



CONSTRUCTION SPECIFICATION FOR STANDARD HIGHWAY FENCE

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540.01	SCOPE
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This specification covers the requirements for the installation of highway fence, brace panels, and gates.

540.01.01 Significance and Use of Appendices

Appendices are not a mandatory part of this specification unless invoked by the Owner.

Appendix 540-A is a commentary appendix to provide designers with information on the use of this specification in a Contract.

540.02

REFERENCES

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

Ontario Provincial Standard Specifications, Construction

OPSS 510 Removal

Ontario Provincial Standard Specifications, Material

OPSS 1540 Standard Highway Fence Components

ASTM International

A 780-01(2006) Standard Practice for Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings

540.03

DEFINITIONS

For the purpose of this specification, the following definitions apply:

Brace Post means the wooden post installed to anchor the diagonal wooden brace within the brace panel.

Corner Post means the terminal post installed at horizontal deflections in the fenceline greater than 22 degrees.

Cross Fences means intersecting wire fences.

Line Wire means the horizontal wire of the fence fabric.

Stay Wire means the vertical wire that is woven or wrapped around the line wire to form the rectangular opening of the fence fabric.

Steel Brace Panel means the steel brace, steel line post, angle iron, and grout.

Straining Post means the terminal post installed at changes in vertical deflections in the fence line greater than 22 degrees or at approximately 200 m intervals.

Terminal Post means end, gate, corner, and straining posts.

Wooden Brace Panel means the diagonal wooden brace, wooden brace post, brace wire, fasteners, and when installed in rock, steel T-rail posts with 3.5 mm wire and grout.

540.05

MATERIALS

540.05.01

Highway Fence

Highway fence components shall be according to OPSS 1540.

540.07 CONSTRUCTION

540.07.01 Removal

Removal of existing fence shall be according to OPSS 510.

540.07.02 Site Preparation

Prior to the commencement of fencing operations, remove all debris and correct ground undulations along the fenceline to obtain a smooth and uniform gradient.

All trees, stumps, and brush along the fenceline shall be cut off at ground level and all logs and overhanging branches that would interfere with the erection of the fence shall be removed.

540.07.02.01 Selective Clearing

Where fencing is required through wooded areas that are not designated for clearing and grubbing, only selective clearing shall be permitted in order to gain access to the fenceline and to permit fence erection with lightweight equipment. Clearing shall be kept to a minimum and shall be subject to the approval of the Contract Administrator prior to the commencement of any clearing operation. The Contractor may be required to travel around obstructions.

The location of access points shall be based on the least amount of clearing required and the frequency of access points shall be subject to reasonable material delivery requirements. The access points shall be approved by the Contract Administrator.

540.07.03 Highway Fence

540.07.03.01 General

Survey reference points or permanent property boundary markers shall not be disturbed or moved without the authorization of the Contract Administrator. Where it is necessary to set posts adjacent to such points, the posts shall be placed on the roadway side of the property line as close as feasible to the monuments or markers.

Fence posts are to be installed vertically and to the depth at the locations specified in the Contract Documents.

540.07.03.02 Post Installation

540.07.03.02.01 General

Terminal posts shall be installed at all highway fence ends, both sides of all openings and gates, locations with changes in horizontal or vertical deflections greater than 22 degrees in the fenceline, and at locations identified for straining purposes. Terminal posts shall be installed on each side of watercourse crossings. Line posts shall be installed as specified in the Contract Documents.

540.07.03.02.02 Post Installation in Earth, Shale, or Loose or Friable Rock

Postholes for wooden posts shall be excavated to 150 mm greater than the diameter of the larger end of the post. The large end of the post shall be placed in the bottom of the posthole. Material resulting from posthole excavation shall be used as backfill around the posts and compacted to 90% modified proctor density.

Steel posts shall be driven with care to ensure they will not be bent or burred.

540.07.03.02.03 Post Installation in Rock

Posts installed in rock shall be either wooden or steel posts or as specified in the Contract Documents. When either steel or wooden posts are selected, all posts in a run of fence in rock shall be of the same material. Mixing of wooden or steel posts is not allowed.

Postholes for steel posts shall be drilled in rock to a maximum diameter of 150 mm. Overburden shall be excavated to a maximum diameter of 300 mm. Posts shall be placed in the resulting postholes and filled as specified in the Contract Documents.

540.07.03.03 Brace Panels

Brace panels shall include the installation of the diagonal wooden braces or diagonal angle iron braces; diagonal brace wires; and fasteners, as is appropriate.

Diagonal brace wires may be tensioned using the twitch-stick method.

Where cross fence separates property owners, three brace panels shall be installed at the end post of cross fences. Where the cross fence does not separate property owners, one brace panel shall be installed on the cross fence at the end post.

Brace panels at straining posts shall be installed at equal intervals of approximately 200 m with no intervals greater than 230 m. Brace panels shall be installed on each side of a corner, straining, opening, or gate locations.

Brace panels shall be installed at terminal posts on each side of watercourse crossings.

Where fences are to be partially removed, brace panels shall be installed at the terminal ends of the remaining fence.

540.07.03.04 Fence Fabric

Fence fabric shall be placed on the side of the post nearest the roadway, except on curves with a radius of less than or equal to 1750 m. In this situation, the fabric shall be placed on the side of the post away from the centre of the curve.

Fence fabric shall be uniformly tensioned so that its line wires are tight and parallel and the stay wires are straight, uniformly spaced, and at right angles to the line wires.

Staples shall be set diagonally to the grain of the wooden post and driven home tight. Top wire shall be double stapled and all other wires single stapled.

Fence fabric shall be fastened to the steel post using wire ties at all nine line wires.

Fencing fabric shall be tensioned and properly terminated with the wire wrapped around the terminal posts at least once and around itself at least four complete turns and stapled to the terminal posts.

Rolls shall be spliced together by laying the end stay wires of each section to be spliced together and wrapping the overhanging line wires around the corresponding line wires on the adjacent roll, at least four complete turns as specified in the Contract Documents. After splicing, all projecting ends of the line wires shall be removed. Terminal posts shall not be installed for splice purposes only.

540.07.04 Cross Fences

Cross fences shall be secured to the adjacent post prior to cutting the fence at the brace panel.

540.07.05 Gates

Gates shall be installed in locations and be of the type and size as specified in the Contract Documents.

Where gates are required without adjacent fencing, terminal posts with brace panels shall be installed on each side of the gate.

Gates shall be installed to open away from the roadway and to close by gravity.

540.07.06 Zinc Coating Repairs

Cut ends, field drilled holes, and damaged areas of hot dip galvanized coatings on galvanized components except fence fabric, which shall be repaired according to ASTM A 780.

540.07.07 Site Restoration

After fence erections, the site shall be cleaned and trimmed and the ground restored to a neat condition.

540.07.08 Management of Excess Material

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

540.08 QUALITY ASSURANCE

540.08.01 Construction

The Contract Administrator may perform a spot visual inspection to determine conformance with the workmanship, design, and dimensional requirements of this specification.

Failure to conform to the specifications may result in a partial or complete inspection of the installation by the Owner and removal and replacement of all defective workmanship or materials by the Contractor.

540.08.02 Fence Fabric, Gates, and Steel Posts

The Contract Administrator may request documentation showing compliance with OPSS 1540. The Contract Administrator may obtain and test samples to ensure compliance with the specifications. Products represented by the test samples that are not in compliance, shall be removed from the Work Area and replaced.

540.09 MEASUREMENT FOR PAYMENT

540.09.01 Actual Measurement

540.09.01.01 Highway Fence

Measurement shall be made in metres following the contour of the ground for the actual length of highway fence erected and shall include gate openings and brace panels.

540.09.01.02 Brace Panels

For measurement purposes, a count shall be made of the number of brace panels installed, regardless of material type.

540.09.01.03 Gates

For measurement purposes, a count shall be made of the gates installed, regardless of the size and type. Double gates shall be counted as one gate.

540.09.02 Plan Quantity Measurement

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

540.10 BASIS OF PAYMENT

**540.10.01 Highway Fence - Item
Brace Panels - Item
Gates - Item**

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material required to do the work.

540.10.02 Removals and Replacements

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

Appendix 540-A, Commentary for OPSS 540, April 2007

Note: This appendix does not form part of the standard specification. It is intended to provide information to the designer on the use of this specification in a Contract.

Designer Action/Considerations

The designer should specify the following in the Contract Documents:

- Posthole depths and locations. (540.07.02.01)
- Gate locations, types, and sizes. (540.07.04)

The designer should ensure that the Ontario Provincial Standards General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

OPSD 971.101	Fence, Highway, In Earth, Shale, or Loose or Friable Rock, Installation
OPSD 971.102	Fence, Highway, In Rock, Installation