



**CONSTRUCTION SPECIFICATION FOR  
GUIDE RAIL END TREATMENT - STEEL BEAM  
ENERGY ATTENUATING TERMINAL SYSTEMS**

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<b>732.01</b>	<b>SCOPE</b>
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This specification covers the requirements for the installation of steel beam energy attenuating terminal (SBEAT) systems.

**732.01.01 Specification Significance and Use**

This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

## **732.01.02 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.

## **732.02 REFERENCES**

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

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

### **Ontario Provincial Standard Specifications, Material**

OPSS 1601 Wood, Preservative Treatment, and Shop Fabrication

### **Ontario Ministry of Transportation Publications**

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

### **ASTM International**

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

## **732.04 DESIGN AND SUBMISSION REQUIREMENTS**

### **732.04.01 Submission Requirements**

One copy of the manufacturer's installation instructions and Working Drawings for each type of SBEAT system to be installed shall be submitted to the Contract Administrator.

Installation of the SBEAT system shall not commence until the Contract Administrator has received the copy of the installation instructions and Working Drawings.

**732.05 MATERIALS**

**732.05.01 General**

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

**732.05.02 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/A 123M.

**732.07 CONSTRUCTION**

**732.07.01 General**

SBEAT systems shall be installed according to manufacturer's instructions at the locations specified in the Contract Documents.

When an SBEAT system is specified in the Contract Documents, the Contractor has the option of using one of the following systems:

- a) Extruder Terminal system
- b) Sequential Kinking Terminal system
- c) X-Lite Tangent Terminal system
- d) SoftStop Terminal system

When an SBEAT Type M system is specified in the Contract Documents, the Contractor has the option of using one of the following systems:

- a) MGS – ET-Plus 31 Terminal System
- b) MGS – SoftStop Terminal System
- c) MGS – Sequential Kinking Terminal System
- d) MGS – X-Lite Terminal System

SBEAT systems with steel posts shall be installed to steel beam guide rail systems with steel posts.

SBEAT systems with wooden posts shall be installed to steel beam guide rail systems with wooden or steel posts.

SBEAT systems shall be installed according to the manufacturer's instructions at locations as specified in the Contract Documents using only the components supplied for a particular SBEAT system unit.

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 SBEAT system.

**732.07.02 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.

Wooden post tops shall be cut to the height and to the chamfer as specified in the Contract Documents.

All holes shall be drilled in the wooden posts prior to installation and in the steel posts prior to galvanizing.

The predrilled holes and the cut tops of the wooden posts shall be treated with two coats of an approved wood preservative according to OPSS 1601.

All lower hinge break away posts, steel foundation tubes, and soil plates shall be installed so that no more than 100 mm is exposed above finished grade.

### **732.07.03 Steel Beam Guide Rails**

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

SBEAT system and SBEAT Type M System mounting heights shall be measured vertically from the top of the steel beam guide rail to the ground or gutter line. SBEAT system mounting heights shall be within the ranges in Table 1. SBEAT Type M system mounting heights shall be within the ranges in Table 2.

Where curb with gutter is required, steel beam guide rail mounting height shall be measured:

- a) Vertically at face of steel beam guide rail, when face of steel beam guide rail is more than 300 mm beyond gutter line.
- b) Vertically at gutter line, when face of steel beam guide rail is 300 mm or less beyond the gutter line.

Channel shall not be used within the SBEAT system.

### **732.07.04 Damage to Galvanizing**

Precautions shall be taken to protect galvanizing against damage. Minor abrasions shall be repaired according to ASTM A 780/A 780M. 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.

### **732.07.05 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 energy attenuator.

When installed on a paved surface, the object marker and oversize snow plow marker shall be integrally attached to a surface mounted flexible post. The signs and post shall be supplied by the manufacturer as a complete unit. The post shall have the ability to bend 90 degrees from vertical and self-restore after impacts. The minimum outside diameter of the post shall be 60 mm. The post shall be anchored to the pavement according to the manufacturer's recommendations.

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.

**732.07.06 Management of Excess Material**

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

**732.09 MEASUREMENT FOR PAYMENT**

**732.09.01 Actual Measurement**

**732.09.01.01 Steel Beam Energy Attenuating Terminal System**

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

**732.09.02 Plan Quantity Measurement**

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

**732.10 BASIS OF PAYMENT**

**732.10.01 Steel Beam Energy Attenuating Terminal System - 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.

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

**TABLE 1**  
**SBEAT System Mounting Heights**

<b>System</b>	<b>Height During Construction and Seasonal Shutdown mm</b>	<b>Height for Completion of the Work mm</b>
Extruder Terminal	685 to 760	685 to 735
Sequential Kinking Terminal	685 to 760	685 to 735
X-Lite Tangent Terminal	685 to 760	685 to 735
SoftStop Terminal	760 to 810	760 to 810

**TABLE 2**  
**SBEAT Type M System Mounting Heights**

<b>System</b>	<b>Height During Construction and Seasonal Shutdown mm</b>	<b>Height for Completion of the Work mm</b>
MGS ET-Plus 31 Terminal	760 to 810	760 to 810
MGS SoftStop Terminal	760 to 810	760 to 810
MGS Sequential Kinking Terminal	760 to 810	760 to 810
MGS X-Lite Tangent Terminal	760 to 810	760 to 810

**Appendix 732-A, April 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**

No information provided here.

**Related Ontario Provincial Standard Drawings**

No information provided here.

