

Adjust Steel Beam Guide Rail, Wooden Posts - Item No.  
Adjust Steel Beam Guide Rail, Steel Posts - Item No.  
Adjust Steel Beam Guide Rail, Steel Posts with Steel Offset Blocks - Item No.  
Single Rail Steel Beam Guide Rail, Relocation - Item No.  
Single Rail Steel Beam Guide Rail with Channel - Item No.  
Single Rail Steel Beam Guide Rail, TL-2, Adjacent to Sidewalk - Item No.  
Single Rail Steel Beam Guide Rail, TL-3 - Item No.  
Single Rail Steel Beam Guide Rail, TL-3, Adjacent to 2H:1V Slope - Item No.  
Single Rail Steel Beam Guide Rail, TL-3, Adjacent to Curb and Gutter - Item No.  
Single Rail Steel Beam Guide Rail, TL-3, Base Plated for Shallow Culverts - Item No.  
Single Rail Steel Beam Guide Rail, TL-4 - Item No.  
Single Rail Steel Beam Guide Rail, Double Sided, TL-3 - Item No.  
Single Rail Steel Beam Guide Rail, Double Sided, TL-4, Median - Item No.  
Double Rail Steel Beam Guide Rail, Double Sided, TL-5, Median - Item No.  
Double Rail Steel Beam Guide Rail, Double Sided, TL-5, Roadside - Item No.

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Special Provision No. 721S09

~~April~~ November 2021

### **Amendment to OPSS 721, November 2015**

OPSS 721, November 2015, Construction Specification for Steel Beam Guide Rail and Cable Guide Rail is deleted in its entirety and replaced with the following:

#### **REQUIREMENTS FOR STEEL BEAM GUIDE RAIL SYSTEMS**

##### **721.01 SCOPE**

This specification covers the requirements for the installation of steel beam guide rail (SBGR) systems.

##### **721.02 REFERENCES**

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

#### **Ontario Provincial Standard Specifications, Construction**

OPSS 501      Compacting

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

OPSS 1504      Steel Beam Guide Rail  
OPSS 1505      Channel Components for Steel Beam Guide Rail  
OPSS 1601      Wood, Preservative Treatment, and Shop Fabrication

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

Ontario Traffic Manual (OTM):  
Book 11 - Pavement, Hazard and Delineation Markings

## CSA Standards

G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles

## ASTM International

A36 / A36M - 19 Carbon Structural Steel  
A780 / A780M - 09 Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings  
D4956 - 19 Retroreflective Sheeting for Traffic Control

### 721.03 DEFINITIONS - Not Used

### 721.04 DESIGN AND SUBMISSION REQUIREMENTS

#### 721.04.01 Submission Requirements

The selection of the systems to be installed at each steel beam guide rail location, including the applicable standard drawings for each location, shall be submitted to the Contract Administrator a minimum of seven Days prior to the first placement.

In addition, a copy of the installation instructions and manufacturer's specifications for proprietary systems shall be submitted to the Contract Administrator prior to system installation.

### 721.05 MATERIALS

#### 721.05.01 Non-Proprietary Steel Beam Guide Rail

Single rail guide rail panels shall be according to OPSS 1504.

Channel components shall be according to OPSS 1505.

Wooden posts and blocks shall be according to OPSS 1601.

Plastic blocks shall be as specified in the Contract Documents.

Steel sleeves and spacer tubes used in transition treatments to concrete structures shall be fabricated from Schedule 40 galvanized steel pipe.

Steel posts, sleeves, and spacer tubes shall be hot dip galvanized after fabrication according to CSA G164.

Steel posts shall be according to ASTM A36.

Reflectors shall have a minimum reflective surface of 100 x 100 mm; high intensity retroreflective sheeting according to ASTM D4956, Type VII; colour according to OTM Book 11; and flexibility to bend 90 degrees from vertical and self restore.

Steel base plates for shallow culverts shall be according to ASTM A36.

#### 721.05.02 Proprietary Steel Beam Guide Rail

Single rail guide rail panels shall be according to OPSS 1504.

Thrie beam rail shall be according to the Contract Documents.

All supplied proprietary components on proprietary systems shall be according to the manufacturer's specifications.

The names of proprietary systems and manufacturers acceptable for steel beam guide rail are listed in Table 1.

Retroreflective sheeting for adherence to galvanized steel posts shall be according to the manufacturer's recommendations.

Sheeting colour shall be according to OTM Book 11.

#### **721.05.03                      Fabricated Steel Bases**

Fabricated steel bases shall be according to OPSS 1503.

#### **721.06                              EQUIPMENT - Not Used**

#### **721.07                              CONSTRUCTION**

##### **721.07.01                      General**

Guide rail systems shall be installed plumb and to the alignment and grade as specified in the Contract Documents, regardless of the material encountered.

Tops of wooden posts shall be cut as specified in the Contract Documents and treated with two coats of 2% copper naphthenate wood preservative. Field applied wood preservative that comes in contact with any galvanized components shall be removed immediately.

Acceptable material from posthole excavation shall be used as backfill around posts and compacted according to OPSS 501.

When required, fabricated steel bases shall be installed level and square to the centreline of the roadway.

Cut ends, field drilled holes, and damaged areas of hot dip galvanized coatings on any galvanized component shall be repaired according to ASTM A780.

Flame cutting shall not be permitted.

##### **721.07.02                      Acceptable Systems**

The system names and where applicable, the manufacturer's name, of acceptable systems for steel beam guide rail, roadside and median tender items are specified in Table 1.

The Contract Documents specify the system requirements at each installation location, according to the convention defined in Table 2.

A system listed in Table 1 that meets the specified system requirements shall be selected and installed according to the Contract Documents and the Contractor's submission.

## **721.07.03 Steel Beam Guide Rail**

### **721.07.03.01 Installation**

Steel beam guide rail shall be installed as specified in the Contract Documents.

In general, SBGR systems are modular. Typically, the system length will be a multiple of the rail panel length. Typical nominal rail panel lengths for the Guardian 5 TL-5 system are 4572 mm (three beam and W beam panels within the TL-5 system length), but shorter and special shape panels are used at system ends, as detailed in the applicable standard drawings. Typical nominal rail panel length for all other systems is 3810 mm, but shorter panels are used for the Type M leaving end treatment, for transitions between different systems, and special panels for structure connection, as detailed in the applicable standard drawings.

Steel posts used on steel beam guide rail installations shall use either plastic blocks or routed wooden blocks. Where wooden breakaway posts are required, they shall be installed with wooden blocks.

Different types of plastic and wooden blocks shall not be permitted together within a steel beam guide rail installation.

When a transition to a rigid obstacle is required, the offset block for the channel may be either wood or a pipe sleeve over the connecting bolt. The pipe sleeve shall be 89 mm outer diameter (OD) galvanized steel pipe cut to the required length.

Backup plates, steel spacer tubes, and pipe sleeves shall be installed as specified in the Contract Documents.

All joints shall be lapped in the direction of traffic.

Bolts shall be tightened to 100 Nm. Bolts for wooden post installations shall be field cut as required to maintain a maximum protrusion of 10 mm beyond the nut. The cut end of the bolt shall be ground smooth with all sharp edges and burrs removed.

In the event of any conflict between the requirements of any proprietary systems and the above requirements, the requirements of the proprietary systems shall govern.

Steel beam guide rail mounting heights shall be measured vertically from the top of the steel beam guide rail.

Steel beam guide rail without channel mounting heights shall be within the following ranges:

- a) 685 to 760 mm during construction and seasonal shutdown.
- b) 685 to 735 mm upon completion of the Work.

Steel beam guide rail with channel mounting heights shall be within the following ranges:

- a) 685 to 785 mm during construction and seasonal shutdown.
- b) 735 to 785 mm upon completion of the Work.

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

- a) Vertically at face of steel beam guide rail, when the face of steel beam guide rail is more than 300 mm beyond the back side of the concrete curb.

- b) Vertically at the edge of pavement, when the face of steel beam guide rail is 300 mm or less from the back side of the concrete curb.

Type M and Ezy Guard 4 single and double-sided steel beam guide rail mounting heights shall be within the following ranges:

- a) 710 to 810 mm during construction and seasonal shutdown.
- b) 760 to 810 mm upon completion of the Work.

Where curb with gutter is required with Type M steel beam guide rail, mounting heights shall be measured vertically at the inside edge of the concrete gutter.

Where sidewalk is required with Type M steel beam guide rail, mounting heights shall be measured vertically at the face of Type M steel beam guide rail.

Type M20 base plated steel posts shall be field cut and field punched to provide Type M steel beam guide rail mounting heights according to the Contract Documents.

Anchors for the Type M20 base plated ~~steel posts~~system shall be epoxied according to the Contract Documents by an installer certified by the manufacturer's direct representative.

ACP Sentry single and double-sided steel beam guide rail mounting heights shall be within the following ranges:

- a) 725 to 825 mm during construction and seasonal shutdown.
- b) 775 to 825 mm upon completion of the Work.

Ezy Guard High Containment single and double-sided steel beam guide rail mounting heights shall be within the following ranges:

- a) 905 to 1005 mm during construction and seasonal shutdown.
- b) 955 to 1005 mm upon completion of the Work.

ACP TL-4 single sided steel beam guide rail mounting height shall be within the following ranges:

- a) 1000 to 1100 mm during construction and seasonal shutdown.
- b) 1025 to 1075 mm upon completion of the Work.

Height installation tolerances for the Guardian 5 double sided double rail system shall be:

- a)  $\pm 50$  mm during construction and seasonal shutdown.
- b)  $\pm 25$  mm upon completion of the Work.

### **721.07.03.02 Reflectors**

Reflectors shall be placed:

- a) Starting at the fifth post from the approach end of a steel beam guide rail end treatment.
- b) At a maximum interval of every tenth post on tangent.
- c) On curves, as specified in OTM Book 11, Table 4, but not at an interval less than every tenth post.

- d) Ending on the last post of the steel beam guide rail installation.
- e) On the posts at the four adjacent steel beam guide rail splices at the approach and leaving end of structures.

The reflector shall be fastened to the post using adhesives, bolts and nuts, or screws with reflective surfaces clear above the top of the posts. One-sided reflectors shall be installed on divided highways and two-sided reflectors shall be installed on undivided highways.

#### **721.07.03.03 Steel Beam Structure Connections**

Steel beam guide rail shall be connected to new or existing structure walls as specified in the Contract Documents.

#### **721.07.03.04 Adjust Steel Beam Guide Rail**

Steel beam guide rail shall be adjusted at locations as specified in the Contract Documents.

Steel beam rail elements, channel elements, and offset blocks shall be disassembled from the posts. Post bolts, washers, nuts and existing steel offset blocks shall be removed and disposed of as specified in the Contract Documents.

Steel beam rail elements, channel elements, wooden offset blocks, and plastic offset blocks, shall be salvaged for reinstallation. Washers from the front face of the existing steel beam guide rail shall not be reinstalled.

Salvaged steel beam rail elements, channel elements, and wooden or plastic offset blocks shall be reinstalled within the mounting height ranges as specified in the Installation clause using new post bolts, washers, and nuts.

For steel post adjustment, the post shall be raised a minimum of 50 mm above the specified height and then driven down to the required depth before the salvaged steel beam guide rail components are reinstalled. When existing steel offset blocks have been removed, new wooden or plastic offset blocks shall be installed. A new hole shall be field punched through the existing post as specified in the Contract Documents.

For wooden post adjustment, a new hole shall be field drilled through the existing post as specified in the Contract Documents. The top of the offset block shall not extend beyond the top of the existing post. When channel elements are being reinstalled, an additional hole shall be field drilled through the existing post as specified in the Contract Documents.

New reflectors shall be supplied and installed as specified in the Reflectors clause. When new reflectors are installed on a wooden post system, the reflector shall be installed on the approach transverse face of the wooden offset block with one edge 12 mm from edge of post.

#### **721.07.03.05 Single Rail Steel Beam Guide Rail, Relocation**

Relocation of the single rail steel beam guide rail shall include the dismantling, storage, transportation, and re-installation of steel beam guide rail systems as specified in the Contract Documents.

#### **721.07.04 Management of Excess Material**

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

**721.08 QUALITY ASSURANCE - Not Used**

**721.09 MEASUREMENT FOR PAYMENT**

**721.09.01 Actual Measurement**

**721.09.01.01 Adjust Steel Beam Guide Rail, Wooden Posts  
Adjust Steel Beam Guide Rail, Steel Posts  
Adjust Steel Beam Guide Rail, Steel Posts with Steel Offset Blocks**

Measurement of adjust steel beam guide rail shall be by length in metres along the ~~centreline~~ face of rail of the adjusted system from end to end of each steel beam guide rail installation. The length includes all treatments, transitions, connections, and terminal systems.

**721.09.01.02 Single Rail Steel Beam Guide Rail, Relocation  
Single Rail Steel Beam Guide Rail with Channel  
Single Rail Steel Beam Guide Rail, TL-2, Adjacent to Sidewalk  
Single Rail Steel Beam Guide Rail, TL-3  
Single Rail Steel Beam Guide Rail, TL-3, Adjacent to 2H:1V Slope  
Single Rail Steel Beam Guide Rail, TL-3, Adjacent to Curb and Gutter  
Single Rail Steel Beam Guide Rail, TL-4  
Single Rail Steel Beam Guide Rail, Double Sided, TL-3  
Single Rail Steel Beam Guide Rail, Double Sided, TL-4, Median  
Double Rail Steel Beam Guide Rail, Double Sided, TL-5, Median  
Double Rail Steel Beam Guide Rail, Double Sided, TL-5, Roadside**

Measurement of steel beam guide rail, including relocation, shall be by length in metres along the ~~centreline face of rail of the system~~ from end to end of each steel beam guide rail installation. The length includes all treatments, transitions, and connections, but does not include terminal systems.

Steel beam guide rail systems that are temporarily surplus and are required for future stages shall be paid for as one relocation for the combined moves into and out of storage, including any off-site storage required due to on-site restrictions.

Installed system lengths may exceed those specified in the Contract Documents due to the modular nature of SBGR systems and the use of transition and special panels as detailed in the applicable standard drawings. The contractor shall install a sufficient number of SBGR panels to satisfy the lengths specified in the Contract Documents. Measurement and payment for SBGR systems installed shall be according to the Actual Measurement clause.

**721.09.01.03 Single Rail Steel Beam Guide Rail, TL-3, Base Plated for Shallow Culverts**

Measurement of base plated steel beam guide rail shall be by length in metres along the length of the culvert under the face of guide rail along the roadway.

**721.09.02 Plan Quantity Measurement**

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

721.10

**BASIS OF PAYMENT**

721.10.01

- Adjust Steel Beam Guide Rail, Wooden Posts - Item**
- Adjust Steel Beam Guide Rail, Steel Posts - Item**
- Adjust Steel Beam Guide Rail, Steel Posts with Steel Offset Blocks - Item**
- Single Rail Steel Beam Guide Rail, Relocation - Item**
- Single Rail Steel Beam Guide Rail with Channel - Item**
- Single Rail Steel Beam Guide Rail, TL-2, Adjacent to Sidewalk - Item**
- Single Rail Steel Beam Guide Rail, TL-3 - Item**
- Single Rail Steel Beam Guide Rail, TL-3, Adjacent to 2H:1V Slope - Item**
- Single Rail Steel Beam Guide Rail, TL-3, Adjacent to Curb and Gutter - Item**
- Single Rail Steel Beam Guide Rail, TL-3, Base Plated for Shallow Culverts - Item**
- Single Rail Steel Beam Guide Rail, TL-4 - Item**
- Single Rail Steel Beam Guide Rail, Double Sided, TL-3 - Item**
- Single Rail Steel Beam Guide Rail, Double Sided, TL-4, Median - Item**
- Double Rail Steel Beam Guide Rail, Double Sided, TL-5, Median - Item**
- Double Rail Steel Beam Guide Rail, Double Sided, TL-5, Roadside - 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.



**Table 1**  
**Acceptable Systems for Steel Beam Guide Rail Tender Items**

| Item (Note 1)   | System  | Manufacturer                     |
|---|---|----------------------------------|
| <b>Single Rail Steel Beam Guide Rail</b>                                  |   |                                  |
| TL-2, Adjacent to Sidewalk  | Type M30 SBGR, Adjacent to Sidewalk                             | Non-Proprietary                  |
| TL-3  | Type M20 SBGR   | Non-Proprietary                  |
|   | Type M30 SBGR   | Non-Proprietary                  |
|   | ACP Sentry  | Australian Construction Products |
|   | Ezy Guard 4   | Ingal Civil Products             |
| TL-3, Adjacent to 2H:1V Slope   | Type M20 SBGR Adjacent to 2H:1V Slope, with 2438 mm Long Posts  | Non-Proprietary                  |
|   | ACP Sentry Adjacent to 2H:1V Slope, with 2100 mm Long Posts     | Australian Construction Products |
|   | Ezy Guard 4 Adjacent to 2H:1V Slope                             | Ingal Civil Products             |
| TL-3, Adjacent to Curb and Gutter   | Type M30 SBGR, Adjacent to Concrete Curb                        | Non-Proprietary                  |
| TL-3, Base Plated for Shallow Culverts                                    | Type <del>M30</del> -M20 SBGR, Base plated for Shallow Culverts | Non-Proprietary                  |
| TL-4  | ACP Sentry Thrie Beam   | Australian Construction Products |
|   | Ezy Guard 4 High Containment                                    | Ingal Civil Products             |
| Double Sided, TL-3  | Type M20 or M30 SBGR, Double Sided                              | Non-Proprietary                  |
|   | ACP Sentry, Median  | Australian Construction Products |
|   | Ezy Guard 4, Median   | Ingal Civil Products             |
| Double Sided, TL-4, Median  | Ezy Guard 4 High Containment, Median                            | Ingal Civil Products             |
| <b>Double Rail Steel Beam Guide Rail</b>                                  |   |                                  |
| Double Sided, TL-5, Median  | Guardian 5, Median  | Gregory Industries               |
| Double Sided, TL-5, Roadside  | Guardian 5, Roadside  | Gregory Industries               |
| Notes:  |   |                                  |
| 1. TL-“X” refers to MASH Test Level (i.e., TL-3 means MASH Test Level 3). |   |                                  |

**Table 2  
Contract Drawing Notation**

|   |  |
|---|--|
| <b>A - General Item Identification</b>  | SBGR - Steel Beam Guide Rail   |
| <b>B - Location Attribute</b>   | S3 - 3H:1V Slope or Flatter<br>S2 - 2H:1V Slope or Flatter<br>CG - Adjacent to Concrete Curb and Gutter<br>SW - Adjacent to Sidewalk<br>M - Median |
| <b>C - AASHTO MASH Test Level</b>   | 2 - MASH Test Level 2<br>3 - MASH Test Level 3<br>4 - MASH Test Level 4<br>5 - MASH Test Level 5   |
| Notes:<br>1. Steel Beam Guide Rail is noted on the Contract Drawings by AAAA-BB-C (i.e. SBGR-SW-2). |  |

WARRANT: Always with these tender items.