ACT Government

# NON RIGID SAFETY BARRIER 15B

MUNICIPAL INFRASTRUCTURE TECHNICAL SPECIFICATION

**15 - ROAD SIDE FURNITURE**

Transport Canberra and City Services

JULY 2019

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# 1 NON-RIGID ROAD SAFETY BARRIER SYSTEMS

## 1.1 General

### 1.1.1 Responsibilities

#### 1.1.1.1 General

Requirement: Provide non-rigid road safety barriers and terminals as documented. Proprietary systems shall be installed according to the manufacturer's specification.

#### 1.1.1.2 Performance

Requirements: All new road safety barriers must be accepted by RMS for used on classified roads.

Existing barriers: Existing road safety barriers may be retained where deemed appropriate by the Road Authority.

### 1.1.2 Cross references

#### 1.1.2.1 Design Standards

General: The following Design Standards are related to this Specification:

| | |
|---|---|
| MITS 00 | Preliminaries |
| MITS 01 | Traffic Management |
| MITS 06 | Minor Concrete works |
| MITS 10 | Concrete works |

### 1.1.3 Referenced documents

#### 1.1.3.1 Standards

General: The following documents are incorporated into this Specification by reference:

**Australian standards**

| | |
|---|---|
| AS 1214 | Hot-dip galvanized coatings on threaded fasteners (ISO metric course thread series) |
| AS 1237 | Plain washers for metric bolts, screws and nuts for general purposes |
| AS 1237.1 | General plan |
| AS 1237.2 | Tolerances |
| AS/NZS 1594 | Hot-rolled steel flat products |
| AS 1627 | Metal finishing – Preparation and pre-treatment of surfaces |
| AS1627.4 | Abrasive blast cleaning of steel |
| AS1627.5 | Pickling |
| AS/NZS 1906 | Retroreflective materials and devices for road traffic control purposes |
| AS/NZS 1906.2 | Retroreflective devices (non-pavement application) |
| AS 2311 | Guide to the painting of buildings |
| AS 3730 | Guide to the properties of paints for buildings |
| AS 3730.10 | Latex – Exterior – Gloss |

| | |
|---|---|
| AS 3730.18 | Undercoat /Sealer – Latex – Interior/exterior |
| AS/NZS 3845 | Road safety barrier systems |
| AS/NZS 4680 | Hot-dip galvanized (zinc) coatings on fabricated ferrous articles |

## 1.1.4 Standards

### 1.1.4.1 General

Standard: To *AS/NZS 3845.*

Proprietary products: To *TCCS Products previously considered for use list*

## 1.1.5 Interpretation

### 1.1.5.1 Abbreviations

General: For the purposes of this Specification the abbreviations given below apply:

**MELT:** Modified eccentric loader terminal.

**RMS**: Roads and Maritime Services, NSW Government, and its successors.

**RSB:** Road Safety Barrier.

### 1.1.5.2 Definitions

General: For the purpose of this Specification, the definitions of terms used to define the components of the road reserve are in conformance with *AS 1348, Glossary of Austroads Terms* and *AGRD03,* the definitions given below also apply:

**Clear zone**: The horizontal width of space available for the safe use of an errant vehicle which consists of the verge area and is measured from the nearside edge of the left-hand traffic lane. In the case of a divided road, it is also measured from the offside edge of the right-hand traffic lane to the edge of the pavement for opposing traffic.

**MELT**: A public domain gating terminal; note that this form of terminal is no longer accepted by RMS for new works.

**Non-rigid road safety barrier system**: A road safety barrier system where elements are designed to move substantially in a crash, and where energy is absorbed by movement of the road safety barrier system and deformation of the vehicle.

**Thrie-beam**: The triple corrugated beam component of a public domain and proprietary non-rigid road safety barrier system.

**Transition beam**: The corrugated beam used for the changeover from a thrie-beam road safety barrier system to a W-beam road safety barrier system.

**W-beam**: The double corrugated beam component of a public domain and proprietary non-rigid road safety barrier system.

## 1.1.6 Hold points and witness points

### 1.1.6.1 Notice

General: Give written notice to the Authorised person so that the documented inspection and submissions may be made to the **Hold point table** and the **Witness point table.**

**Table 15B-1 Hold point table**

| Item | Clause title | Requirement | Notice for inspection | Release by |
|---|---|---|---|---|
| **Materials** | | | | |
| **15B.1** | General - Approved Products | Submit compliance certification | 1 week prior to erection | Authorised Person |
| **15B.2** | Steel - Certificates of compliance | Provide documentary evidence of conformity of steel components | 1 week prior to erection | Authorised Person |
| **15B.3** | Steel - Protective treatment | Provide manufacturer's certificate of compliance for galvanizing | 1 week prior to erection | Authorised Person |
| **15B.4** | Timber - Certificates of compliance | Provide documentary evidence of conformity of timber components | 1 week prior to erection | Authorised Person |
| **15B.5** | Wire rope safety barrier systems -Proprietary item | Submit compliance certification | 1 week prior to erection | Authorised Person |
| **Execution** | | | | |
| **15B.6** | Establishment - Method statement | Process description for the installation of road safety barrier systems | 1 week prior to erection | Authorised Person |
| **15B.7** | Establishment - Location of barriers | Set out to drawings or as directed | 2 working days prior to erection | Authorised Person |
| **15B.8** | Installation of wire rope safety barrier systems - Manufacturer's published requirements | Submit tension certificates and testing | Same day as tensioning | Authorised Person |

**Table 15B-2 Witness points table**

| Item | Clause title | Requirement | Notice for inspection |
|---|---|---|---|
| **Execution** | | | |
| **15B.1** | Establishment - Sequence of construction | Erection after pavement activities | 1 week before installation – progressive |
| **15B.2** | Erection of steel posts - Driving equipment | Equipment and procedure for erection | 1 week before installation |
| **15B.3** | Erection of steel posts -Damage to posts | Assessment by Authorised Person for replacement | 3 working days before removal of damaged post |
| **15B.4** | Erection of road safety barrier systems - Excessive damage to rails | Assessment and rejection by Authorised Person | 1 working day after perceived damage |

# 1.2 Materials

## 1.2.1 General

### 1.2.1.1 Approved products

General: Transport Canberra require that all new safety barrier products must be accepted by Roads and Maritime Services (RMS) NSW for use on classified roads within NSW prior to use in the ACT.

Certification: Submit compliance certification by the manufacturer that the barrier system meets all specified criteria.

This is a **HOLD POINT**.

## 1.2.2 Steel

### 1.2.2.1 Certificates of compliance

Requirement: Do not erect steel road safety barrier components until the Contractor has produced documentary evidence that the steel components conform to the requirements of this Specification.

This is a **HOLD POINT**

### 1.2.2.2 Quality

Standard: W-beam and Thrie beam elements to *AS/NZS 1594.*

Steel components: Supply all steel components for public domain non-rigid road safety barrier systems, W-beam and Thrie-beam, to *AS/NZS 3845* and of the type shown on the Drawings.

Flat washers: To *AS 1237.1* and *AS 1237.2.*

Curving steel rail: Factory curved to conform to drawings for small radius (<40m) bends. Carry out curving so that the galvanizing is not damaged.

### 1.2.2.3 Protective treatment

Treatment and galvanising: Unless otherwise stated for a specific proprietary safety barrier system or device, treat all surfaces of all ferrous metal components including posts, blockout pieces, rail elements, anchor plates, connectors and terminal pieces after fabrication to *AS 1627.4* or *AS 1627.5* and finish by hot-dip galvanizing to *AS 4680*. Galvanize all ferrous bolts, nuts, and washers to *AS 1214*, unless otherwise specified as high strength bolts.

Certificate of compliance: For galvanized steel components provide a manufacturer's certificate of compliance certifying that the zinc coating mass conforms to *AS/NZS 4680* or, for components of proprietary safety barrier system's or devices, to the manufacturer's recommendations.

This is a **HOLD POINT**.

### 1.2.2.4 W-beam and Thrie-beam barriers

Standard: To *AS/NZS 3845.*

#### 1.2.2.5 Storage

Protection: Store all materials, whether fabricated or not, so that damage and corrosion are prevented as follows:

- Store at least 200mm above ground on platforms, slabs or other supports.
- Storage to prevent 'white rust' from freshly galvanized material.

Rejection: Rusted or bent or damaged steel will be rejected.

### 1.2.3 Timber

#### 1.2.3.1 Certificates of compliance

Existing barriers: Timber components may be present within existing road safety barriers. Timber components are not approved for use by RMS in new barrier systems.

Requirement: Do not erect timber road safety barrier components until the Contractor has produced documentary evidence that the timber components conform to this Specification.

This is a **HOLD POINT**.

#### 1.2.3.2 Quality

Location: Use timber posts only in W-beam terminal sections, as shown on the drawings.

Standard: Type, grade, size and treatment level to conform to *AS/NZS 3845* and as shown on the drawings.

Quality: All surfaces smooth and free from obvious saw marks.

Storage: Do not store any timber posts/blockout blocks on top of the steel sections.

#### 1.2.3.3 Finish

Preparation: Stop holes, cracks and other imperfections with white putty after the primer coat.

Paint: Conform to the following:

- Undercoat: Undercoat, latex exterior, one coat: To *AS 3730.18.*
- Top coat: Gloss latex exterior, one coat: To *AS 3730.10.*

Application: To *AS 2311 Section 6.*

Colour: Grey.

### 1.2.4 Wire rope safety barrier systems

#### 1.2.4.1 Proprietary Item

Conformance: Supply tensioned wire rope barrier systems as shown in the drawings.

Certification: Submit compliance certification by the manufacturer that the proposed wire rope barrier system meets all specified criteria.

This is a **HOLD POINT**.

### 1.2.5 Plastic

#### 1.2.5.1 General

Standard: Retroreflective materials to *AS 1906.*

Other items: Other plastic components to comply with the manufacturer's recommendations.

## 1.3 Execution

### 1.3.1 Provision for traffic

#### 1.3.1.1 General

Requirement: To *MITS 01 Traffic Management.*

Material stacks: Locate any temporary stacks of new or surplus material associated with the works clear of the traffic flow and behind the line of the safety barrier system being removed, under construction or for construction.

Works program: Manage the sequence for construction to make sure that there are no traffic hazards or safety issues for road users. This includes exposed ends of barriers and when leaving partially completed works at the end of the day.

### 1.3.2 Site establishment

#### 1.3.2.1 Survey

Requirement: Confirm site surface and benchmarks. Conform to *MITS 00 Preliminaries.*

### 1.3.3 Quality requirements

#### 1.3.3.1 General

Standard: Construct non-rigid road safety barrier to *AS/NZS 3845* except where explicit departures are shown on the drawings.

### 1.3.4 Establishment

#### 1.3.4.1 Sequence of construction

General: Erect road safety barriers after the construction of the base on concrete pavements and after the placing of the initial layer of asphaltic concrete or sprayed seal on a flexible pavement, unless otherwise approved.

This is a **WITNESS POINT.**

#### 1.3.4.2 Method statement

Submit: Prior to the installation of any road safety barrier system, submit a process description for the installation of road safety barrier systems.

This is a **HOLD POINT**.

#### 1.3.4.3 Location of barriers

Set out: Locate all road safety barriers and terminal sections to conform to the drawings or as directed by the Authorised Person. Peg or paint mark the start and finish points and line of safety barrier, transitions and terminals including the line of flare if applicable.

This is a **HOLD POINT**.

Post accuracy: Stand posts vertically and space so that no post movement is necessary to align holes or for any other reason when the safety barrier is erected.

## 1.3.5 Erection of steel posts

#### 1.3.5.1 Positioning of posts

Location: As shown on the drawings.

Top of the posts: To *AS/NZS 3845* unless otherwise shown on the drawings.

Level of the posts: On terminal ends, level the posts to conform to the extended crossfall of the main pavement unless otherwise shown on the drawings.

Tolerance: Line the tops of posts within ± 20mm of the heights specified, or as nominated by the manufacturer. Make sure a smooth line both horizontally and vertically.

#### 1.3.5.2 Foundation and testing

Foundations: Erect steel posts by driving, or by other means as directed, to *AS/NZS 3845.*

Open section: Point the open section of the post in the same direction as adjacent traffic.

Post holes: Compact the bottom of the holes to achieve the same density as the surrounding soil. Support the posts true to line and level whilst the holes are backfilled with clean, well graded, non-cementitious sub-base or base course granular material and compact to achieve the same density as the surrounding material.

Ground tolerance: As recommended by manufacturer or 3mm maximum movement in any direction when force tested to *AS/NZS 3845.*

#### 1.3.5.3 Driving equipment

Equipment: Submit proposed details of equipment for driving steel posts and procedure to prevent damage to posts if installing by driving, for approval.

This is a **WITNESS POINT**.

#### 1.3.5.4 Damage to posts

Acceptable condition: No obvious deformation as a result of driving.

Repairs: Repair any damage that occurs to the posts within 24 hours using an organic zinc-rich primer to conform to the repair requirements of *AS/NZS 4680, clause 8.*

Rejected posts: Replace any post deemed excessively damaged and rejected by the Authorised Person.

This is a **WITNESS POINT**.

## 1.3.6 Erection of timber posts

### 1.3.6.1 Positioning of timber posts

Location: As shown on the drawings.

Top of the posts: To *AS/NZS 3845* unless otherwise shown on the drawings.

Level of the posts: On terminal ends, level the posts to conform to extended crossfall of the main pavement unless otherwise shown on the drawings.

Tolerance: Line the tops of posts within ± 20mm of the heights specified, or as nominated by the manufacturer. Make sure a smooth line both horizontally and vertically.

### 1.3.6.2 Polystyrene foam

Wrap posts: Wrap the section of the timber posts to be cast into a reinforced concrete footing in 12mm thick polystyrene foam sheeting before concrete casting.

### 1.3.6.3 Concrete Footings for timber posts

Minimum compressive strength: 32MPa at 28 days to conform to MITS 06B Paths, Driveways and Medians.

Footing size: 600mm diameter to *AS/NZS 3845.*

Tolerance of footing: 0 to + 50mm depth.

Overbreak: Fill over-excavation and excessive depth with 32MPa concrete at no cost to the Principal.

### 1.3.6.4 Reinforcing fabric

Specification: Wire fabric reinforcing as shown on the drawings.

## 1.3.7 Erection of road safety barrier rails

### 1.3.7.1 Blockouts, rail laps and stiffening pieces

Blockouts: Erect steel blockout pieces with the open section pointing in the same direction as adjacent traffic.

Rail laps: Arrange all rail laps in the same direction as adjacent traffic so that approach rail ends are not exposed to traffic.

Stiffening pieces: 300mm long, on intermediate posts.

### 1.3.7.2 Minor damage to galvanising

Protection: Handle and erect road safety barrier rails and blockout pieces to prevent damage to the galvanising.

Repairs: Repair any minor damage to the galvanising within 24 hours using an organic zinc-rich primer to conform to the repair requirements of *AS/NZS 4680, clause 8.*

#### 1.3.7.3 Excessive damage to rails or blockout pieces

Rejected: Replace any road safety barrier rails or blockout pieces deemed excessively damaged and rejected by the Authorised Person.

This is a **WITNESS POINT**.

#### 1.3.7.4 Erection procedure

Initial tightening: Tighten road safety barrier rail attachment bolts and splice bolts sufficiently to erect the barrier.

Levelling: Make adjustments to the rails using the slotted holes provided to produce a smooth regular line, free of any kinks or bumps.

Top of rails: Overall line of the top of the safety barrier rails to conform to the vertical alignment of the road pavement.

#### 1.3.7.5 Splice bolt tightening

Tightening: When the alignment both vertically and horizontally is obtained fully tighten the splice bolts to snug tight. The bolt head (not the shoulder) must be in full bearing with the rail.

## 1.3.8 End treatment of road safety barriers

#### 1.3.8.1 Leading, trailing terminals

Locations: At both approach and departure ends of the road safety barrier, as detailed on the drawings.

#### 1.3.8.2 Terminal sections

Locations: The approach and departure ends of double sided road safety barriers, as detailed on the drawings.

#### 1.3.8.3 MELT

Locations: At approach end locations of road safety barriers as shown on the drawings.

#### 1.3.8.4 Double sided safety barrier

Terminal sections: Locate terminal sections at the approach and departure ends of double sided road safety barriers as detailed on the drawings.

#### 1.3.8.5 Connections to rigid barriers

Construction details: Connect non-rigid road safety barrier connections to rigid road safety barriers or bridge parapets as detailed on the drawings and specified in *MITS 15C Rigid road safety barrier systems*.

## 1.3.9 Installation of wire rope safety barrier systems

### 1.3.9.1 Manufacturer's published requirements

Installation: Install Wire Rope safety barrier systems to conform to the manufacturer's specified requirements.

Concrete footings: Install all posts in concrete footings with suitable sockets including covers to the sockets. Do not use driven posts.

Intermediate blocks or tension bays: Install intermediate blocks or tension bays at the dimensions recommended by the manufacturer.

Footings: Installation to conform to the following:

- The manufacturer's published requirements.
- Uniform shape.
- Unless specified otherwise by the manufacturer, no protrusion above the finished surface level by more than 20mm.

Wire rope tension: Submit certification that the wire rope has been tensioned to conform to the manufacturer's published requirements. The certificate must include the date, time, ambient air temperature, tension force and signature and name of the individual managing the work at the time.

This is a **HOLD POINT**.

## 1.3.10 Delineators

### 1.3.10.1 Fixing

Standard: To *AS 1906.2.*

Locations: Fix delineators with brackets to the road safety barrier, to the details and at the locations shown on the drawings beginning at the first post and then to conform to the **Location of delineators table.**

**Table 15B-3 Location of delineators table**

| Radius of curve (m) | Spacing of reflectors on barrier every |
|---|---|
| **30–90** | 3rd post |
| **90–180** | 5th post |
| **180–275** | 8th post |
| **275–365** | 11th post |
| **over 365 (including straight road)** | 16th post |

### 1.3.10.2 Arrangement and colour

Direction of traffic: Arrange the delineators so that drivers approaching from either direction will see only red reflectors on their left side, and white reflectors on their right.

## 1.4 Completion

### 1.4.1 Submissions

Work as Executed Records: To *MITS 00B Quality Requirements*.

# 2 MEASUREMENT AND PAYMENT

## 2.1 Measurement

#### 2.1.1.1 General

Payments made to the Bill of Quantities: To *MITS 00A General requirements*, this Specification, the drawings and **Pay items**.

#### 2.1.1.2 Methodology

The following methodology will be applied for measurement and payment:

- Allow for all work, materials, testing and quality assurance requirements in each Pay Item.
- Concrete footings for posts: Paid under this Specification and not *MITS 06B Paths, Driveways and Medians.*

## 2.2 Pay items

**Table 15B-4 Pay items table**

| Item No | Pay items | Unit of measurement | Schedule of rates scope |
|---|---|---|---|
| 15B.1 | Single sided RSB | Linear metre of barrier constructed, measured along the centre line of the rail, centre to centre of posts, excluding terminal sections and connectors to RSB or bridge parapets. | All activities associated with the supply and installation of single sided RSB, including delineators and concrete footings for posts.<br>Separate pay items shall be included for each barrier type. |
| 15B.2 | Single sided RSB Terminal section | Each terminal section | All activities associated with the supply and erection of terminals including concrete footings.<br>A separate pay items shall be included for each terminal type:<br>Leading Terminal<br>Trailing Terminal |

| Item No | Pay items | Unit of measurement | Schedule of rates scope |
|---|---|---|---|
| 15B.3 | Connectors to rigid RSB or bridge parapet | Each connector section | All activities associated with the supply and erection of RSB connectors including concrete footings excluding the anchorage assemblies cast into the rigid RSB or bridge parapet.<br>Separate pay items shall be included for each connector type. |
| 15B.4 | Double sided RSB | Linear metre of barrier constructed, measured along the centre line of the rail, centre to centre of posts, excluding terminal sections and connectors to rigid safety barriers or bridge parapets. | All activities associated with the supply and installation of double sided RSB, including delineators and concrete footings for posts.<br>Separate pay items shall be included for each barrier type. |
| 15B.5 | Double sided RSB Terminal section | Each terminal section | All activities associated with the supply and erection of each terminal section. |
| 15B.6 | Steel Wire Rope Barrier | Linear meter of barrier constructed, measured along the centre line of the barrier, centre to centre of posts, excluding rope anchor terminal sections. | All activities associated with the supply and installation of steel wire rope barrier, including wire rope swaging, tensioning and application of delineators.<br>Separate pay items shall be included for each barrier type. |
| 15B.7 | Steel Wire Rope Barrier Anchor Terminal | Each terminal section | All activities associated with the supply and erection of each anchor terminal section, including supply and installation of concrete and any proprietary anchor system components required. |
| 15B.8 | Removal of RSB | Linear metre of barrier removed, measured along the centre line of the barrier, centre to centre of posts, including any terminal sections or connectors to rigid RSB or bridge parapets. | All activities associated with removal and legal disposal of RSB including footing.<br>This pay item shall include the supply, placement and compaction of backfill for the reinstatement.<br>A separate pay item shall be included in the Contract for each safety barrier type to be removed:<br>• Non-rigid barrier system<br>• Rigid barrier system |

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