



Technical drawing showing the bolt and nut assembly for the guardrail system. The drawing includes the following labels and dimensions:

- M16 Ø BOLT**
- FOR ATTACHMENT TO THE SUPPORTING POST**
- STANDARD NUT AND WASHER**
- REINFORCING PLATE (75 x 45 x 3)**
- SHAPED SHOULDER TO PREVENT ROTATION OF THE BOLT**
- GUARDRAIL PLATES**
- MIN. LENGTH = 400**
- RECESS IN NUT**
- M16 Ø BOLT FOR JOINING GUARDRAIL PLATES**
- GUARDRAILS**
- SHAPED SHOULDER TO PREVENT ROTATION OF THE BOLT**
- 30**

Technical drawing showing the front elevation and plan of a slotted hole.

FRONT ELEVATION

Dimensions:

- Overall height: 400 ± 5
- Height of upper section: 200
- Height of lower section: 200
- Overall width: 315 ± 5

PLAN

Dimensions:

- Overall length: 710 ± 15
- Length of upper section: 160 ± 5
- Length of lower section: 108
- Length of lower section: 108
- Overall width: 210 ± 50

Notes:

- USE M16 Ø SPLICED BOLTS FOR JOINTING OF RAILS AND END WINGS
- SLOTTED HOLE

Technical drawing of a baseplate showing dimensions and geometry. The baseplate is 16 units wide and 9 units high. The main body is 145 units wide and 70 units high. The top edge is a semi-circle with a radius of $R=18$. The bottom edge is a V-shape with a 70° angle. The distance from the center of the V to the right edge is 126 units.

Figure 1 is a cross-sectional diagram of a diamond-shaped traffic sign. The sign has a total height of 161 and a width of 17. It features a central circular area with a red border and a white center. The background is white retroreflective (Class 1), and the border is red retroreflective (Class 1). The sign is mounted on a base plate. A traffic direction arrow points to the right.

TRAFFIC DIRECTION ➡

Technical drawing of a steel cap welded to a steel post. The drawing shows a cross-section of the assembly. The steel cap is welded to the top of the steel post. Dimensions are given in millimeters (mm). The steel post has a diameter of 165 mm. The steel cap has a thickness of 12 mm. The drawing also shows the dimensions of the steel post and the steel cap, including the diameter of the post, the thickness of the cap, and the dimensions of the flange. The drawing is labeled with dimensions and material specifications.

STEEL CAP WELDED TO TOP OF STEEL POST

150 9450

165 Ø STEEL POST (23.55kg/m) AND GALVANIZED @ 458g/m²

180 150 180

MILD STEEL PLATE, 300 x 300, 12mm THICK AND WELDED TO POST BOLT HOLE POSITIONS AND PLATE SIZE BE CONFIRMED PRIOR TO MANUFACTURE

85

20 Ø GALVANIZED MILD STEEL RAW PIPE AND WASHER (50 MIN. LONG)

600 TO FINISH ROUNDED EDGE

GUARDRAIL SPECIFICATIONS	
1.	BOLT: HIGH TENSILE STEEL 16mmØ.
2.	WASHERS: 3mm THICK SPACER BLOCK: PINE OR GUM, PRESSURE IMPREGNATED IN ACCORDANCE WITH SANS 10005 WITH CREOSOTE WHICH COMPLIES WITH SANS 538 OR 539.
4.	POSTS: 160mmØ MIN - 230mmØ MAX, SALIGNA (BLUEGUM). PRESSURE IMPREGNATED IN ACCORDANCE WITH SANS 10005 WITH CREOSOTE WHICH COMPLIES WITH SANS 538 OR SANS 539.
5.	GALVANISING: GUARDRAILS: (SANS 1215/ISO 1461) TYPE A1 ARTICLES. BOLTS AND WASHERS: (SANS 1215/ISO 1461) TYPE C1 ARTICLES.
6.	TIMBER POSTS: POSTS SHALL COMPLY WITH THE REQUIREMENTS OF SANS 457 AND SHALL CARRY THE SANS MARK.
7.	REFLECTIVE PLATES: THE OUTER SURFACES SHALL BE COATED WITH AN ENGINEERING GRADE RETRO-REFLECTIVE MATERIAL WHICH COMPLIES WITH THE PROVISIONS OFS 191 IN THE COLOURS SHOWN ON DRAWING TD-R-GR-002.

NOTES ON GUARDRAIL ERECTION DETAILS:

1. THE HOLES FOR TIMBER POSTS SHALL BE OF SUFFICIENT SIZE TO PERMIT PROPER SETTING OF THE POSTS AND TO ALLOW SUFFICIENT ROOM FOR BACKFILLING.
2. AT LEAST 1.0m OF POST SHALL BE EMBEDDED IN THE GROUND.
3. HOLES FOR TIMBER POSTS SHALL BE SPACED TO SUIT THE STANDARD LENGTH OF GUARDRAIL SUPPLIED.
4. HOLES SHALL BE BACKFILLED (12:1) SOIL-CEMENT MIXTURE AT OPTIMUM MOISTURE CONTENT IN COMPACTED LAYERS NOT EXCEEDING 100mm.
5. WHERE JOINED, THE END OF THE GUARDRAIL WHICH OVERLAPS ON THE SIDE OF THE TRAFFIC SHALL POINT IN THE DIRECTION OF THE TRAFFIC MOVEMENT.

<p>NOTE: LENGTH OF GUARDRAIL = 4.130mm NORMAL SPACING OF POSTS = 3.810mm.</p>

REFER TO ELEVATION OF GUARDRAIL
TERMINATION TYPE A - AT APPROACHES FOR THE
VERTICAL DOWNWARD TAPERING DIMENSIONS.

TERMINAL SECTION TYPE B = 19.050m

19.050m (DOWNWARD TAPER)

(5 DOUBLE GUARDRAIL SECTIONS AT 1/2 SPACING OF POSTS)

3810

3810

1905

1500

1215

960

735

40

75

40

35

60

15

EDGE OF ROAD

DIRECTION OF TRAFFIC

NOTE:
PLASTIC REFLECTOR
PHOTOMOUNT VALUE > 10

PLAN - FLATTENED BASE
PLATE FOR REFLECTIVE LENS

PLAN - FLATTENED BASE
PLATE FOR REFLECTIVE LENS

NOTE:
PLATE MUST BE GALVANISED AFTER FABRICATION, BEFORE ASSEMBLY TO ENSURE THE GALVANISING IS NOT DAMAGED DURING BENDING.

The drawing shows a bent plate with the following dimensions and features:

- Overall width: 35
- Overall height: 75
- Inner radius: 35
- Outer radius: 75
- Angle: 90°
- Plate thickness: 10
- Distance from top edge to bend: 30
- Distance from bottom edge to bend: 30

SECTION O - O PLA
REFLE

PLAN - WHITE
REFLECTIVE VINYL

WHITE REFLECTIVE VINYL
7 YEAR, CLASS 1 ENGINEERING
GRADE REFLECTIVE TAPE - WHITE
ATTACHED TO GALVANISED
PLATE WITH PRESSURE
SENSITIVE GLUE.

POP RIVET X2
COMMERCIAL GRADE ALUMINIUM
POP RIVETS, 8mm x 4.8mm.
LENGTH IS NOT CRITICAL

1

Diagram illustrating the placement of guardrail reflective plates. The diagram shows a cross-section of a guardrail with reflective plates. Key dimensions and labels include:

- TRAFFIC DIRECTION (indicated by an arrow pointing right)
- SEE DETAIL B (pointing to a bolt)
- SEE DETAIL A (pointing to a post)
- POSITION OF GUARDRAIL REFLECTIVE PLATES (SPACING 7620 c/c)
- 1905 (HALF SPACING OF)
- 3810 (NORMAL SPACING OF)
- 600 (vertical dimension)

<p><u>GUARDRAIL WARRANT:</u></p> <ol style="list-style-type: none"> 1. WHERE THE ROAD IS IN FILL > 3.0m. 2. WHERE THERE IS PERMANENT WATER ADJACENT TO THE ROADWAY. 3. ON ALL BRIDGE APPROACHES. 4. AT OBSTRUCTIONS 1.0m AWAY FROM THE SHOULDER BREAKPOINT. 5. AT ANY DANGER POINT WHERE THE OFF-SHOULDER HAZARD IS GREATER THAN THE HAZARD OF THE GUARDRAIL. <p>THE ABOVE CRITERIA ARE TO BE APPLIED WITH DISCRETION AND THE POSITION OF ALL GUARDRAILS MUST BE CONFIRMED WITH THE ENGINEER PRIOR TO THE ERECTION THEREOF.</p>

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WOODEN POSTS ONLY SHALL BE USED FOR POSTS Nos 1 TO 9
NO DEVIATION FROM THIS LAYOUT SHALL BE PERMITTED.

POST SPACING FOR '3810' GUARDRAILS

3810

1905 1905 1905 953 952 953 476 476 470

1 2 3 4 5 6 7 8 9

GUARDRAIL TO CONTINUE INTO TERMINATION

ONE EXTRA STANDARD LENGTH GUARDRAIL PANEL FIXED TO FRONT AND REAR GUARDRAILS AS SHOWN

4128

STANDARD GUARDRAIL PANEL LENGTHS

ENDBLOCK

Technical drawing of a 1000mm x 1000mm plate with dimensions and annotations:

- Overall Dimensions:** 1000mm (4130mm) by 1000mm (315mm).
- Top Edge:**
 - Left side: 52mm, 216mm, 108mm.
 - Right side: 108mm, 108mm, 52mm.
- Bottom Edge:**
 - Left side: 160mm.
 - Right side: 160mm.
 - Center: 4130mm.
- Left Side:**
 - Vertical dimensions: 159mm, 159mm.
 - Horizontal dimension: 160mm.
- Right Side:**
 - Vertical dimensions: 159mm, 159mm.
 - Horizontal dimension: 160mm.
- Annotations:**
 - 8 SLOTS FOR SPLICE BOLTS (30x25mm):** Located along the top edge.
 - SLOT FOR BOLT (65x20mm):** Located near the bottom center.
 - POSTS @ 3810 c/c:** Located along the bottom edge.

75x45x3mm STEEL
REINFORCING PLATE
WITH SLOTTED HOLE
(40x30mm)

150 MIN.
230 MAX.

TRAFFIC DIRECTION →

16mmØ BOLT WITH NUT AND WASHER

180

25

150

84±5

138

315±5

360

205

180

395

1625

3

VARIES 170

3.25 NOMINAL MIN. FOR ALUMINIUM
2.6 NOMINAL MIN. FOR STEEL

TRAFFIC FACE OF GUARDRAIL (SEE SECTION AT POST BOLT HOLES)

POST BOLT HOLE

55±5°

SPLICE BOLT HOLES WITH CENTRES ON COMMON AXIS

84 ± 5

44

28

3

194

315 ± 5

75x45x3mm STEEL
REINFORCING PLATE
WITH SLOTTED HOLE
(40x30mm)

TRAFFIC DIRECTION ➡

CREOSOTE TREATED
SPACER BLOCK SALIGNA
(150x200x360mm)

TOP DIA.
180 MIN.
230 MAX.

100

150

84±5

TERMINAL SECTION TYPE A = 34.290m

19.050m (DOWNWARD TAPER)
(5 DOUBLE GUARDRAIL SECTIONS AT 1/2 SPACING OF POSTS)

15.240m (4 GUARDRAIL SECTION) AT FULL SPACING OF POSTS

3810 3810

500 135 576 440 324 226 144 80 36 12 1905

FINISHED ROAD LEVEL

GUARDRAIL POSTS

Diagram illustrating the layout and dimensions of Terminal Section Type A, which is 34.290m long.

The section is divided into the following segments:

- 19.850m (DOWNWARD TAPER):** This segment contains 5 double guardrail sections at 1/2 spacing of posts. The vertical height at the start is 1500mm, and it tapers to 907mm at the end of this section.
- 15.240m (4 GUARDRAIL SECTION) AT FULL SPACING OF POSTS:** This segment contains 4 guardrail sections at full spacing of posts. The vertical height at the start is 907mm, and it tapers to 905mm at the end of this section.
- 3810mm:** Two segments of 3810mm each, containing guardrail posts.

The total length of the terminal section is 34.290m. The diagram also shows the edge of the road and the guardrail posts.

		CONSTRUCTION RECORD (AS-BUILT) WORKS CONTRACT ENGINEER _____ Name: _____ Prof. Reg. No.: _____ Date: _____		 CIVIL AND STRUCTURAL ENGINEERS (Pty) LTD P. O. Box 72727 LYNNWOOD RIDGE 0040 Tel: 012-842 0000 Fax: 012-203 4429 e-mail - pta@sna.co.za		 KGAREBANA CIVIL & STRUCTURAL ENGINEERS (Pty) LTD 11 VLOTENBURG ROAD EQUESTRIA PRETORIA 0184 Tel: 012-542-0069 Fax: 071-254-4108 e-mail - kgem@kgarebana.co.za		DESIGNED BY NAME: _____ Prof. Reg. No.: _____ CHECKED BY NAME: _____ Prof. Reg. No.: _____ DRAWN BY NAME: _____		CONSULTANT APPROVAL Name: _____ KG. MALCOMSON Prof. Reg. No.: 889542 Date: 02 / 12 / 2019		HEAD OFFICE 48 Tambolie Avenue Val de Grace Pretoria 0001 PO Box 415 Pretoria 0001 South Africa Tel: (012) 844 8000		 SANRAL SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD BUILDING SOUTH AFRICA THROUGH BETTER ROADS Tel: (012) 426 0040		NORTHERN REGION 38 Ida Street Menlo Park Pretoria 0001 Private Bag X17 Lynnwood Ridge 0040 Tel: (012) 426 0040		THIS ACCEPTANCE IS FOR PROCEDURAL AND ADMINISTRATIVE REVIEW PURPOSES ONLY AND DOES NOT ATTRACT LEGAL LIABILITY OR LIABILITY OF ANY KIND FROM WHATSOEVER CAUSE OR HOWEVER ARISING MSBBR: REPAIRS TO BRIDGE PARAPETS; R40 NELSPRUIT B0064 AND R33 PIET RETIEF B3297 EMERGENCY REPAIR FOR BRIDGE B3297 ON R033/06N AT km 27.5		ACCEPTANCE Date: _____ For the SA NATIONAL ROADS AGENCY SOC LTD. _____ CONSULTANT DRAWING NO. 18312147 SANRAL DOCUMENT #		PROJECT NUMBER NRA X.002-063-2018/01-C05		BRIDGE/STRUCTURE NO. B3297 CONSULTANT DRAWING NO. 18312147 SANRAL DOCUMENT #		DRAWING LOCATION DATA ROUTE SECTION DRAWING KM DISTANCE DRAWING TYPE START R033 06N 27.5 STRUCTURES-BRIDGES		SCALE: AS SHOWN SHEET 07 OF 10		V2 12/11/2020 X1 DATE REVISION CONSULT.		SCANNED ORIGINAL WITH SIGNATURE ORIGINAL VERSION REVISION CONSULT.		KG MALCOMSON KG MALCOMSON KG MALCOMSON CONSULT.		SANRAL PROJECT MANAGER _____ Name: _____ Prof. Reg. No.: _____ Date: _____		V2 12/11/2020 X1 DATE REVISION CONSULT.		SCANNED ORIGINAL WITH SIGNATURE ORIGINAL VERSION REVISION CONSULT.		KG MALCOMSON KG MALCOMSON KG MALCOMSON CONSULT.		SANRAL PROJECT MANAGER _____ Name: _____ Prof. Reg. No.: _____ Date: _____		V2 12/11/2020 X1 DATE REVISION CONSULT.		SCANNED ORIGINAL WITH SIGNATURE ORIGINAL VERSION REVISION CONSULT.		KG MALCOMSON KG MALCOMSON KG MALCOMSON CONSULT.		SANRAL PROJECT MANAGER _____ Name: _____ Prof. Reg. No.: _____ Date: _____		V2 12/11/2020 X1 DATE REVISION CONSULT.		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