

# Roads

## Master Specification

### RD-BF-C1 Supply and Installation of Steel Beam Safety Barrier Systems

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## Document Management

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# RD-BF-C1 Supply and Installation of Steel Beam Safety Barrier Systems

## 1 General

- 1.1 This Part specifies the requirements for the supply and installation of Steel Beam Road Safety Barrier (SBSB) systems.
- 1.2 SBSB systems must comply with the following (in order of precedence):
- Contract specific drawings; and
  - the following DPTI standard drawings:

**Table RD-BF-C1 1-1 DPTI Standard Drawings**

Drawing No.	Sheet No.	Title	Amendment No.
S-4050	36	Installation and Setout	4
	37	Installation Adjacent to Rigid Barriers	6
	38	W/Thrie Beam Installation Details 1	2
	39	W/Thrie Beam Installation Details 2	6
	40	Assembly – Steel Breakaway Posts (Type Nokout)	2
	41	Terminal Components	3
	42	W-Beam and Thrie Beam Assemblies	2
	43	Fabrication Details for W-Beam Rails	3
	44	Fabrication Details for Thrie Beam Rails	4
	45	Post, Blockouts and Delineators	2
	46	Post, Blockouts and Anchor Assembly	4
	47	Bolts, Nuts, Screws, Washers & Cable Assembly	2

- 1.3 DPTI standard drawings are available from the following web site:  
<https://www.dpti.sa.gov.au/standards>.
- AS 3845 Road Safety Barrier Systems.
  - Austrroads AGRS09/08 Guide to Road Safety - Part 9: Roadside Hazard Management, available from: <https://austrroads.com.au/>.
  - The manufacturer's instructions.
- 1.4 The following documents are also referenced in this Part:
- AS 1214 Hot-Dip Galvanized Coatings on Threaded Fasteners.
  - AS 1365 Tolerances for Flat-Rolled Steel Products.
  - AS 1391 Metallic Materials - Tensile Testing at Ambient Temperature.
  - AS 1594 Hot-Rolled Steel Flat Products.
  - AS1627.1 Metal finishing – Preparation and pretreatment of surfaces – Removal of oil, grease and related contamination.
  - AS 1627.2 Metal finishing – Preparation and pretreatment of surfaces – Power tool cleaning.
  - AS 3569 Steel Wire Ropes.
  - AS 3750.7 Paint for steel structures – Aluminium paint.
  - AS 3750.9 Organic Zinc-rich Primer.
  - AS 4680 Hot-dip Galvanized (Zinc) Coatings on Fabricated Ferrous Articles.
  - AS 9001 Quality Management Systems – Requirements.
  - DPTI GD 300: “Accepted Safety Barrier Products” available from:  
<https://www.dpti.sa.gov.au/documents>.

- m) Attachment R42A: "Safety Barrier Work Summary Template", available from:  
<https://www.dpti.sa.gov.au/documents>.
- 1.5 Delineators must comply with RD-LM-S3 "Supply of Guide Posts and Delineators" and RD-LM-C3 "Installation of Guide Posts and Delineators".
- 1.6 All bridge approach W-Beam Guard fence must be installed in accordance with Standard Drawing No.4050, sheets 36-47.

## 2 Quality Requirements

- 2.1 At a minimum, the Contractor must provide the following documents, procedures and / or instructions:
- evidence that the components comply with Clause "Supply of Steel Beam Road Safety Barrier Components";
  - details of the country of manufacture;
  - certified copies of manufacturer's tests sheets for all materials. For steel components the test sheets to include chemical properties and results of tensile, elongation and 180 degree bend tests. The tests must comply with AS 3845 and other relevant Australian standards and be from NATA accredited laboratory (a certificate from a non-NATA laboratory is not acceptable);
  - if the components differ from those shown on the Drawing 4050, sheets 36-47, a copy of the Manufacturer's instructions and any procedure for installation and maintenance of the road safety barrier system;
  - a system which ensures traceability of all test results to locations in accordance with PC-QA1 "Quality Management Requirements";
  - for galvanized steel components, a manufacturer's certificate of compliance certifying that the zinc coating mass is in accordance with the requirements of AS 3845 or AS 4680; and
  - evidence that the person(s) supervising the installation of the SBSB terminals have attended training in the installation of terminals, conducted by the manufacturer, within the previous 2 years, or a program demonstrating that the requirements of Clause 4.1 will be met.
- 2.2 If not provided beforehand, the documentation must be submitted at least 14 days prior to the commencement of installation.
- 2.3 Provision of the documentation listed in this Clause shall constitute a **Hold Point**.

## 3 Supply of Steel Beam Safety Barrier Components

### General

- 3.1 Components of the SBSB, including motorcycle barrier components, must be manufactured under a quality system certified to AS 9001 and must be a DPTI accepted product (refer to GD 300).
- 3.2 The Contractor must provide test results that demonstrate compliance with the requirements of this clause, and evidence that the testing has been undertaken on samples which are representative of the materials supplied under this Contract.
- 3.3 Timber posts must not be used. Components must conform to the dimensions shown on the drawings.

### Identification

- 3.4 All steel rails, posts and plastic components of a safety barrier must be permanently marked with the following information:
- name or mark of the manufacturer;
  - strength and base metal thickness of steel rails and posts; and
  - a traceable identification number.

- 3.5 The marking must be in text not more than 20 mm high and be in an unobtrusive and readily accessible position.

## Metal Components Rails

- 3.6 The rails must be manufactured from steel which meets the requirements of AS 1594 Grade HA350. The mechanical properties of the base metal must conform to the following requirements when tested in accordance with AS 1391:
- a) minimum yield strength: 350 MPa;
  - b) minimum tensile strength: 430 MPa; and
  - c) minimum elongation in 80 mm 16%;
- 3.7 The base metal must comply with the following tolerances when measured in accordance with AS 1365:
- a) base metal thickness: 2.7 mm  $\pm$ 0.1 mm;
  - b) mill tolerance on strip width: +2.5 mm, -0.0; and
  - c) mill camber tolerance on 2000 mm length: 4.0 mm maximum.
- 3.8 For guard fence erected as barrier railing on bridges and major culverts, the base material must comply with the following tolerances when measured in accordance with AS 1365:
- a) base metal thickness: 3.5 mm  $\pm$ 0.1 mm;
  - b) mill tolerance on strip width: +2.5 mm, -0.0; and
  - c) mill camber tolerance on 2000 mm length: 8.0 mm maximum.

## Other Components

- 3.9 Steel posts and blocks must be manufactured from steel which meets the requirements of AS 1594 Grade HA300 and HU300 respectively. The base material thickness must be 4.3 mm  $\pm$ 0.1 mm.
- 3.10 Bullnoses must be manufactured from steel which meets the requirements of AS 1594 Grade HA350.
- 3.11 Breakaway cable terminal wire rope must comply with the requirements of AS 3569.

## Galvanizing

- 3.12 All steel components must be hot-dip galvanized after fabrication. Galvanizing must comply with:
- a) Bolts, nuts and washers: AS 1214
  - b) All other components: AS 4680
- 3.13 The minimum zinc coating per side for all internal and external surfaces must be:
- a) Beams and terminal: 390 g/m<sup>2</sup>
  - b) Steel posts and blocks: 500 g/m<sup>2</sup>
- 3.14 Galvanized coatings must be:
- a) smooth, adherent and of uniform colour; and
  - b) free from stains, gross surface imperfections, markings, runs, blisters, irregularities or inclusions.
- 3.15 Care must be taken during storage, handling, loading and delivery to avoid wet-storage staining and / or damage to the zinc coating.

## Curved Rail

- 3.16 If curving is undertaken after galvanizing has been completed, it must be carried out in such a manner that the galvanizing is not damaged. If the radii for curved rails are not specified on the Drawings, the Contractor must determine the appropriate radius.

- 3.17 Shop curving must be undertaken where the required deflection exceeds 160 mm over a 4.0 m section of barrier. The radius must be permanently marked on the rear of the barrier in a manner that does not damage the galvanizing.

## Damage

- 3.18 Components must be transported, handled and installed to avoid damage. Components are not to be left with splits, burrs or sharp edges after installation. Any minor damage to galvanizing must be repaired as follows:
- clean surfaces to bare metal by power tool cleaning to a minimum of Class St2 in accordance with AS1627.2;
  - degrease cleaned surfaces using solvent cleaning in accordance with AS1627.1; and
  - apply 2 coats of organic zinc rich primer, as approved to AS3750.9, to a minimum total dry film thickness of 100  $\mu\text{m}$ .
- 3.19 Where the SBSB is to be installed in a location where appearance is critical (i.e. urban and semi-urban areas), a final coat of aluminium paint as approved to AS3750.7 must be applied to all repairs. This method of repair must be restricted to individual areas not exceeding 40  $\text{cm}^2$  for any single repair and a total 0.1% of the surface area of any face for multiple repairs.

## 4 Installation of SBSB Systems

### Training of Personnel

- 4.1 Except for SBSB terminals listed as public domain on GD 300 "Accepted Safety Barrier Products", terminals must be installed under the supervision of a person who has attended training in the installation of terminals, conducted by the manufacturer. This person must be on site at all times while the terminal is being installed.

### General

- 4.2 Posts must be installed in a manner that does not damage the post or any attached soil plate. This may involve pre-drilling holes to loosen the soil or excavating a hole to the required depth. The Contractor must reinstate any disturbed pavement or ground around a post so that it is in a tight, dense condition and has the same resistance to water penetration as the surrounding surface.

### Driving of Posts

- 4.3 Driving may be used to install posts. Where the ground has subsided due to the driving process, the surface must be back filled to natural surface level.
- 4.4 Steel posts must be affectively guided and held during initial stages of driving and must not be bent or sprung into position. No significant horizontal force must be used to correct any tendency for a post running off line. Where a post has run off line or twisted, it must be removed and driving must recommence. To minimise damage to the top of the post, a driving head must be positioned over the post during driving.

### Backfill of Post Holes

- 4.5 If a hole is excavated for the installation of a post, it must be backfilled and compacted with Type A material or PM 2/20 so that the permeability of the backfill is not less than the surrounding material. Compaction in layers not exceeding 150 mm at OMC to not less than 95% is deemed to meet this requirement. 1% cement may be added to this backfill.
- 4.6 When a lateral force of 100 kg is applied in any direction within the top 200 mm of the post, the movement of the post at ground level must not exceed 3 mm.

## Cranked Posts

- 4.7 Where cranked posts (refer Drawing No. S-4050, sheet 46) are to be installed, the post must be installed by providing a hole for the post and backfilling in accordance with Clause "Backfill of Post Holes".

## Rock Drilling

- 4.8 Where installation of posts is prevented due to rock, rock-drilling equipment must be used to achieve the required depth. If rock is encountered, the Contractor must provide notification immediately.
- 4.9 For the purpose of this Clause, "rock" means material that prevents the post driver pushing the post to its correct depth when penetration of not more than 5 mm from 5 consecutive blows is encountered with a 500 kg weight falling 3 m or causes noticeable damage to the post during installation.

## Tolerances

- 4.10 The safety barrier system must form a smooth line vertically and horizontally when viewed along the line of the system, free from humps, sags or other irregularities. Tolerances for erection of the safety barrier must be as follows:
- a) horizontal placement of fence  $\pm 10$  mm;
  - b) vertical placement of fence  $\pm 20$  mm; and
  - c) rotational deviation of post  $\pm 5$  degrees.
- 4.11 In addition to the above tolerances, the departure from a line drawn between the tops of any three posts must not exceed 25 mm vertically.

## Installation to Specification

- 4.12 Where the Contractor is unable to install the safety barrier in accordance with the requirements of this Part (e.g. an obstruction prevents the installation of a post), a **Hold Point** must apply.
- 4.13 Prior to pouring concrete for traffic barrier footings, the Contractor must digitally record photographs which can clearly demonstrate that the specified dimensions of the excavation have been achieved.
- 4.14 The Modified Eccentric Loader Terminal (MELT) is a gating type terminal approved for use on DPTI works. The use of any alternative type is subject to prior approval and the Contractor demonstrating that the performance is equivalent to or higher than the MELT type.
- 4.15 Trailing terminals may be used on departure end of road safety barrier where it is not practicable to install a MELT due to road condition or terrain. Trailing terminals must not be used within the clear zone of opposing traffic.

## Records

- 4.16 The Contractor must record details of the completed installation using the Microsoft Excel Template Attachment R42A "Safety Barrier Work Summary Template", available from: <https://www.dpti.sa.gov.au/documents>

## 5 Removal of Existing Barrier

- 5.1 Unless specified otherwise, the removed barrier must become the property of the Contractor. The removed barrier must not be disposed of in landfill. After posts from existing safety barrier runs are removed, the Contractor must fill the post holes in accordance with Clause "Backfill of Post Holes".
- 5.2 Removal of safety barrier system includes:
- a) dismantling or demolition of safety barriers, transitions and terminal;
  - b) extracting all posts, anchors and other in-ground components and materials;
  - c) removing all components and waste material from the site;

- d) cleaning, backfilling and mechanically compacting all excavation and holes formed by the extraction of posts, anchors and other in-ground components and materials; and
- e) stacking or disposing of components and waste materials.

## 6 Hold Points

6.1 The following is a summary of Hold Points referenced in this Part:

Document Ref.	Hold Point	Response Time
2.3	Submission of Quality Documentation	7 days
4.12	Where an obstruction prevents the Installation of safety fence to the specified design.	1 day

## 7 Verification Requirements and Records

7.1 The Contractor must supply the following records:

**Table RD-BF-C1 7-1 Verification Requirements**

Document Ref.	Subject	Record to be Provided
4.13	Excavation of Footings	Photographic record of excavation prior to placing concrete
4.16	Installation of SBSB	Detail of the installation as specified in Attachment R42A: Safety Barrier Work Summary Template