



CONSTRUCTION SPECIFICATION FOR STEEL BEAM GUIDE RAIL SYSTEMS

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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 1503 Cable Guide Rail
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-20	Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings
D4956-19	Retroreflective Sheeting for Traffic Control

721.04 DESIGN AND SUBMISSION REQUIREMENTS

721.04.01 Submission Requirements

721.04.01.01 Steel Beam Guide Rail System

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 7 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 [the installation of the](#) system ~~installation~~.

721.05 MATERIALS

721.05.01 Fabricated Steel Bases

Fabricated steel bases shall be according to OPSS 1503.

721.05.02 Non-Proprietary Steel Beam Guide Rail

Single rail guide rail panels, [bolts, nuts and washers](#) 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 for non-proprietary guiderail shall have a minimum reflective surface of 100 x 100 mm. Reflectors for proprietary guiderails shall be according to the manufacturer's recommendations with a minimum reflective surface area of 10,000 mm²; high intensity Rretroreflective surfaces shall have high intensity 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.

721.05.03 Proprietary Steel Beam Guide Rail

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

Thrie beam rail shall be ~~according to~~ as specified in 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 shall be as specified~~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.

721.07 CONSTRUCTION

721.07.01 General

Guide rail systems shall be installed plumb and to the alignment and grade 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 system requirements at each installation location shall be as specified in the Contract Documents and the convention defined in Table 2.~~The Contract Documents specify the system requirements at each installation location, according to the convention defined in Table 2.~~

An acceptable system specified in Table 1 and meeting the requirements specified in the Contract Documents and the Submission Requirement subsection shall be selected and installed.~~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.

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 andwith 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 ~~and 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 ~~as specified in according to~~ the Contract Documents.

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

[Australian Construction Products \(ACP\)](#) 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.

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 according to~~ 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 [according to the manufacturer's installation instructions](#) 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 specified in the Contract Documents. Existing steel beam guide rail with rail splices located at every other post shall be adjusted and reinstated according to the requirements for Type M guide rail specified in this specification.

Steel beam rail elements, 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, W~~ 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 for Type M steel beam guide rail using new rail elements, post bolts, washers, and nuts.

For steel post adjustment, the post shall be raised a minimum of 50 mm above the height specified in the Contract Documents~~specified height~~ and then driven down to the required depth before the new and 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.

721.07.03.06 Steel Beam Guide Rail Post Cover

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

When post covers are specified in the Contract Documents, the Gregory Industries Inc. N-Cap Contractor must use the following system: shall be used.

a) Gregory Industries Inc. N-Cap

721.07.04 Management of Excess Material

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

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
	<u>Adjust Steel Beam Guide Rail, Steel Posts with Rail Replacement</u>
	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 of the adjusted system from end to end of each steel beam guide rail installation. The length includes all treatments, transitions ~~and~~, 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 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, and including any off-site storage required due to on-site restrictions.

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.

721.09.01.04 Steel Beam Guide Rail Post Cover

For measurement purposes, a count shall be made of each guide rail post cover installed.

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
	<u>Adjust Steel Beam Guide Rail, Steel Posts with Rail Replacement - Item</u>
	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
	<u>Steel Beam Guide Rail Post Cover - Item</u>
	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
Single Rail Steel Beam Guide Rail		
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 M30 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
Double Rail Steel Beam Guide Rail		
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

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