CONSTRUCTION SPECIFICATION FOR STEEL BEAM TERMINAL SYSTEM

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733.01 SCOPE

This specification covers the requirements for the installation of steel beam terminal (SBT) systems.

733.01.01 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 according to the Contract Documents.

733.01.02 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.

733.02 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 Ministry of Transportation Publications

Ontario Traffic Manual (OTM):
Book 6 - Warning Signs

ASTM International

A 123/A 123M-15	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A 780/A 780M-09 (2015)	Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

733.04 DESIGN AND SUBMISSION REQUIREMENTS

733.04.01 Submission Requirements

Installation of the SBT system shall not commence until the Contract Administrator has received one copy of the manufacturer's installation instructions.

733.05 MATERIALS

733.05.01 General

All supplied system components shall be according to the manufacturer's specifications.

733.05.02 U Channel Posts

Posts shall be 2.44 m long perforated steel U channel with 11 mm diameter holes spaced on 50 mm centres, minimum weight of 4.46 kg/m, and hot dip galvanized according to ASTM A 123.

733.07 CONSTRUCTION

733.07.01 General

SBT systems shall be installed according to the manufacturer's instructions at locations specified in the Contract Documents using only the components supplied for a particular steel beam terminal system.

The MASH Slotted Rail Terminal (MSRT) M10 Guardrail End Treatment system shall be used for all SBT installations.

A minimum 2 m wide area behind the posts, measured from the back of the posts, shall be clear of all obstacles for the entire length of the SBT.

733.07.02 Posts and Steel Foundation Tubes

All posts and steel foundation tubes shall be set to the depth and alignment at locations specified in the Contract Documents, regardless of the material encountered.

The lower anchor cable release steel post shall be installed so that no more than 100 mm is exposed above finished grade.

733.07.03 Steel Beam Guide Rails

SBT systems shall be connected to new or existing steel beam guide rail as specified in the Contract Documents.

SBT system mounting heights shall be measured vertically from the top of the steel beam guide rail to the ground. SBT system mounting heights shall be within the ranges in Table 1.

733.07.04 Damage to Galvanizing

Precautions shall be taken to protect galvanizing against damage. Minor abrasions shall be repaired according to ASTM A 780. Components with major abrasions shall be replaced.

The method of repair for any damage shall be approved by the Contract Administrator prior to the commencement of such work.

733.07.05 Object Markers and Oversize Plow Markers

A Wa-33 object marker according to OTM Book 6, a Wz-2 oversize snow plow marker, and galvanized mounting hardware shall be installed at each SBT.

When installed on a granular surface, the Wa-33 object marker and Wz-2 oversize snow plow marker shall be securely fastened to a U channel post and the post shall be direct buried to a minimum embedment depth of 900 mm.

Posts shall be installed at locations as specified in the Contract Documents.

733.07.06 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

733.09 MEASUREMENT FOR PAYMENT

733.09.01 Actual Measurement

733.09.01.01 Steel Beam Terminal System

For measurement purposes, a count shall be made of each complete steel beam terminal system installed, regardless of the type of steel beam end terminal system placed.

733.09.02 Plan Quantity Measurement

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

733.10 BASIS OF PAYMENT

733.10.01 Steel Beam Terminal System - Item

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

Costs associated with any required removals and replacement or repairs of defective work and materials shall be the Contractor's responsibility at no additional cost to the Owner.

TABLE 1
Steel Beam Terminal System Mounting Heights

System	Height During Construction and Seasonal Shutdown mm	Height for Completion of the Work mm
MASH Slotted Rail Terminal (MSRT) M10	760 to 810	760 to 810

Appendix 733-A, November 2017
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:

- Steel beam terminal system locations. (733.07.01)

Steel beam terminal (SBT) systems are only installed on horizontal curves with a centreline radius less than 190 m. On curves with a radius greater or equal to 190 m, a steel beam energy attenuating terminal (SBEAT) shall be used.

SBT systems are nominally 14.3 m long, same as SBEAT systems, and contribute nominally 10.0 m tangent to the length of need for steel beam guide rail (SBGR) installations.

SBT's are flared away from the shoulder over the length of installation with the face of post 1 offset 1.2 m from edge of shoulder.

The granular base and earth or rock slopes for the roadway shall be widened to accommodate the terminal in accordance with the appropriate 200 series OPSD.

Where the roadway is being widened for installation of an SBT, ensure that drainage requirements are properly addressed.

Where widening is required and soft ground or muskeg is known or suspected to be present, investigation for widening and subexcavation details will typically be required.

Designers have the flexibility to extend the length of SBGR installations to a location where desirable grading requirements can be accommodated for the SBT.

The area immediately downstream of the approach end of the SBT behind the system should be traversable and clear for a minimum distance of 22 m long by 6 m wide in accordance with appropriate 200 series OPSD.

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 202.037	Roadway Widening For Steel Beam Terminal On Inside of Curve
OPSD 202.038	Roadway Widening For Steel Beam Terminal On Outside of Curve
OPSD 922.150	Energy Attenuator, End Terminal, Steel Beam Terminal, MASH Slotted Rail Terminal System, Installation