

54.25 Supply and Install Cable Barrier and Metal Posts

54.25.1 GENERAL

The Work consists of supplying and installing cable barrier and metal posts for use as hazard avoidance barriers.

54.25.2 STANDARDS OF REFERENCE

All material supplied shall refer to the following standards, specifications or publications:

- Society of Automotive Engineers:
 - SAE J403 - Sept. 80 - Chemical Composition of SAE Carbon Steels
- Canadian Standards Association:
 - CAN/CSA G40.20-M87 - General Requirements for Rolled or Welded Structural Quality Steel
 - CAN/CSA G40.21-M87 - Structural Quality Steel
 - CSA/CAN 3-G12-M78 - Zinc-Coated Steel Wire Strand
 - CSA W47.1-1983 - Certification of Companies for Fusion Welding of Steel Structures.
 - CSA W59-M1984 - Welded Steel Construction (Metal Arc Welding).
 - CSA G164-M1981 - Hot Dip Galvanizing of Irregularly Shaped Articles.
- American National Standards Institute/American Society for Testing and Materials:
 - ASTM A307-86a - Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength
 - ASTM A325M-86 - High-Strength Bolts for Structural Steel Joints (Metric).
 - ANSI/ASTM A536-84 - Ductile Iron Castings

- ASTM A47-M84 - Ferritic Malleable Iron Castings (Metric)
- ASTM B30-85a - Copper-Base Alloys in Ingot Form

54.25.3 MATERIALS

The Contractor shall supply all materials necessary to complete the Work. Previously installed material may not be used.

The Contractor shall supply the Engineer with the material manufacturer's certification that the material conforms with the specifications.

The Contractor shall supply the following major components in accordance with the applicable drawings:

● Posts c/w ground plates	TEB 3.42
● Hook bolts c/w double hex nuts	TEB 3.43
● Galvanized steel cables (305 m rolls)	TEB 3.43
● Tension bolts and ferrous castings	TEB 3.44
● End fittings	TEB 3.44
● Slicers and wedges	TEB 3.44
● Pressed ferrules and cable fittings	TEB 3.44
● Fabricated steel sections for anchor blocks	TEB 3.45

54.25.3.1 Cables

The barrier cable and the cable used for pressed ferrule and cable fittings shall conform to CSA/CAN 3-G12M for grade 110 steel wire strand, hot zinc coated (galvanized) or Class A electro-zinc-coated and shall be supplied in a continuous length of 305 metres on expendable reels.

The cable shall be a 13 mm diameter, 7-wire strand weighing approximately 228 kg per 300 m with a minimum breaking strength of 70 kN.

54.25.3.2 Fittings

Ferrous castings for the end fitting and splicer shall conform to ASTM A47M for malleable iron, grade 32510 or ASTM Designation A536 for ductile iron, type 60-45-10.

The tension bolt for the end fitting shall be SAE 1035 hot rolled fine grained steel, and the ferrule shall be SAE 1020 rolled steel, conforming to SAE J403. As an option, the tension bolt may contain

a square or hex nut welded as shown in drawing TEB 3.44, conforming to low hydrocarbon classification CSA W59M.

The ferrous castings, tension bolt and ferrule shall be hot dip galvanized conforming to CSA G164M. The ferrule shall be galvanized after it has been pressed onto the cable.

Wedges shall be bronze conforming to ASTM B30 for alloy suitable for sand casting.

All fittings shall be so designed and be of such section as to develop the full strength of a single cable or cable assemblies, as the case may be.

- Single cable assembly (minimum tensile strength of 100 kN)
- Three cable assembly (minimum tensile strength of 300 kN)

54.25.3.3 Posts and Fabricated Steel Sections for Anchor Blocks

Posts shall be American Standard Beam Section. Posts, ground plates, brackets, and splice plates shall conform to CSA/CAN G40.21M, grade 230G.

54.25.3.4 Hook Bolts and Nuts

Hook bolts and nuts shall conform to ASTM A307-86a.

Self-drilling, self-tapping fasteners shall be #12-24-1.50 indented hex washer head, cadmium plated.

54.25.3.5 Production

54.25.3.5.1 General Requirements

- Welding shall conform to CSA W59M and W47.1.
- All components and associated hardware except for self-drilling, self-tapping fasteners shall be hot dip galvanized after fabrication and shall conform to CSA G164M.
- All dimensions are subject to manufacturing tolerances unless otherwise indicated. The individual components shall be capable of being assembled to conform to the finished structure as indicated on the drawings.

54.25.3.5.2 Pressed Ferrule and Cable Fitting

- The ferrules supplied are for use at the end of the fitting cable and shall be pressed onto the end of the fitting cable.
- The ferrule shall not slip from the cable when tested under a tensile static load to the limit of cable breakage.

54.25.3.5.3 Marking

- Coils and reels of the guardrail cable shall be identified by an attached, durable tag on which the following information is indelibly recorded:
 - Galvanized steel wire strand
 - Manufacturer's name
 - Nominal diameter of strand
 - Grade
 - Length of strand in metres
 - Weight of strand in kilograms per coil

54.25.4 EQUIPMENT

The Contractor shall supply all equipment necessary to complete the Work.

54.25.5 PROCEDURE

The Engineer will determine the locations of the Work.

All Work shall be performed during daylight hours only. No Work shall be performed when the visibility is less than 700 metres.

Traffic control and signing shall be performed in accordance with Specification 55.1, Traffic Accommodation and Temporary Signing.

All installations shall be in accordance with drawings TEB 3.42, TEB 3.43, TEB 3.44 and TEB 3.45.

Posts shall be accurately set to the required depth and alignment in a smooth, continuous installation, as shown on the drawings or as directed by the Engineer. Permissible tolerance for plumb and grade of posts shall be 6 mm maximum.

Post holes shall be excavated by auger to a sufficient diameter to allow for pneumatic tamping. Unsuitable material at the bottom of the excavated holes shall be replaced with granular material at the Contractor's expense, as directed by the Engineer. The Contractor shall thoroughly compact the material at the bottom of the hole. The posts shall rest directly and solidly on the compacted material.

Excavated material which is unsuitable for use as backfill shall be substituted with granular material by the Contractor at his expense. Backfill shall be thoroughly compacted using pneumatic tampers, in layers not exceeding 150 mm, for the full depth of the excavation. Cementitious materials shall not be used for post support unless specifically authorized by the Engineer.

When performing repairs, the Contractor shall check adjoining posts for damage and report any damage to the Engineer.

54.25.6 TIME TO COMPLETE

In urgent situations, the Contractor shall complete the Work within 5 calendar days of the issuance of the Work Order. In all other cases, the Work shall be completed within 60 calendar days of the issuance of the Work Order.

54.25.7 MEASUREMENT AND PAYMENT

Measurement will be in metres of the length of cable barrier installed.

Payment will be made at the unit price bid per metre for "Supply and Install Cable Barrier". This payment will be full compensation for supplying and installing posts and cable barrier, traffic accommodation and signing, and all labour, materials, equipment, tools and incidentals necessary to complete the Work.

In urgent situations where the Contractor is required to complete any type of guardrail Work within 5 calendar days of the issuance of the Work Order, an additional payment will be made at the unit price bid per occurrence for "Guardrail - Premium". This payment will be full compensation for complying with the accelerated scheduling required to complete the Work. This payment will be made only once per Work Order, regardless of the different types of guardrail Work completed.

54.25.8 WARRANTY

The warranty period for this Work shall be 1 year. At the end of the one year warranty period, the permissible tolerance for plumb and grade of all posts shall be 13 mm.