adequately supported at the locations shown on the drawings.

Unless otherwise indicated, two - 15M longitudinal reinforcing bars, 2 m long shall be placed at each catch basin, one bar 100 mm below the top and one bar 100 mm above the bottom of the curb, centred on the catch basin.

Unless otherwise indicated, two - 15M reinforcing bars shall be placed at the mid-slab depth in the gutter longitudinally across the full width of industrial and commercial driveways. Short bars shall be overlapped by a minimum of 300 mm.

#### **TS 3.50.07.07      Placing Concrete**

Concrete shall be placed and consolidated to meet the requirements of Section 19 of CAN/CSA A23.1 and the requirements of this Specification. The concrete delivering and spreading operations shall be coordinated to provide a uniform rate of progress of the placing operation.

The concrete shall be placed to the specified thickness, line and grade. The concrete shall be consolidated by 50 mm vibrators and other suitable tools to eliminate voids, honeycombing and entrapped air, especially against the formwork. For concrete placed using slipform equipment, the internal vibrators shall provide the necessary consolidation and no additional vibration will be required.

#### **TS 3.50.07.08      Finishing Concrete**

The concrete surface shall be finished while it is still sufficiently plastic to achieve the desired grades, elevation and texture. The surface of the concrete shall not be finished when standing water is present on the surface. The surface shall be uniform, dense and free from undulations and projections.

The top surface shall be screeded to true grade and cross section and finished with a magnesium or aluminum float.

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The surface of the curb and concrete curb and gutter shall have no irregularities exceeding 6 mm in 3 m when tested with a straightedge in any direction. The edge of the curb and concrete curb and gutter shall be edged with a small radius edger.

The final finish for curb and concrete curb and gutter shall have a light brush texture.

### **TS 3.50.07.09            Joints**

Contraction, expansion and construction joints shall be formed or sawcut in the curb and concrete curb and gutter as required. The joints shall coincide with joints in the concrete road base and sidewalks.

#### **TS 3.50.07.09.01        Contraction Joints**

Contraction joints shall be constructed by forming or sawcutting to a depth of one quarter of the thickness of the concrete curb and concrete curb and gutter. The maximum distance between contraction joints shall be 6 metres. Joints shall coincide with and be of similar construction to joints in the adjacent sidewalk and road base.

#### **TS 3.50.07.09.02        Expansion Joints**

Expansion joints shall be constructed using 12 mm wide bituminous fibre to the full thickness of the curb and concrete curb and gutter as directed by the Commissioner.

Full depth (isolation) joints shall be formed around appurtenances extending into and through the curb and concrete curb and gutter. The isolation joints shall be placed perpendicular to the curb between 300 mm and 400 mm from the outside edge of the frame.

The top surface of the bituminous fibre shall be flush with the concrete surface. The fibre shall be vertical and straight in alignment.

#### **TS 3.50.07.09.03        Construction Joints**

At the end of each day's work, or in the event of an unavoidable stoppage of concrete placement extending more than 30 minutes, a construction joint shall be formed. Where possible, the construction joint shall coincide with the planned location of a contraction joint.

### **TS 3.50.07.10            Concrete Curing**

Concrete curing shall meet the requirements of TS 13.00.

### **TS 3.50.07.11            Concrete Curb and Curb and Gutter Protection**

Concrete Curb and Concrete Curb and Gutter Protection shall meet the requirements of TS 13.00.



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**TS 3.50.07.12            Backfill**

Granular backfill shall be placed to the required lines and depth as shown on the contract drawings or as specified by the Commissioner. The moisture content and compaction of the granular backfill shall be uniform and shall meet the requirements of TS 1010.

**TS 3.50.08                QUALITY ASSURANCE**

Quality assurance shall meet the requirements of TS 13.00

**TS 3.50.09                MEASUREMENT FOR PAYMENT**

**TS 3.50.09.01            Concrete Curb  
Concrete Curb and Gutter**

Measurement for the above item(s) shall be the length, measured in linear metres along the front face of the curb. No deduction will be made for utility frames and covers.

**TS 3.50.10                BASIS FOR PAYMENT**

**TS 3.50.10.01            Concrete Curb - Item  
Concrete Curb and Gutter - Item**

Payment at the contract price for the above item(s) shall be full compensation for all labour, equipment, materials and incidentals to do the work. Payment shall include, but not be limited to, the supplying, placing and finishing of the concrete, the supplying and placing of steel reinforcement and the supplying, placing and compacting of native backfill material.