CONSTRUCTION SPECIFICATION FOR
STEEL BEAM GUIDE RAIL AND CABLE GUIDE RAIL

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552.01 SCOPE

This specification covers the requirements for the installation of steel beam guide rail and cable guide rail systems.

552.01.01 Specification Significance and Use

This specification has been developed for use in provincial- and municipal-oriented Contracts. The administration, testing, and payment policies, procedures, and practices reflected in this specification correspond to those used by many municipalities and the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.
552.01.02 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.

552.02 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.

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 Provincial Standard Specifications, Construction**

OPSS 501 Compacting
OPSS 510 Removal

**Ontario Provincial Standard Specifications, Material**

OPSS 1350 Concrete - Materials and Production
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
Canadian Standards Association (CSA)

G164-M92 (R2003) Hot Dip Galvanizing of Irregularly Shaped Articles

ASTM International

A 36/A 36M-05 Standard Specification for Carbon Structural Steel
D 4956-07 Standard Specification for Retroreflective Sheeting for Traffic Control

552.05 MATERIALS

552.05.01 Cable Guide Rail

Guide rail cable, fittings, cable clamps and nails, and steel sections for anchor blocks shall be according to OPSS 1503.

Guide rail posts shall be according to OPSS 1601.

Precast concrete anchor blocks shall be according to OPSS 1503.

Reflectorized strips on 0.5 mm thick aluminum sheet shall be according to the Contract Documents and OTM Book 11.

552.05.02 Steel Beam Guide Rail

Steel beam guide rail 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 according to 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 CAN/CSA G164.

Steel posts shall be according to ASTM A 36.

Reflectors shall have a minimum reflective surface of 100 x 100 mm; high intensity retroreflective sheeting according to ASTM D 4956, Type VII; colour according to OTM Book 11; and flexibility to bend 90° from vertical and self restore.

552.05.04 Fabricated Steel Bases

Fabricated steel bases shall be according to OPSS 1503.

552.05.05 Concrete

Concrete shall be according to OPSS 1350 with a nominal minimum 28-Day compressive strength of 30 MPa.
552.07 CONSTRUCTION

552.07.01 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 napthenate wood preservative. Field applied wood preservative that comes in contact with any galvanized components shall be removed immediately.

Acceptable material from posthole or anchor block 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 A 780.

Flame cutting shall not be permitted.

552.07.02 Cable Guide Rail

552.07.02.01 Installation

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

Wooden posts shall be installed to the specified depth with the larger end of the post in the ground.

Cable shall be attached to guide rail posts using cable clamps and nail fasteners.

Cable mounting height shall be measured from the top of final shoulder grade at the post face. Cable height shall be adjusted to provide a smooth installation.

Cables shall be tensioned so that the sag between posts shall be a maximum of 6 mm.

Cable splices occurring on the same cable shall be spaced a minimum length of 15 m apart.

There shall be only one cable splice per panel regardless of the number of cables in the system.

552.07.02.02 Anchor Blocks

Precast or cast-in-place cubical or cylindrical anchor blocks shall be installed as specified in the Contract Documents, regardless of the material encountered.

In porous or crumbly soil, forms for cast-in-place anchors shall be used to prevent contamination of the concrete. Forms may be left in place or removed.

Earth backfill and granular materials shall be compacted according to OPSS 501.

552.07.02.03 Reflectorized Strips

Reflectorized strips shall be installed:

a) starting at the second post from the approach end.
b) at a maximum interval of every fifth post on tangent.

c) at a maximum interval of every third post on curves.

d) ending on the second to last post.

The reflectorized strip shall be fastened on posts as specified in the Contract Documents using two 50 mm aluminum nails.

552.07.02.04 Adjust Cable Guide Rail

Cable guide rail shall be adjusted as specified in the Contract Documents and includes:

a) the removal of the following:
   i. staples and spacers or cable clamps and nails
   ii. cables as salvage

b) the reinstallation of the following at the new cable height on the existing posts:
   i. salvaged cables
   ii. new cable clamps and nails

552.07.03 Steel Beam Guide Rail

552.07.03.01 Installation

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

Each steel beam guide rail installation may incorporate either steel posts with either plastic or routed wooden blocks or wooden posts with wooden blocks, but not both. Wooden posts shall only be allowed within steel posts installations when wooden posts are specified for guide rail end treatments. Extension of an existing wooden post installation using steel posts shall only be allowed when the extension length is greater than 100 m.

Different types of plastic and wooden blocks shall not be used 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 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 N·m. 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.

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

552.07.03.02 Reflectors

Reflectors shall be installed:
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) as specified in OTM Book 11, Table 4, on curves.
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.

552.07.03.03 Steel Beam Guide Rail Structure Connections

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

552.07.03.04 Adjust Steel Beam Guide Rail

Steel beam guide rail shall be adjusted as specified in the Contract Documents and includes the removal and salvage of offset blocks, steel beam elements, channels, bolts and washers from the existing guide rail posts, and their reinstallation at the new steel beam element height on the existing posts as specified in the Contract Documents. Washers from the front face of the existing steel beam guide rail shall not be reinstalled.

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.

For wooden post adjustment, the top of the offset block shall not extend beyond the top of the existing post.
552.07.04 Management of Excess Material

Management of excess material shall be as specified in the Contract Documents.

552.09 MEASUREMENT FOR PAYMENT

552.09.01 Actual Measurement

552.09.01.01 Cable Guide Rail

Measurement of cable guide rail shall be by length in metres along the centreline of the system from centre of anchor block to centre of anchor block at each end of an installation. No additions shall be made for the overlapping length of cable at intermediate anchor blocks.

552.09.01.02 Adjust Cable Guide Rail

Measurement of adjust cable guide rail shall be by length in metres along the centreline of the system from centre of anchor block to centre of anchor block at each end of an installation. No additions shall be made for the overlapping length of cable at intermediate anchor blocks.

552.09.01.03 Anchor Blocks

For measurement purposes, a count shall be made of the number of anchor blocks installed.

552.09.01.04 Single Rail Steel Beam Guide Rail

Single Rail Steel Beam Guide Rail with Channel

Double Rail Steel Beam Guide Rail

Measurement of steel beam guide rail shall be by length in metres along the centreline of the system from end to end of each steel beam guide rail installation and does not include the terminal systems.

552.09.01.05 Adjust Steel Beam Guide Rail

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 and includes the end treatments and terminal systems.

552.09.01.06 Steel Beam Guide Rail Structure Connections

For measurement purposes, a count shall be made of the number of steel beam guide rail structure connections installed.

552.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement.
Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

When there is not a separate tender item for steel beam guide rail structure connections, payment at the Contract price for single rail steel beam guide rail with channel shall include full compensation for all labour, Equipment, and Material to do the work of connecting steel beam guide rail to a structure.

Costs associated with any required repairs or removal and replacement of defective materials shall be the Contractor's responsibility at no extra cost to the Owner.
Appendix 552-A, November 2008  
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:

- Guide rail system locations. (552.07.01)

- Cable guide rail to be adjusted. (552.07.02.03)

- Steel beam guide rail to be adjusted. (552.07.03.04)

Leaving end treatment should be used on divided highways and ramps, when the leaving end of the installation is located beyond the clear zone for opposing traffic.

Height adjustments for steel beam guide rail with wooden post shall be a minimum of 50 mm.

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 912.130 Guide Rail System, Steel Beam, Steel Post With Offset Block Assembly, Installation - Single Rail
- OPSD 912.140 Guide Rail System, Steel Beam, Wooden Post Assembly, Installation - Single Rail
- OPSD 912.141 Guide Rail System, Steel Beam, Wooden Post Assembly, Installation - Double Rail
- OPSD 912.233 Guide Rail System, Steel Beam, End Treatment, Installation - Shoulder
- OPSD 912.234 Guide Rail System, Steel Beam, End Treatment, Installation - Leaving End Collector Median
- OPSD 912.235 Guide Rail System, Steel Beam, Leaving End Treatment, Installation
- OPSD 912.380 Guide Rail System, Steel Beam, Permanent Transition Installation, Channel Termination, Median
- OPSD 912.430 Guide Rail System, Steel Beam, Structure Connection
- OPSD 912.480 Guide Rail System, Steel Beam, Permanent Connection Installation, Single Steel Beam to Concrete Barrier
- OPSD 912.481 Guide Rail System, Steel Beam, Permanent Connection Installation, Double Steel Beam to Concrete Barrier
- OPSD 912.530 Guide Rail System, Steel Beam, Structure Approach Treatment, Installation - Rural Highway
- OPSD 912.531 Guide Rail System, Steel Beam, Installation - Entrances and Intersecting Roadways
- OPSD 912.532 Guide Rail System, Steel Beam, Barricade, Installation
- OPSD 912.533 Guide Rail System, Steel Beam, Treatment of Hazard In Median, Installation - Rail and Channel Plate
- OPSD 913.130 Guide Rail System, Cable, Installation - Shoulder