B353 - CONCRETE CURB AND GUTTER SYSTEMS - OPSS 353

353.1 GENERAL

The primary function of curb and gutter and concrete gutter outlets in the design of paved roads, is to facilitate the channelling of surface runoff from the roadway, to control erosion of shoulders and slopes.

353.2 REFERENCES

MTO Highway Drainage Design Standards
Roadside Safety Manual (RSM)
Geometric Design Standards for Ontario Highways (GDSOH)

353.3 TENDER ITEMS

Concrete Curb and Gutter (variation)
Concrete Gutter Outlets (variation)

353.4 SPECIFICATIONS

The requirements for concrete curb and gutter are contained in OPSS 353.

353.5 SPECIAL PROVISIONS

Refer to Chapter 'E' of this manual to review the applicable standard special provisions.

353.6 STANDARD DRAWINGS

Applicable standard drawings are contained in the 600 series of Ontario Provincial Standard Drawings (OPSDs) and the 600 series of Ministry of Transportation of Ontario Drawings (MTODs).

353.7 DESIGN

353.7.1 Concrete Curb and Gutter

353.7.1.1 General

Roadside ditches are generally the most cost effective solution for channelling surface runoff from roadways. The designer should consider curb and gutter only when a ditch is infeasible due to property constraints, topography, etc. In addition, curb and gutter is used to provide traffic guidance and control.

The designer should refer to Sections C.4.2.2 and D.8.1 of the GDSOH, Section 2.7.3 of the RSM and Standard SD-2 of the MTO's Highway Drainage Design Standard for guidance on curb and gutter type. Where guiderail is required adjacent to curb and gutter, the appropriate MTOD shall be used.

When curb and gutter is selected, drainage by gutter outlets and spillways is preferred over catch basins and sewers as this is more cost effective.

Excavations required for construction of curb and gutter are considered part of the work and are not documented separately.

Granular quantities required for curb and gutter construction are included with the appropriate granular item and are not documented separately.

353.7.1.2 Erosion Protection on Gradients

The designer should follow Section D.5.2.2 of the GDSOH for shoulder erosion protection on gradients.

The designer should consider shoulder paving to mitigate shoulder and slope erosion on gradients whenever possible.

353.7.1.3 Intersections at Grade

The designer should follow section E.4.4.2 of the GDSOH when determining whether curb and gutter is required at intersections to mitigate gravel tracking. Shoulder treatment options are shown in OPSD 304.010.

353.7.1.4 Interchange Ramps

The designer should consider open ditch drainage for interchange ramps whenever possible. Curb and gutter may be considered where property or other constraints make such construction more cost effective than drainage by open ditch.

353.7.1.5 Structure Approaches

Roadside erosion protection is required at structure approaches. The designer should consider paved shoulders as the primary method of erosion control wherever practical.

Where curb and gutter is necessary to provide adequate erosion protection, the minimum length should be 20 m beyond the structure where the curb and gutter is not present on the roadway.

353.7.1.6 Bullnoses and Raised Medians

Bullnose areas should consist of pavement markings only, unless substantial grade differentials, subsequent drainage needs and/or traffic guidance require the use of curb and gutter.

The designer should follow Section F.5.3.5 of the GDSOH when placing curb and gutter at bullnose areas.

All raised medians and permanent channelization islands are to be bounded by curb and gutter.

353.7.1.7 Transitions

In order to achieve a smooth transition of varying types of curb and/or curb and gutter, a transition section is employed. The transition length is included on the curb and gutter standard drawings.

Where a concrete curb and gutter changes from one type to another, the designer should indicate the midpoint of the transition on the plan drawings. A transition detail drawing is not required.

353.7.2 Concrete Gutter Outlets

Gutter outlets discharge surface runoff from concrete curb and gutter.

The type and spacing of gutter outlets shall be according to Standard SD-8 in the MTO Drainage Design Standards.

353.8 COMPUTATION

These are Plan Quantity Payment items.

353.8.1 Source of Information

The main sources of information for the computation of these tender items are the Field Note Books, B-Plans, ETR Books, Design Cross-Sections, the MTO Drainage Design Standards and Ontario Provincial Standard Drawings Manual.

353.8.2 Method of Calculation

The unit of measurement for Concrete Curb and Gutter is the metre. The length is measured along the flow line of the gutter, with no deductions made for the length of gutter outlets or catchbasins. The types and lengths of curb and gutter to be placed will include bullnose and transition sections, and straight and circular curb and gutter. The various lengths are scaled from the plan.

Curb termination lengths are included with the length of straight and circular sections, where applicable.

The unit of measurement for Concrete Gutter Outlets is each. The location of gutter outlets is determined from the profiles.

353.9 DOCUMENTATION

353.9.1 Straight and Circular Construction

Curb and/or curb and gutter to be installed on tangent and curves with radii of 15.0 m and greater are documented as straight. Curves with radii of less than 15.0 m are documented as circular.

353.9.2 Drawings

Curb and gutter is shown on the plans by the appropriate symbol and the appropriate OPSD or MTOD number e.g. (OPSD 600.010). Where the curb and gutter changes from one type to another the transition midpoint station is identified.

Termination sections are specified on the drawings by the appropriate OPSD number.

Concrete gutter outlets are indicated on the construction plans of the contract drawings. The appropriate OPSD number and type is identified.

353.9.3 Quantity Sheet

Concrete Curb and Gutter is a variation item. There are two variations, the OPSD or MTOD # that applies, and the type of construction, straight or circular. Each variation requires a separate column on the Quantities – Miscellaneous sheet. Locations are documented by station to station limits and location right or left of the roadway centreline. Transition and termination sections are included with the measured curb quantity and are not documented separately. The quantities in each column are sub-totalled. These sub-totals are combined into one total which is the tender total. The tender total is transferred to the tender documentation.

Concrete Gutter Outlets is a variation item. There is one variation, the OPSD # that applies. Each variation requires a separate column on the Quantities – Miscellaneous sheet. Locations are documented by station and location right or left of the roadway centreline. The quantities in each column are sub-totalled. These sub-totals are combined into one total which is the tender total. The tender total is transferred to the tender documentation.

353.9.1 Documentation Accuracy

Stations are recorded to the nearest whole number metre. Quantity entries for Concrete Curb and Gutter are recorded to the nearest whole number metres of linear measurement. Quantity entries for Concrete Gutter Outlets are recorded in whole numbers.