

Main Roads Technical Standard

MRTS14

Road Furniture

IMPORTANT INFORMATION

The requirements of this document represent Technical Policy of the department and contain Technical Standards. Compliance with the department's Technical Standards is mandatory for all applications for the design, construction, maintenance and operation of road transport infrastructure in Queensland by or on behalf of the State of Queensland.

This document will be reviewed from time to time as the need arises and in response to improvement suggestions by users. Please send your comments and suggestions to the feedback email given below.

FEEDBACK

Your feedback is welcomed. Please send to mr.techdocs@tmr.qld.gov.au.

COPYRIGHT

© State of Queensland (Department of Transport and Main Roads) 2009

Copyright protects this publication. Except for the purposes permitted by and subject to the conditions prescribed under the Copyright Act, reproduction by any means (including electronic, mechanical, photocopying, microcopying or otherwise) is prohibited without the prior written permission of the department. Enquiries regarding such permission should be directed to the Road & Delivery Performance Division, Queensland Department of Transport and Main Roads.

DISCLAIMER

This publication has been created for use in the design, construction, maintenance and operation of road transport infrastructure in Queensland by or on behalf of the State of Queensland.

Where the publication is used in other than the department's infrastructure projects, the State of Queensland and the department gives no warranties as to the completeness, accuracy or adequacy of the publication or any parts of it and accepts no responsibility or liability upon any basis whatever for anything contained in or omitted from the publication or for the consequences of the use or misuse of the publication or any parts of it.

If the publication or any part of it forms part of a written contract between the State of Queensland and a contractor, this disclaimer applies subject to the express terms of that contract.

June 09

Table of Contents

	Page
1 INTRODUCTION.....	1
2 DEFINITION OF TERMS	1
3 REFERENCED DOCUMENTS	1
3.1 Standard Drawings.....	1
4 STANDARD TEST METHODS	2
5 QUALITY SYSTEM REQUIREMENTS	2
5.1 Hold Points, Witness Points and Milestones.....	2
5.2 Construction Procedures.....	2
6 SURPLUS MATERIAL	2
7 DEMOLITION OF ROAD FURNITURE AND ROADSIDE STRUCTURES	2
7.1 General.....	2
7.2 List of Items to be Demolished	2
7.3 Construction	2
8 REMOVAL AND SALVAGE OF ROAD FURNITURE.....	3
8.1 General.....	3
8.2 List of Items to be Salvaged	3
8.3 Storage Site.....	3
8.4 Construction	3
9 REMOVAL AND RE-ERECTION OF ROAD FURNITURE.....	3
9.1 General.....	3
9.2 List of Items to be Removed and Re-erected.....	3
9.3 Construction	3
10 ROAD EDGE GUIDE POSTS	4
10.1 General.....	4
10.2 Material Requirements	4
10.2.1 Timber Posts.....	4
10.2.2 Rigid Posts Other Than Timber	4
10.2.3 Flexible Posts.....	5
10.2.4 Delineators.....	6
10.3 Construction	6
10.3.1 Location	6
10.3.2 Installation.....	6
10.3.3 Delineators.....	6
11 FENCING	7
11.1 General.....	7
11.2 Scope	7
11.3 Material Requirements	7
11.3.1 General	7
11.3.2 Hardwood Timber Posts	7
11.3.3 Softwood Timber Posts (Excluding Cypress Pine)	7
11.3.4 Cypress Pine.....	7
11.3.5 Steel Posts, Stays and Rails.....	7
11.3.6 Galvanised Fencing Wire (Plain and Barbed)	7
11.3.7 Galvanised Chainwire	7
11.3.8 Galvanised Wire Netting	7
11.3.9 Welded Mesh.....	7
11.3.10 Steel Posts (Y-Section).....	7
11.4 Construction	7
12 GATES	8
12.1 General.....	8
12.2 Scope	8

12.3	Material Requirements	8
12.3.1	Gate Frame	8
12.3.2	Mesh.....	8
12.3.3	Other Fittings.....	8
12.4	Construction	8
13	SUPPLEMENTARY REQUIREMENTS.....	8

SUPERSEDED

Road Furniture

1 INTRODUCTION

This Technical Standard applies to the demolition and re-erection of and the supply and construction of road edge guide posts, fencing and gates.

This Technical Standard shall be read in conjunction with MRTS01 *Introduction to Technical Standards*, MRTS50 *Specific Quality System Requirements* and other Technical Standards as appropriate.

This Technical Standard forms part of the *Main Roads Specifications and Technical Standards Manual*.

2 DEFINITION OF TERMS

The terms used in this standard are as defined in Clause 3 of MRTS01 *Introduction to Technical Standards*.

3 REFERENCED DOCUMENTS

Table 3 lists documents referenced in this Technical Standard.

Table 3 – Referenced Documents

Reference	Title
AS 1163	Structural steel hollow sections
AS/NZS 1580.602.2	Paints and related materials – Methods of test – Measurement of specular gloss of non-metallic paint films at 20 degrees, 60 degrees and 85 degrees
AS/NZS 1906.1	Retroreflective materials and devices for road traffic control purposes – Retroreflective sheeting
AS/NZS 1906.2	Retroreflective materials and devices for road traffic control purposes – Retroreflective devices (non-pavement application)
AS 2082	Timber – Hardwood – Visually stress-graded for structural purposes
AS 2423	Coated steel wire fencing products for terrestrial, aquatic and general use
AS 2858	Timber – Softwood – Visually graded for structural purposes
AS/NZS 3678	Structural steel – Hot-rolled plates, floorplates and slabs
AS/NZS 3679.1	Structural steel – Hot-rolled bars and sections
AS/NZS 3679.2	Structural steel – Welded I sections
AS 3730.10	Guide to the properties of paints for buildings – Latex – Exterior – Gloss
AS 3730.13	Guide to the properties of paints for buildings – Primer – Wood – Solvent-borne – Interior/exterior
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
	<i>Building Timbers: Properties and Recommendations for their Use in Queensland (Queensland Department of Primary Industries)</i>
	<i>Queensland Timber Utilisation and Marketing Act 1987</i>

3.1 Standard Drawings

Table 3.1 lists the Standard Drawings referenced in this document.

Table 3.1 – Referenced Standard Drawings

Drawing Number	Title
1356	Road Edge Guide Posts – Timber and Tubular Steel Post and Installation Details
1600	Fencing – Rural Fence and Gates Timber Posts and Stays

Drawing Number	Title
1601	Fencing – Rural Fence and Gates CHS Posts and Stays
1602	Fencing – Chainwire Fences and Gates
1603	Fencing – Koala Proof Fence and Gate
1604	Fencing – Galvanized Welded Mesh Fencing

4 STANDARD TEST METHODS

There are no standard test methods referenced by this Technical Standard.

5 QUALITY SYSTEM REQUIREMENTS

5.1 Hold Points, Witness Points and Milestones

General requirements for Hold Points, Witness Points and Milestones are specified in Clause 5 of MRTS01 *Introduction to Technical Standards*.

The Hold Points and Milestones applicable to this Standard are summarised in Table 5.1. There are no Witness Points defined.

Table 5.1 – Hold Points and Milestones

Clause	Hold Point	Milestone
8.2	1. Dismantling of items to be salvaged.	Submission of schedule of items to be salvaged (7 days).
9.2	2. Dismantling of items to be re-erected.	Submission of schedule of items to be re-erected (7 days).

5.2 Construction Procedures

Construction procedures which are required to be submitted in accordance with Clause 1 of MRTS50 *Specific Quality System Requirements* are listed in Clause 2 of Annexure MRTS14.1.

6 SURPLUS MATERIAL

Surplus excavated, removed or demolished material shall be utilised or disposed of in accordance with the requirements of Clause 11 of MRTS01 *Introduction to Technical Standards*.

7 DEMOLITION OF ROAD FURNITURE AND ROADSIDE STRUCTURES

7.1 General

Clause 7 describes the work to be carried out where existing road furniture or roadside structures are required to be demolished.

7.2 List of Items to be Demolished

The items of road furniture to be demolished and disposed of are listed in Clause 3 of Annexure MRTS14.1.

7.3 Construction

Where necessary, excavations shall be carried out to permit demolition and removal of existing road furniture.

Existing road furniture shall be demolished and removed in a manner which avoids damaging any adjacent work. All existing footings shall be removed.

Resulting excavations shall be backfilled and finished so as to reinstate the area to a safe and free-draining state. Backfilling shall be carried out in accordance with the requirements of MRTS04 *General Earthworks*.

8 REMOVAL AND SALVAGE OF ROAD FURNITURE

8.1 General

Clause 8 describes the work to be carried out where existing road furniture is required to be removed and salvaged under the Contract.

8.2 List of Items to be Salvaged

Broadly, the items of road furniture to be salvaged are listed in Clause 1.1 of Annexure MRTS14.1.

Not less than 7 days prior to the commencement of dismantling and removal of any existing road furniture, the Contractor shall submit a schedule of items of existing road furniture to be salvaged in accordance with the provisions of the design documentation. **Milestone**

Dismantling and removal shall not commence until expiration of the 7 day period. **Hold Point 1**

8.3 Storage Site

Salvaged items shall be transported to the storage site nominated in Clause 1.2 of Annexure MRTS14.1.

8.4 Construction

Where necessary, excavations shall be carried out to permit removal of existing road furniture.

Existing road furniture to be salvaged shall be dismantled and removed with minimum damage to the items.

Where possible, fittings shall be undone, components disassembled and supports removed without any damage and/or cutting of the components. Where this is not possible, the method of dismantling shall be included in the schedule mentioned in Clause 8.2.

Any part of the existing installation which is not to be salvaged shall be demolished and removed in a manner which avoids damaging any adjacent work. All existing footings shall be removed.

Resulting excavations shall be backfilled and finished so as to reinstate the area to a safe and free-draining state. Backfilling shall be carried out in accordance with the requirements of MRTS04 *General Earthworks*.

Salvaged materials shall be carefully transported to the storage site nominated in Clause 8.3.

Salvaged materials shall be neatly stacked at the storage site on appropriate timber packers.

Where salvaged items are damaged during dismantling, transport or storage, steps may be taken to recover the value of such items from the Contractor.

9 REMOVAL AND RE-ERECTION OF ROAD FURNITURE

9.1 General

Clause 9 describes the work to be carried out where existing road furniture is required to be removed and re-erected under the Contract.

9.2 List of Items to be Removed and Re-erected

The items of road furniture to be removed and re-erected shall be as listed in Clause 4 of Annexure MRTS14.1.

Not less than 7 days prior to commencement of dismantling and removal of any road existing furniture, the Contractor shall submit a schedule of items of existing road furniture to be dismantled for re-erection in accordance with the provisions of the design documentation. **Milestone**

Dismantling and removal shall not commence until expiration of the 7 day period. **Hold Point 2**

9.3 Construction

Where necessary, excavations shall be carried out to permit removal of existing road furniture.

Existing road furniture to be salvaged and re-erected shall be dismantled and removed with minimum damage to the items.

Where possible, fittings shall be undone, components disassembled and supports removed without any damage and/or cutting of the components. Where this is not possible, the method of dismantling shall be included in the schedule mentioned in Clause 9.2.

Any part of the existing installation which is not to be salvaged for re-erection shall be demolished and removed in a manner which avoids damaging any adjacent work. All existing footings shall be removed.

Resulting excavations shall be backfilled and finished so as to reinstate the area to a safe and free-draining state. Backfilling shall be carried out in accordance with the requirements of MRTS04 *General Earthworks*.

Salvaged materials shall be safely stored on appropriate timber packers until they can be re-erected.

Salvaged material shall be re-erected in accordance with the appropriate clauses of this standard. New incidental materials that may be necessary to re-erect the road furniture shall be supplied (e.g. bolts, nuts, concrete, etc).

Where salvaged items, recovered in accordance with Clause 9, are damaged during dismantling, transport, storage or re-installation, such items shall be replaced by the Contractor.

10 ROAD EDGE GUIDE POSTS

10.1 General

Clause 10 describes the work to be carried out where road edge guide posts are required to be installed under the Contract.

10.2 Material Requirements

10.2.1 Timber Posts

10.2.1.1 Hardwood

Hardwood posts shall be durability class 1, 2 or 3 and have a stress grade of F5 or better, in accordance with AS 2082.

10.2.1.2 Softwood

Softwood posts shall be durability class 1, 2, 3 or 4. Durability class 4 softwood shall be preservative-treated to an H5 level in accordance with the *Timber Utilisation and Marketing Act 1987*, and any untreated heartwood shall not exceed 20% of the cross-sectional area. Softwood posts shall have a stress grade of F5 or better in accordance with AS 2858.

10.2.1.3 All Timber

Timber guide posts shall be graded under the authority of a recognised timber quality assurance program and be branded with the registered trade mark of the program.

All timber which is prone to excessive shrinkage and/or distortion shall have a moisture content less than 18%. All other timber may be unseasoned.

All posts shall be cut to the dimensions shown on Standard Drawing number 1356. Spring and bow in all posts shall not exceed 15 mm.

The above-ground section of posts shall be painted as follows –

- a) the timber surface shall be cleaned; and
- b) the surface shall receive one coat of pink solvent-borne wood primer in accordance with the requirements of AS 3730.13 and two coats of gloss latex paint in accordance with the requirements of AS 3730.10 with a gloss level in excess of 85 gloss units in accordance with the requirements of AS/NZS 1580.602.2.

10.2.2 Rigid Posts Other Than Timber

10.2.2.1 Materials

Road edge guide posts shall be composed of material which is heat resistant and fire retardant and which is capable of retaining 85% of its colour, appearance and physical properties for at least 5 years when exposed to weather conditions existing in Queensland. The materials shall be durable and resistant to mould growth

and mildew and shall not be affected by hydrocarbon solvents. All materials shall be corrosion resistant or treated to resist corrosion. The post materials shall also be resistant to ultraviolet light.

10.2.2.2 Colour

The surface of road edge guide posts shall be a durable gloss or semi-gloss opaque white colour.

10.2.2.3 Surface Finish

Road edge guide posts shall be free of sharp edges, burrs, discolouration or other defects which may affect appearance and/or serviceability.

10.2.2.4 Dimensions

The cross-sectional area of road edge guide posts is not critical but shall not differ from post to post by more than 3%. The following dimensional requirements shall, however, be satisfied –

- a) rigid posts shall have a minimum width of 80 mm facing traffic over at least the top 250 mm of their length; and
- b) posts shall be of such length to provide a height of 1000 mm above the ground surface and minimum anchoring depths of approximately 500 mm for buried posts and 350 mm for driven posts respectively.

10.2.2.5 Bending Strength

The minimum bending strength, at yield, at the weakest point of the road edge guide post (on a partially flattened section) shall be 0.3 kNm.

10.2.2.6 Weathering Resistance

Evidence to confirm that the post material has successfully completed an accelerated weathering test as set out in this Clause shall be included in the quality records.

A sample of the post material shall be subject to artificial weathering, i.e. exposed to accelerated UV aging, in a NATA-recognised weatherometer. The type of weatherometer, plus the dry and wet cycle durations shall be included in the test results. After exposure, the surface shall show no lightening from the original colour and no evidence of physical deterioration.

10.2.3 Flexible Posts

10.2.3.1 General

The requirements of Clause 10.2.2 above shall apply to flexible posts except as modified by Clauses 10.2.3.2 to 10.2.3.7.

10.2.3.2 Dimensions

Flexible posts shall have a minimum width facing traffic of 100 mm.

10.2.3.3 Bending Strength

No minimum bending strength shall apply to flexible posts.

10.2.3.4 Additional Testing

Evidence to confirm that the post has been subject to and passed the following tests shall be included in the quality records –

- a) heat resistance in accordance with the requirements of Clause 10.2.3.5;
- b) cold resistance in accordance with the requirements of Clause 10.2.3.6; and
- c) vehicle impact in accordance with the requirements of Clause 10.2.3.7.

10.2.3.5 Heat Resistance

The post shall be conditioned at 60 degrees C \pm 2 degrees C for 2 hours in an oven. The conditioned post shall be capable of straightening itself within 30 seconds when bent 90 degrees at the midpoint. This test shall be performed four times for both directions and each test shall be completed within 2 minutes of removal from the oven.

10.2.3.6 Cold Resistance

The post shall be conditioned at $0^{\circ}\text{C} \pm 2^{\circ}\text{C}$ (ice bath) for 2 hours. The following tests shall then be performed –

- a) The conditioned post shall be capable of straightening itself within 60 seconds when bent to 90 degrees at the midpoint. This test shall be performed four times for both directions. The post shall be reconditioned for 60 seconds between bend tests; and
- b) The conditioned post shall show no signs of fracturing, cracking or splitting when a steel ball weighing 1 kg is dropped a distance of 1.5 m through a vertical frictionless guide to impact the surface of the post. The surface of the post being struck by the ball shall be in a horizontal position, with the post supported and held in position at both ends. This impact test shall be carried out five times and concentrated near the middle of the post. The post shall be reconditioned for 60 seconds between impact tests.

10.2.3.7 Vehicle Impact

The post shall be capable of self-erecting and remaining serviceable after being subjected to a series of direct impacts by a typical passenger vehicle at temperatures between 15°C and 30°C . The posts to be tested shall be installed in accordance with the recommendations of the manufacturer and shall be furnished complete with attached delineators. The post shall be capable of withstanding a series of 10 bumper bar impacts directed to the front face of the guide post at a speed of 60 km/h and 5 bumper bar impacts at 90 degrees to the front face of the guide post at a speed of 100 km/h. The post shall return to within 5 degrees of vertical within 30 minutes of impact. The impacting vehicle shall suffer little or no damage during the impact tests.

10.2.4 Delineators

Each road edge guide post shall be supplied with either two delineators (one white and one red) or with a single delineator (red or white).

Delineators shall be affixed so that they are weatherproof and vandal resistant. The delineators shall be centrally located and placed so that the top of the reflector is between 50 mm and 100 mm from the top of the post. They shall have a minimum area of $5,000\text{ mm}^2$ in either circular (80 mm diameter) or rectangular (100 mm x 50 mm) configuration.

For rigid road edge guide posts, the delineators shall consist of either –

- a) Type A (corner cube) material which conforms with the requirements of AS/NZS 1906.2; or
- b) prismatic lens sheeting which meets the requirements of Class 1A material, as defined in AS/NZS 1906.1,

As stated in Clause 5 of Annexure MRTS14.1.

For flexible road edge guide posts, the delineators shall consist of prismatic lens sheeting which meets the requirements of Class 1A materials, AS defined in AS/NZS 1906.1. Corner cube or rigid backed delineators that can be damaged by vehicular impact shall not be used on flexible road edge guide posts.

10.3 Construction

10.3.1 Location

Road edge guide posts shall be located as shown in the design documentation and/or as determined from Standard Drawing number 1356.

10.3.2 Installation

Road edge guide posts may be installed by excavation and backfilling of a post hole or by driving, depending on the post material and the manufacturer's recommendations.

10.3.3 Delineators

On all carriageways, a red delineator shall be affixed to the face of the road edge guide post on the left hand side of the carriageway and a white delineator shall be affixed to the face of the road edge guide post on the right hand side of the carriageway, as seen from oncoming traffic. On divided carriageways, no delineators shall be affixed to the face of the guide post facing away from oncoming traffic.

11 FENCING

11.1 General

Clause 11 describes the work to be carried out where fencing is required to be installed under the Contract.

11.2 Scope

Details of the fencing required to be erected under the Contract are stated in Clause 6.1 of Annexure MRTS14.1.

11.3 Material Requirements

11.3.1 General

Material requirements shall be as shown in the design documentation, or where not so shown, as shown on Standard Drawings number 1600, 1601, 1602, 1603 and 1604.

11.3.2 Hardwood Timber Posts

In accordance with Building Timbers: Properties and Recommendations for their Use in Queensland, all hardwood timber posts shall be durability Class 1 or 2 and shall either have the sapwood removed from the section in the ground and to a distance of 100 mm above the ground or the sapwood shall be treated, to H5 level, with a fixed salt preservative of the CCA (Copper Chromium Arsenic) type to the requirements of the *Queensland Timber Utilisation and Marketing Act 1987*.

11.3.3 Softwood Timber Posts (Excluding Cypress Pine)

Softwood timber posts and fence droppers shall have no exposed heartwood, except on the ends, and the heartwood content shall not be greater than 10% of the cross-section area. All softwood posts shall be treated, to H5 level, with a fixed salt preservative of the CCA type to the requirements of the *Queensland Timber Utilisation and Marketing Act 1987*.

11.3.4 Cypress Pine

Cypress pine posts shall be completely free from sapwood.

11.3.5 Steel Posts, Stays and Rails

Steel posts, stays and rails shall comply with the requirements of AS 1163 and galvanised in accordance with AS/NZS 4680.

11.3.6 Galvanised Fencing Wire (Plain and Barbed)

Plain and barbed fencing wire shall comply with the requirements of AS 2423.

11.3.7 Galvanised Chainwire

Galvanised chainwire shall comply with the requirements of AS 2423.

11.3.8 Galvanised Wire Netting

Galvanised wire netting shall comply with requirements of AS 2423.

11.3.9 Welded Mesh

Welded mesh shall comply with the details shown in the design documentation.

11.3.10 Steel Posts (Y-Section)

Unless shown in the design documentation as galvanised, steel posts (Y-section) shall be supplied with a bronze coloured coating. Where galvanising is specified, galvanising shall be in accordance with AS/NZS 4680.

11.4 Construction

Fencing shall be constructed in the locations and to the details shown in the design documentation.

Minimum clearing only shall be carried out to allow for construction of the fence. Localised excavations shall be constructed where necessary.

Strainer posts or strainer assemblies shall be located at every change in horizontal direction and to the maximum spacings shown in the design documentation.

In undulating country, fencing shall be erected so that the post tops follow a smooth line, wherever possible.

Wires shall be strained in accordance with the manufacturer's recommendations and tied to the strainer posts and/or assemblies, intermediate posts and droppers with approved ties.

Special treatments at water crossings and grids, where necessary, shall be constructed to the details shown in the design documentation or, where not shown, be made secure against stock.

12 GATES

12.1 General

Clause 12 describes the work to be carried out where gates are required to be installed under the Contract.

12.2 Scope

Details of the gates required to be erected under the Contract are stated in Clause 6.2 of Annexure MRTS14.1.

12.3 Material Requirements

12.3.1 Gate Frame

Gate frames shall be constructed to the details shown in the design documentation, or where not so shown, to the details shown on Standard Drawings numbers 1600, 1601, 1602 and 1603, as applicable.

Gate frames shall be manufactured from round hollow section complying with AS 1163 and galvanised in accordance with AS/NZS 4680.

Fabrication shall be carried out in accordance with the requirements of MRTS78 *Fabrication of Structural Steelwork*.

12.3.2 Mesh

Mesh shall comply with the requirements shown in the design documentation.

12.3.3 Other Fittings

Other fittings shall be manufactured from steel complying with AS/NZS 3678, AS/NZS 3679.1 and AS/NZS 3679.2, as appropriate and hot-dipped galvanised in accordance with the requirements of AS/NZS 4680.

12.4 Construction

Gates shall be installed in the locations shown in the design documentation.

Erection details and clearance dimensions shall be as shown in the design documentation or, where not so shown, on Standard Drawings numbers 1600, 1601, 1602 and 1603, as applicable.

13 SUPPLEMENTARY REQUIREMENTS

The supplementary requirements given in Clause 7 of Annexure MRTS14.1 shall apply.