



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

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353.01 SCOPE

This specification covers the requirements for the construction of concrete curb and gutter, setbacks, gutter outlets, and bullnoses together with the installation of catch basin frames and grates which lie within the flow lines of the curb and gutter system.

353.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be as specified in the Contract Documents.

353.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

353.02 REFERENCES

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 206	Grading
OPSS 314	Untreated Granular Subbase, Base, Surface Shoulder, and Stockpiling
OPSS 350	Concrete Pavement and Concrete Base
OPSS 407	Construction of Maintenance Hole, Catch Basin, Ditch Inlet, and Valve Chamber Installation
OPSS 501	Compacting
OPSS 904	Concrete Structures
OPSS 905	Steel Reinforcement for Concrete
OPSS 919	Formwork and Falsework

Ontario Provincial Standard Specifications, Material

OPSS 1212	Hot Poured Rubberized Asphalt Joint Sealing Compound
OPSS 1308	Joint Filler in Concrete
OPSS 1315	White Pigmented Curing Compounds for Concrete
OPSS 1350	Concrete - Materials and Production
OPSS 1440	Steel Reinforcement for Concrete
OPSS 1850	Frames, Grates, Covers, and Gratings

353.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Cold Joint means as defined in OPSS 904

Concrete Pavement means concrete pavement or concrete base.

Curb and Gutter means curb, gutter, or combinations of curb and gutter.

Curb and Gutter Systems means curb and gutter, setbacks, gutter outlets, concrete spillways, bullnoses, or any combination of them.

353.05 MATERIALS

353.05.01 Concrete

Concrete shall be according to OPSS 1350. Concrete shall also be according to the following requirements:

a) Minimum specified 28-Day compressive strength: 30 MPa

Concrete shall also be according to the following requirements:

a) Coarse Aggregate: 19.0 mm nominal maximum size

b) When used supplementary cementing material shall be ground granulated blast furnace slag or fly ash or a combination of the two materials and shall be restricted to the following proportions by mass of the total cementing material:

1) Slag up to 25%; or

2) Fly ash up to 10%, or

3) A mixture of slag and fly ash up to 25% except the amount of fly ash shall not exceed 10% by mass of the total cementing materials.

353.05.02 Catch Basin Frames and Grates

Catch basin frames and grates shall be according to OPSS 1850.

353.05.03 Joint Materials

Expansion joint fillers shall be according to OPSS 1308 for types A or B except that granulated cork fillers shall not be accepted.

Hot rubberized asphalt joint sealing compound shall be according to OPSS 1212.

353.05.04 Curing Compound

Curing compound shall be according to OPSS 1315.

353.05.05 Forms

Forms shall be according to OPSS 919.

353.05.06 Steel Reinforcement

Steel reinforcement shall be according to OPSS 1440.

353.07 CONSTRUCTION

353.07.01 General

The Construction section applies equally to concrete curb and gutter, concrete spillways, and concrete gutter outlets.

353.07.02 Foundation and Backfill

Excavation and embankment construction shall be according to OPSS 206.

Granular base and granular backfill construction shall be according to OPSS 314.

353.07.03 Compaction

Compaction shall be according to OPSS 501.

353.07.04 Steel Reinforcement

Placement of steel reinforcement shall be according to OPSS 905.

353.07.05 Formwork

Formwork shall be according to OPSS 919 and shall be set true to the lines and grades specified in the Contract Documents and in direct contact with the subgrade or granular course.

353.07.06 Slipform

Slipform paving equipment is acceptable for use provided the slipform product meets the specified cross-sectional requirements.

353.07.07 Joints

When concrete curb and gutter is constructed adjacent to concrete pavement, the transverse joint spacing of the curb and gutter shall coincide with that of the concrete pavement. When concrete curb and gutter is constructed adjacent to asphalt pavement, transverse joints shall have a uniform spacing not exceeding 5 m. In addition to the foregoing, joints shall be constructed between the curb structure, including catch basin frames, setbacks, and gutter outlets.

Joints, including those between curb and gutter systems and any abutting sidewalk, catch basin frames, setbacks, gutter outlets, or any structure, shall be formed with 12 mm thick panels of joint filler except as follows:

- a) Contraction joints in extruded curb and gutter and in formed curb and gutter shall be saw cut.
- b) Longitudinal joints, as shown in the Contract Documents, shall be sawn between a curb and gutter system and concrete pavement and shall be according to OPSS 350, when the curb and gutter

system is placed adjacent to the concrete pavement. The joint shall be sealed with liquid joint sealer and shall be according to OPSS 350.

Joint filler panels shall be set in a vertical position and, if for transverse joints, shall be set normal to the inside edge of the structure.

Panels shall be precut from a single piece of joint filler to the shape of the curb and gutter cross-section as shown in the Contract Documents, but so as to provide a 6 mm recess on the exposed surfaces. Cutting and tolerances shall be according to OPSS 1308.

Expansion joint material shall be set in place before concrete placement begins and shall be supported by removable forms.

All concrete immediately above the filler material shall be carefully removed to form a 6 mm deep, 12 mm wide recess then finishing both edges of each joint to 5 mm radius with a suitable short edging tool.

Contraction joints shall be formed within a sufficient time of placing of the curb and gutter to prevent uncontrolled cracking. The width of the joint shall be 3 to 5 mm and a minimum depth of 65 mm.

353.07.08 Concrete

353.07.08.01 Placement of Concrete

Concrete shall not be placed until the base course, on which the concrete is to be placed, and the forms or stringline have been inspected by the Contract Administrator.

Before placing concrete, the subgrade immediately ahead of the concrete placing shall be wetted by means of a uniform spray of water sufficient to wet the subgrade thoroughly without leaving standing water.

The concrete shall be placed and consolidated such that segregation of the aggregate does not occur.

Concrete shall be placed continuously. If placement of concrete is interrupted, recommencement of the placement operation shall be against a vertical formed joint. A 5mm bituminous fibre joint filler shall be placed at the point of interruption before recommencing placement of concrete. Cold joints shall not be permitted.

The concrete shall be thoroughly consolidated against all formwork and all entrapped air shall be eliminated.

353.07.08.02 Concrete Finishing

The concrete on the upper surfaces shall be floated to a smooth uniform finish of the required cross-section, free of open texturing, plucked aggregate, and local projections. Only hardwood or magnesium trowels shall be used for hand finishing.

Care shall be taken to avoid over finishing or working more mortar to the surface than is actually required. Back edges shall be rounded by use of a 5 mm radius edging tool. Neat cement shall not be used as a drier to facilitate finishing.

Any honeycombed areas occurring along the formed surfaces shall be filled with mortar composed of one part Portland cement and two parts sand with 12% of entrained air.

353.07.08.03 Concrete Curing

Formed and slipformed concrete shall be cured with one or more of the following methods:

- a) Burlap and water.
- b) Moisture vapour barrier.
- c) White pigmented curing compound.

For curing with burlap and water, the burlap shall be presoaked by immersing it in water for a period of 24 hours immediately prior to placing it. Two layers of burlap shall be applied to the surface of the concrete. Strips of burlap shall overlap 150 mm and shall be held down without marring the surface of the concrete. The burlap shall be applied immediately after finishing of the concrete surface, from 2 to 4 m from the finishing operation. The burlap shall be maintained continuously in a wet condition throughout the 96-hour curing period. The burlap shall be covered with a layer of moisture vapour barrier in a manner which shall prevent deformation of the surface of the concrete. Air flow in the space between the moisture vapour barrier and the burlap shall be prevented in conformance with the requirements of curing with moisture vapour barrier. The moisture vapour barrier shall be placed within 12 hours following placement of the concrete.

For curing with only a moisture vapour barrier, the moisture vapour barrier shall be placed immediately after finishing of the concrete surface, from 2 to 4 m from the finishing operation. Strips of moisture vapour barrier shall overlap a minimum of 150 mm. Air flow in the space between the moisture vapour barrier and the concrete surface shall be prevented. To achieve this, the moisture vapour barrier shall be held down at the edges and at all laps to prevent displacement. The material shall be kept in place for a minimum curing period of 96 hours.

Curing with curing compound shall not be used on any construction joint or when cold weather concreting is in effect.

The curing compound shall be agitated by mechanical means to provide a homogeneous mixture immediately prior to application. It shall be applied immediately after finishing of the concrete surface, from 2 to 4 m from the finishing operation, completely covering the surface of the concrete. A second application of curing compound shall be applied within 30 to 60 minutes after the first application. Each application shall be such that the membrane formed is uniform in thickness and colour and free of breaks and pinholes. The surface shall be maintained in this condition for a minimum period of 7 Days. The rate of each application shall not be less than the rate specified by the manufacturer of the compound.

353.07.08.04 Concrete Tolerances

The exposed surfaces of the finished concrete shall be such that, when tested with a 3 m long straight edge placed anywhere along the surface parallel to the edge of curb face, there shall be no deviation greater than 3 mm between the bottom of the straight edge and the surface of the concrete nor shall there be any deviation from alignment in excess of 3 mm.

353.07.09 Cold Weather Concreting

Protection of concrete shall be according to OPSS 904. The components of the curb and gutter system shall be considered as slabs on the ground.

353.07.10 Catch Basin and Maintenance Hole Frames and Grates

Catch basin and maintenance hole frames and grates which lie within the flow lines of the curb and gutter system shall be installed as part of the construction of the various components making up the curb and gutter system. Frames shall be set to their final elevation according to OPSS 407. The exposed surfaces of the mortar bed shall be left in a smooth condition, free of depressions, and projections. All remaining formwork shall be removed.

353.07.11 Identification Stamp

At the request of the Contract Administrator, each end of the work and every 20 m shall be legibly marked with an approved stamp. The mark shall be located in the centre of an exposed face of the curb and gutter systems. The mark shall bear the Contractor's name and the year of construction.

353.07.12 Field Sampling and Testing of Concrete

Field sampling and testing of concrete shall be according to OPSS 1350.

Field sampling and testing of concrete shall be according to OPSS 1350.PROV.

353.07.13 Management of Excess Material

Management of excess material shall be as specified in the Contract Documents.

353.09 MEASUREMENT FOR PAYMENT

353.09.01 Actual Measurement

353.09.01.01 Concrete Curb and Gutter

Measurement of concrete curb and gutter shall be by length in metres along the flow line of the gutter whether straight or curved, without separation into types. Such measurements shall include the space occupied by setbacks, gutter outlets, and frames with grates.

353.09.01.02 Concrete Spillways

Measurement of concrete spillways shall be by length in metres along the flow line from the end of the gutter outlet to the spillway termination.

353.09.01.03 Concrete Gutter Outlets

For measurement purposes, a count shall be made of the number of setbacks and gutter outlets installed without separation into types.

353.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clause under Actual Measurement.

353.10 BASIS OF PAYMENT

**353.10.01 Concrete Curb and Gutter - Item
Concrete Spillways - Item
Concrete Gutter Outlets - Item**

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

When roadbed granular material is measured in square metres, the Contract price for the above item shall be full compensation for all labour, Equipment, and Material for the material directly below or behind the concrete curb and gutter system.

There shall be no separate payment of concrete used for fillets in bullnoses.

353.10.02 Hot Mix Asphalt

Hot mix asphalt designated for constructing bullnose fillets shall be paid for at the Contract price for the appropriate Hot Mix Asphalt tender item.

353.10.03 Granular

Granular materials required for the work shall be paid for at the Contract price for the appropriate granular tender item.

353.10.04 Excavation

Excavation required to set the various components to the required line and grade shall be considered as part of the work of installing the curb and gutter system. When such excavation overlaps excavation required for any other work under the Contract, then payment shall be made in accordance with the specification for such other work as though no excavation were required for curb and gutter construction.

353.10.05 Steel Reinforcement

Costs for supplying and placing steel reinforcement are deemed to be included in the items for concrete curb and gutter systems.

**Appendix 353-A, Commentary for OPSS.MUNI 353, November 2016
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS**

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should specify the following in the Contract Documents:

- Line and grade for curb and gutter systems. (353.07.05)
- Testing frequency. (353.07.12)

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

OPSD 600.010	Concrete Barrier Curb with Wide Gutter
OPSD 600.020	Concrete Semi-Mountable Curb with Wide Gutter
OPSD 600.030	Concrete Mountable Curb with Wide Gutter
OPSD 600.040	Concrete Barrier Curb with Standard Gutter
OPSD 600.060	Concrete Semi-Mountable Curb with Standard Gutter
OPSD 600.070	Concrete Barrier Curb with Standard Gutter, Two-Stage Construction
OPSD 600.080	Concrete Barrier Curb with Narrow Gutter
OPSD 600.090	Concrete Semi-Mountable Curb with Narrow Gutter
OPSD 600.100	Concrete Mountable Curb with Narrow Gutter
OPSD 600.110	Concrete Barrier Curb
OPSD 604.010	90° Concrete Outlet for Concrete Curb with Gutter
OPSD 605.010	45° Concrete Outlet for Concrete Curb with Gutter
OPSD 605.030	45° Concrete Outlet for Concrete Curb with Gutter at End of Run
OPSD 606.010	600 mm Radius Barrier Bullnose
OPSD 606.020	600 mm Radius Mountable Bullnose
OPSD 606.030	800 mm Radius Mountable Bullnose, Curb with Gutter Twin Inlet
OPSD 607.010	Over 600 mm Radius Mountable Bullnose
OPSD 607.020	Over 600 mm Radius Barrier Bullnose
OPSD 608.010	Method of Termination for Concrete Curb with Gutter

