

CAPRICORN MUNICIPAL DEVELOPMENT GUIDELINES

GUARDRAIL

C264

CONSTRUCTION SPECIFICATION

TABLE OF CONTENTS

| CLAUSE | CONTENTS | PAGE |
|------------------------------------|--|----------|
| GENERAL | | 2 |
| C264.01 | SCOPE | 2 |
| C264.02 | REFERENCE DOCUMENTS | 2 |
| MATERIALS | | 2 |
| C264.03 | STEEL COMPONENTS | 2 |
| CONSTRUCTION | | 3 |
| C264.04 | GENERAL | 3 |
| C264.05 | ERECTION OF STEEL POSTS | 3 |
| C264.06 | ERECTION OF GUARDRAIL PANELS | 4 |
| C264.07 | END TREATMENT OF GUARDRAIL | 4 |
| C264.08 | DELINEATORS | 4 |
| LIMITS AND TOLERANCES | | 5 |
| C264.09 | SUMMARY OF LIMITS AND TOLERANCES | 5 |

Keeping the Capricorn Municipal Development Guidelines up-to-date

The Capricorn Municipal Development Guidelines are living documents which reflect progress of municipal works in the Capricorn Region. To maintain a high level of currency that reflects the current municipal environment, all guidelines are periodically reviewed with new editions published and the possibility of some editions to be removed. Between the publishing of these editions, amendments may be issued. It is important that readers assure themselves they are using current guideline, which should include any amendments which may have been published since the guideline was printed. A guideline will be deemed current at the date of development approval for construction works.

GENERAL

C264.01 SCOPE

C264.01.01 The work to be executed under this Specification consists of the setting out, supply of all materials and erection of guardrail at the locations shown on the Drawings.

C264.02 REFERENCE DOCUMENTS

C264.02.01 Documents referenced in this Specification are listed in full below whilst being cited in the text in the abbreviated form or code indicated.

*Documents
Standards
Test Methods*

(a) Council Specifications

- C201 - Control of Traffic
- C271 - Minor Concrete Works

(b) Australian Standards

- AS/NZS 1110 - ISO metric precision hexagon bolts and screws.
- AS 1111 - ISO metric hexagon commercial bolts and screws.
- AS 1214 - Hot-dip galvanised coatings on threaded fasteners.
- AS 1365 - Tolerances for flat-rolled steel products.
- AS 1391 - Method for tensile testing of metals.
- AS 1594 - Hot-rolled steel flat products.
- AS 1627.1 - Cleaning using liquid solvents and alkaline solutions.
- AS 1627.4 - Abrasive blast cleaning.
- AS/NZS 4680 - Hot dipped galvanised (zinc) coatings on fabricated ferrous article
- AS 1906.2 - Retroreflective devices (non-pavement application).
- AS 2082 - Visually stress-graded hardwood for structural purposes.
- AS/NZS 3845 - Road safety barrier systems and devices.

MATERIALS

C264.03 STEEL COMPONENTS

C264.03.01 Posts and blocking pieces shall be mild steel conforming to AS 1594, minimum Grade HU1, to the dimensions as detailed on the drawings.

Posts

C264.03.02 Rail elements and terminal pieces shall be mild steel conforming to AS 1594, minimum Grade HA250, to the dimensions as detailed on the drawings.

Rails

C264.03.03 The mechanical properties of the rail elements and terminal pieces, when tested in accordance with AS 1391, shall conform to the following requirements:

| | |
|--|---------|
| Yield Stress, typical | 272 MPa |
| Ultimate Tensile Stress, typical | 372 MPa |
| Elongation in 80mm, typical | 31% |

Tests

| | | |
|------------|---|-------------------|
| C264.03.04 | The rail elements shall comply with AS 1365 to the following tolerances: Metal thickness..... 2.6mm ± 0.21mm Mill tolerance on strip width +2.50mm, -0.0 Mill camber tolerance on 2000mm length..... 4.0mm max | Tolerances |
| C264.03.05 | All guardrail components are to be hot-dip galvanised after fabrication in accordance with AS/NZS 4680 to Class Z 600. Prior to galvanising, the surfaces shall be treated in accordance with AS 1627.1 and AS 1627.4. | Protection |
| C264.03.06 | Splice and post bolts shall comply with AS/NZS 1110 Grade 8.8 and other bolts to AS 1111 Grade 4.6. All bolts, nuts and washers shall be hot-dip galvanised in accordance with AS 1214. | Bolts |

CONSTRUCTION

C264.04 GENERAL

| | | |
|------------|---|-------------------------------|
| C264.04.01 | The Contractor shall at all times conform to the requirements of the Specification for CONTROL OF TRAFFIC C201. | Traffic Control |
| C264.04.02 | Guardrail is to be erected 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 by the Superintendent. | Timing of Construction |

C264.05 ERECTION OF STEEL POSTS

| | | |
|------------|--|--------------------------------|
| C264.05.01 | Underground cables and ducts laid in the guardrail area shall be located prior to the erection of posts and all care must be taken not to damage such cables and ducts. | Cables and Ducts |
| C264.05.02 | Steel posts are to be erected by driving, with the open section pointing in the same direction as adjacent traffic. | Orientation |
| C264.05.03 | The face of guardrail posts are to be located 285mm from the edge of shoulder and the top of the post 700mm above the edge or ground level, unless otherwise shown on the Drawings. | Positioning of Posts |
| C264.05.04 | Posts shall stand vertical and the spacing shall be such that when the guardrail is erected no post movement is necessary in order to align holes or for any other reason. | Spacing |
| C264.05.05 | The posts should be driven to the full depth shown on the Drawings. If this is not possible due to the presence of an underground obstruction, an alternative method of setting the posts, as approved by the Superintendent, shall be used. | Underground Obstruction |
| C264.05.06 | When erected in position the posts shall be on a smooth line both horizontally and vertically at a height of 530mm (± 10mm) from the nominal level of the pavement at the shoulder line to the centre of the guardrail attachment bolts. On flared ends the level of the posts shall be such as to conform to the extended crossfall of the main pavement. | Tolerances |

| | | |
|----------------|---|---|
| C264.05.07 | The posts are to be firm in the ground to the satisfaction of the Superintendent. | <i>Firmness</i> |
| | | |
| C264.06 | ERECTION OF GUARDRAIL PANELS | |
| C264.06.01 | Steel blocking pieces are to be erected with the open section pointing in the same direction as adjacent traffic. | <i>Orientation</i> |
| C264.06.02 | All rail laps shall be in the same direction as adjacent traffic. | <i>Rail Laps</i> |
| C264.06.03 | Backing/stiffening pieces, 300mm long, shall be used on intermediate posts. | <i>Backing Pieces</i> |
| C264.06.04 | Guardrail panels and steel blocking pieces are to be handled and erected in such a manner that no damage occurs to the galvanising. Any minor damage occasioned to the galvanising shall be repaired within 24 hours using an approved cold galvanising compound. | <i>Minor Damage to Galvanising</i> |
| C264.06.05 | Any guardrail panels or steel blocking pieces which have been excessively damaged will be rejected and shall be replaced by the Contractor. | <i>Contractor's Cost</i> |
| C264.06.06 | Guardrail attachment bolts and splice bolts are to be tightened initially such that the rail can be erected. Adjustments are then to be made to the rails using the slotted holes provided to produce a smooth regular line, free of any kicks or bumps. The overall line of the top of the guardrail panels is to visually conform to the vertical alignment of the road pavement. | <i>Erection Procedure</i> |
| C264.06.07 | When the alignment both vertically and horizontally is obtained the splice bolts are to be fully tightened. The bolt head (not the shoulder) should be in full bearing with the rail. The recess in the nut should face the bolt shoulder. Otherwise the splice will not be tight. | <i>Splices</i> |
| | | |
| C264.07 | END TREATMENT OF GUARDRAIL | |
| C264.07.01 | For undivided carriageways both approach and departure ends of the guardrail shall be flared and end anchorage panels with terminal sections as detailed on the Drawings. | <i>Undivided Carriageway</i> |
| C264.07.02 | For divided carriageways the approach end of the guardrail shall be flared and end anchorage panels with terminal section constructed and the departure end of the guardrail shall be unflared with end anchorage panel as detailed on the Drawings. | <i>Divided Carriageway</i> |
| | | |
| C264.08 | DELINEATORS | |
| C264.08.01 | Where shown on the Drawings, delineator brackets shall be attached to the centre of the guardrail under the special washer of the post bolt of the first post and then in accordance with Table C264. 10.1 – Reflector Spacing. | <i>Spacing</i> |

C264.08.02 Circular corner cube delineators, complying with AS 1906.2 shall be fixed to the brackets.

C264.08.03 The delineators shall be so arranged that drivers approaching from either direction will see only red reflectors on their left side, and white reflectors on their right.

Table C264. 10.1 – Reflector Spacing

| Radius of Curve m | Spacing of Reflectors on Guardrail every |
|---------------------------|--|
| 30 - 90 | 3rd post |
| 90 - 180 | 5th post |
| 180 - 275 | 8th post |
| 275 - 365 | 11th post |
| over 365 | 16th post |
| (including straight road) | |

LIMITS AND TOLERANCES

C264.09 SUMMARY OF LIMITS AND TOLERANCES

C264.09.01 The limits and tolerances applicable to the various clauses in this Specification are summarised in Table C264. 11.1 below:

Table C264. 11.1 - Summary of Limits and Tolerances

| Item | Activity | Limits/Tolerances | Spec Clause |
|------|---|---------------------|-------------|
| 1. | Vertical Alignment | | |
| | (a) Nominal shoulder line level to centre of guardrail attachment bolts | 530mm ± 10mm | C264.06 |
| 2. | Concrete Footings | | |
| | (a) Diameter | 500mm -0mm or +50mm | C264.07 |