ROCK FILLED MATTRESS DETAIL:
- Galvanized wire or plastic coated wire mesh mattress filled with rock and securely fixed together.
- Mattress to be shaped to suit inlet and outlet ramps.
- Provide geotextile under rock filled mattress.

CROSS SECTION OF MATTRESS SHOULD BE 'DISH' SHAPED – SEE SECTION 2

Rock filled mattress detail:
- Galvanized wire or plastic coated wire mesh mattress filled with rock and securely fixed together.
- Mattress to be shaped to suit inlet and outlet ramps.
- Provide geotextile under rock filled mattress.

SECTION 1
- Not to scale

SECTION 2
- Not to scale

[Section 2 details]

LOW FLOW CHANNEL FOR FISH WHERE IDENTIFIED

PLATE TURF MINIMUM 1.5m WIDE BEHIND HEADWALL AND WINGWALLS IMMEDIATELY AFTER CONSTRUCTION OF BATTER TO PREVENT SCOUR

PIESE OR BOX CULVERT

PIPE OR BOX CULVERT

PLANT

CULVERT INLET OR OUTLET

NOTES

1. FOR ROCK SIZE REFER TO ROADS AND MARITIME SERVICES SPECIFICATION R55.

2. MATTRESS WORKS ARE TO ADDRESS THE NSW DEPARTMENT OF PRIMARY INDUSTRIES "POLICY AND GUIDELINES FOR FISH FRIENDLY WATER CROSSINGS".

INSTALLATION OF ROCK MATTRESS TO BE COMPLETED AS SOON AS PRACTICABLE FOLLOWING COMPLETION OF WING WALLS TO REDUCE THE RISK OF AN EROSION EVENT.

LOW FLOW CHANNEL FOR FISH WHERE IDENTIFIED

GEOTEXTILE

IDENTIFIED FOR FISH WHERE

LOW FLOW CHANNEL

(MATTRESS SHAPE TO SUIT INLET / OUTLET)

ROCKED FILLED MATTRESS DETAIL:
- Galvanized wire or plastic coated wire mesh mattress filled with rock and securely fixed together.
- Mattress to be shaped to suit inlet and outlet ramps.
- Provide geotextile under rock filled mattress.

CROSS SECTION OF MATTRESS SHOULD BE 'DISH' SHAPED – SEE SECTION 2

ROCK FILLED MATTRESS DETAIL:
- Galvanized wire or plastic coated wire mesh mattress filled with rock and securely fixed together.
- Mattress to be shaped to suit inlet and outlet ramps.
- Provide geotextile under rock filled mattress.

SECTION 1
- Not to scale

SECTION 2
- Not to scale

[Section 2 details]

LOW FLOW CHANNEL FOR FISH WHERE IDENTIFIED

PLATE TURF MINIMUM 1.5m WIDE BEHIND HEADWALL AND WINGWALLS IMMEDIATELY AFTER CONSTRUCTION OF BATTER TO PREVENT SCOUR

PIESE OR BOX CULVERT

PIPE OR BOX CULVERT

PLANT

CULVERT INLET OR OUTLET

NOTES

1. FOR ROCK SIZE REFER TO ROADS AND MARITIME SERVICES SPECIFICATION R55.

2. MATTRESS WORKS ARE TO ADDRESS THE NSW DEPARTMENT OF PRIMARY INDUSTRIES "POLICY AND GUIDELINES FOR FISH FRIENDLY WATER CROSSINGS".

INSTALLATION OF ROCK MATTRESS TO BE COMPLETED AS SOON AS PRACTICABLE FOLLOWING COMPLETION OF WING WALLS TO REDUCE THE RISK OF AN EROSION EVENT.

LOW FLOW CHANNEL FOR FISH WHERE IDENTIFIED

GEOTEXTILE

IDENTIFIED FOR FISH WHERE

LOW FLOW CHANNEL

(MATTRESS SHAPE TO SUIT INLET / OUTLET)
SHEETS OF

STANDARD DRAWING

ROAD DESIGN ENGINEERING

ROCK FILLED MATTRESS PROTECTION FOR CULVERTS AT INLETS AND OUTLETS

NOTES

1. FOR ROCK SIZE REFER TO ROADS AND MARITIME SERVICES SPECIFICATION R55.

2. MATTRESS WORKS ARE TO ADDRESS THE NSW DEPARTMENT OF PRIMARY INDUSTRIES "POLICY AND GUIDELINES FOR FISH FRIENDLY WATER CROSSINGS".

INSTALLATION OF ROCK MATTRESS TO BE COMPLETED AS SOON AS PRACTICABLE FOLLOWING COMPLETION OF WING WALLS TO REDUCE THE RISK OF AN EROSION EVENT.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

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STANDARD DRAWING

ROAD POLICY, SPECIFICATIONS AND TECHNOLOGY

ROCK FILLED MATTRESS FOR CULVERTS AT INLETS AND OUTLETS

0100-01

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**A. SINGLE STRIP METHOD**

1. Bury the top end of the organic fibre reinforced mesh strip (jute mesh) in a trench 150 or more in depth.
2. Tamper the trench full of soil, secure with a row of pins — minimum number 8.
3. Lay mesh along drain without stretching the mesh.
4. Overlap — bury upper end of lower strip as in 1 and 2.
5. Overlap end of top strip 150 and staple.
6. Erosion stop fold of mesh buried in slit trench and tampered double row of staples.
7. Staple the mesh along each edge and centre with two pins on each edge and 1 n centre per metre of mesh.
8. After seeding and laying jute mesh, apply a slow-breaking medium setting anionic bitumen emulsion at a rate in accordance with the Roads and Maritime Services specification R11 sprayed bituminous surfacing (with bitumen emulsion), a heavier application is to be made on outer edges and joints.
9. Anionic bitumen to be applied in all instances except upon the superintendent's discretion for environmental reasons.

**B. TWO OR MORE STRIPS METHOD**

1. Proceed as for single strip for each row, provide 150 overlap between adjoining strips and staple along top edge between strips.
2. After seeding and laying jute mesh, apply a slow-breaking medium setting anionic bitumen emulsion at a rate in accordance with the specification, a heavier application is to be made on outer edges and joints.
3. Anionic bitumen to be applied in all instances except upon the superintendent's discretion for environmental reasons.

**NOTES**

1. Prior to placing the organic fibre reinforced mesh (jute mesh), the drain shall be prepared in accordance with Roads and Maritime Services specification R11 stormwater drainage.
1. Locations selected continually during construction to protect works (i.e. may regularly change).
2. V-shaped channels are acceptable as the banks are usually constructed by a grader to function over a short period (e.g. overnight, weekend).
3. Channel grades to be 1% to 5%.
4. Banks to be adequately machine compacted to prevent failure.
5. Spacing between banks to be dependent upon slope and soil type.
6. Outlets from banks to discharge onto a stable area (e.g. rocks, natural undisturbed ground, timber windrow, sediment trap, geotextile batter drain). Bank outlets to extend past disturbed areas and not be too short.
7. Banks to be inspected after storm events and repaired as required.

**Spillway Detail**
1. Outlet to be level and minimum 2 metres in length.
2. Outlet spill to finish flush with natural surface on undisturbed or stabilised ground.
3. Area below, and at end of, outlet not to be disturbed.

**Permanent Diversion Banks**
- Location to be shown on design drawings.
- Channels to be parabolic or trapezoidal cross-section and not U-shaped.
- Channel grades to be 1% to 5%. Channel protection to be considered where erodible soils exist.
- The removal of trees and shrubs to be avoided where possible.
- Earth banks to be keyed into existing surface and machine compacted to prevent failure.
- Channels to be free of irregularities that will impede normal flow.
- Any stabilisation works to be completed within 10 days of construction (e.g. channel lining with organic reinforced jute mesh).
- Outlets from banks below disturbed construction areas to discharge onto a stable area (e.g. rocks, natural, undisturbed ground) and then into a sediment control if possible (e.g. sediment basin, sediment fence or similar).
- Outlets from banks draining disturbed areas to be discharged onto a stable area (e.g. rocks, natural, undisturbed ground within the same catchment from which the run-off originated).

**Temporary Diversion Banks**
- Locations selected continually during construction to protect works (i.e. may regularly change).
- V-shaped channels are acceptable as the banks are usually constructed by a grader to function over a short period (e.g. overnight, weekend).
- Channel grades to be 1% to 5%.
- Banks to be adequately machine compacted to prevent failure.
- Spacing between banks to be 30m (e.g. rocks, natural, undisturbed ground, timber windrow, sediment trap). Batter grade (batter drain). Bank outlets to extend past disturbed areas and not be too short.
- Banks to be inspected after storm events and repaired as required.

**Notes**
- Permanent diversion banks:
  - Location to be shown on design drawings.
  - Channels to be parabolic or trapezoidal cross-section and not U-shaped.
  - Channel grades to be 1% to 5%. Channel protection to be considered where erodible soils exist.
  - The removal of trees and shrubs to be avoided where possible.
  - Earth banks to be keyed into existing surface and machine compacted to prevent failure.
  - Channels to be free of irregularities that will impede normal flow.
  - Any stabilisation works to be completed within 10 days of construction (e.g. channel lining with organic reinforced jute mesh).
  - Outlets from banks below disturbed construction areas to discharge onto a stable area (e.g. rocks, natural, undisturbed ground) and then into a sediment control if possible (e.g. sediment basin, sediment fence or similar).
  - Outlets from banks draining disturbed areas to be discharged onto a stable area (e.g. rocks, natural, undisturbed ground within the same catchment from which the run-off originated).
- Temporary diversion banks:
  - Locations selected continually during construction to protect works (i.e. may regularly change).
  - V-shaped channels are acceptable as the banks are usually constructed by a grader to function over a short period (e.g. overnight, weekend).
  - Channel grades to be 1% to 5%.
  - Banks to be adequately machine compacted to prevent failure.
  - Spacing between banks to be dependent upon slope and soil type.
  - Outlets from banks to discharge onto a stable area (e.g. rocks, natural, undisturbed ground, timber windrow, sediment trap). Bathet grade (batter drain). Bank outlets to extend past disturbed areas and not be too short.
  - Banks to be inspected after storm events and repaired as required.

**Spillway Detail**
- Outlet to be level and minimum 2 metres in length.
- Outlet spill to finish flush with natural surface on undisturbed or stabilised ground.
- Area below, and at end of, outlet not to be disturbed.
TYPICAL LOCATIONS OF TEMPORARY DIVERSION BANKS

- SPLIT FLOW SYSTEM
- INTERRUPTED SPREADING SYSTEM
- CONTOUR FURROW ABSORPTION SYSTEM
- DIVERSION BANK ABSORPTION SYSTEM

- SERIES OF CONTOUR FURROWS AT CLOSE INTERVALS
- SMURF BANKS
- 0.5% GRADE
- TEMPORARY DIVERSION BANK

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.

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Sheet 1 of 2

R0100 SOIL AND WATER MANAGEMENT SERIES
DIVERSION BANK AND OUTLET SPREADING SYSTEM

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STANDARD DRAWING
ROAD DESIGN ENGINEERING
R0100-04
DIVERSION BANK AND OUTLET SPREADING SYSTEM
1. Check dams may be constructed of a variety of materials (e.g., straw bales, sediment fence, rock & geotextile, sheet piling, etc.).

2. Check dams to be trenched 200 mm into ground surface on basin and sides and securely backfilled.

3. Spillway to be over invert of drain with discharge not permitted to flow around ends.

4. Spillway to be less than 1 metre above invert of drain.

5. Some form of dissipation may be required below spillways of check dams (e.g., rock, sand bags).

6. Check dams to be spaced so the toe of the upstream check is level with the spillway of the next downstream check (refer to diagram above).

7. Check dams to be inspected after storm events and repaired as required.

Cross section of sediment fence check dam:
- Spillway created by:
  - Securing horizontal stake to vertical stakes [1] at a height of 1/3 to the height of the sediment fence.
  - Cutting the sediment fence and securing over the horizontal stake to create a window.

Cross section of straw bale check dam:
- Spillway created by:
  - Securing horizontal stake to vertical stakes [1].
  - Cutting the sediment fence and securing over the horizontal stake to create a window.

Notes:
- Check dams to be inspected after storm events and repaired as required.

All dimensions are in millimetres unless otherwise shown.
NOTES

1. A temporary bank may be required to divert formation run-off into a batter drain.

COMPACTED BUND 300WIDE X 200 HIGH

DRAIN OUTLET

DISSIPATOR (E.G. ROCK)

TEMPORARY BATTER DRAIN
(E.G. GEOTEXTILE LINED)

EARTH BUND

TEMPORARY BATTER DRAIN ON EMBANKMENTS

LEAVE BUND AT TOP OF SLOPE AT THE END OF EACH DAYS FILL Operation TO DISCHARGE INTO TEMPORARY BATTER DRAIN A temporary BAND MAY BE REQUIRED TO HELP DIVERT RUN-OFF INTO THE BATTER DRAIN.

ORIGINAL GROUND

EMBANKMENT CONSTRUCTION

PLACE 100 HIGH ROCK BUND AT INLET

GEOTEXTILE TRENCHED AND BACKFILLED AT TOP OF DRAIN

GEOTEXTILE LINED EMBANK

DOWN DRAIN (I.E. SIDES & MIDDLE)

AT REGULAR INTERVALS

GEOTEXTILE STAKED

'‘DISH’’ DRAIN

GEOTEXTILE LINED

DISPERSANT (E.G. ROCK)

TEMPORARY BANK MAY BE REQUIRED TO DIVERT RUN-OFF INTO BATTER DRAIN

SEDIMENT TRAP

DRAINAGE LINE

FILL SECTION

EARTH BUND

ROLL SURFACE TO SLOPE IN THIS DIRECTION

DOWNSTREAM

NATURAL

FILL BATTER

SEDIMENT CONTROL AT OUTLET

FILL BATTER

GEOTEXTILE TRENCHED AND BACKFILLED AT TOP OF DRAIN

DISPERSANT (E.G. ROCK)

DRAINAGE LINE

EARTH BUND

DRAINAGE LINE

CULVERT OUTLET

DRAINAGE LINE

DRAINAGE LINE

DRAINAGE LINE

DRAINAGE LINE
NOTES

1. DRIVE 1.5m LONG STAR PICKETS OR WOODEN POSTS INTO GROUND, 3.0m APART.

2. DIG A 1.5m DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE GEOTEXTILE TO BE ENTRENCHED AND SUITABLY COMPACTED TO PREVENT SCOURING.

3. BACKFILL TRENCH OVER BASE OF GEOTEXTILE.

4. FIX SELF-SUPPORTING GEOTEXTILE TO UPSLOPE SIDE OF POSTS WITH WIRE TIES OR AS RECOMMENDED BY GEOTEXTILE MANUFACTURER.

5. USE ONLY APPROVED GEOTEXTILE MATERIAL SUITABLE FOR SEDIMENT CONTROL.

DETAIL OF SILT FENCE
NOTES

1. SEDIMENT FENCES TO BE ERECTED ALONG A TERRAIN CONTOUR TO FILTER RUNOFF UNIFORMLY ALONG THE FENCE.
2. THE ENDS OF FENCES TO BE TAPERED UPHILL TO CONTAIN THE BUILDUP OF SEDIMENT.
3. CONCENTRATED FLOWS TO A SMALL AREA OF THE FENCE TO BE AVOIDED SO THAT CAPACITY ALONG THE ENTIRE LENGTH IS MAINTAINED.
4. FENCES TO HAVE A STABLE OVERFLOW POINT IN THE EVENT FLOW RATES EXCEED THE CAPACITY TO FILTER WATER.
5. FENCES HAVE THE FOLLOWING DESIGN LIMITS FOR OPTIMUM FUNCTION:
   (I) THE AREA DRAINING TO THE FENCE IS 0.6 HECTARES OR LESS;
   (II) THE MAXIMUM SLOPE LENGTH ABOVE THE FENCE IS 80 METRES;
6. IF IT IS NECESSARY TO CONSTRUCT A FENCE ACROSS THE SLOPE, TURNUPS SHOULD BE INSTALLED AS SHOWN IN DETAIL.
7. THE ENDS OF FENCES TO BE TAPERED UPHILL TO CONTAIN THE BUILDUP OF SEDIMENT.
8. FENCES TO HAVE A STABLE OVERFLOW POINT IN THE EVENT FLOW RATES EXCEED THE CAPACITY TO FILTER WATER.
9. THE MAXIMUM SLOPE LENGTH ABOVE THE FENCE IS 80 METRES.
10. FENCES TO BE INSPECTED AFTER STORM EVENTS AND REPAIRED AS REQUIRED.

GENERAL FEATURES OF ROADWAY EROSION AND SEDIMENTATION CONTROL
SEDIMENT TRAP AT DROP INLET UTILISING AN EXCAVATED TRENCH

SEDIMENT TRAP AT DROP INLET USING STRAW BALES WITH A CATCHMENT FROM ALL DIRECTIONS

SEDIMENT TRAP AT DROP INLET UTILISING STRAW BALES IN NARROW CHANNEL.
MULTIPLE PIPE OUTLET

SILT TRAP AT CULVERT OUTLET

FILL BATTER

RIP RAP Ø 150
(AS REQUIRED)

STAKES Ø 50 X 500
2 STAKES PER BALE

SILT TRAPPED WITHIN
BOX OF STRAW BALES

SILT TRAP AT CULVERT OUTLET

MULTIPLE PIPE OUTLET

EXCAVATE IF NECESSARY
FOR STORAGE

EARTH EMBANKMENT

OUTLET PROTECTION

TEMPORARY SETTLING BASIN AT OUTLETS

[SINGLE PIPE OUTLET]
NOTES

1. REMOVE ALL VEGETATION AND TOPSOIL FROM UNDER THE DAM WALL AND FROM WITHIN THE STORAGE AREA.
2. FORM A CUT-OFF TRENCH UNDER THE CENTRELINE OF THE EMBANKMENT 600 DEEP AND 1200 WIDE EXTENDING TO A POINT ON THE GULLY WALL ABOVE THE TOP OF THE RISER PIPE.
3. MAINTAIN THE TRENCH FREE OF WATER AND RECOMPACT THE MATERIALS WITH EQUIPMENT TO 95 PER CENT COMPACTION.
4. SELECT FILL THAT IS FREE FROM ROOTS, WOOD, ROCK, LARGE STONES OR FOREIGN MATERIAL.
5. PREPARE THE SITE UNDER THE EMBANKMENT BY RIPPING AT LEAST 100 DEEP TO HELP BOND COMPACTED FILL TO EXISTING SUBSTRATE.
6. SPREAD FILL IN 150 TO 150 LAYERS AND COMPACT AT OPTIMUM MOISTURE CONTENT.
7. INSTALL PIPE OUTLET WITH SEEPAGE COLLARS.
8. FORM-SATISFIES GRADES AT 2(H) : 1(V) UPSTREAM AND 3(H) : 1(V) DOWNSTREAM.
9. INSTALL PIPE OUTLET WITH SEEPAGE COLLARS.
10. CONSTRUCT EMERGENCY SPILLWAY 300MM ABOVE TOP OF RISER PIPE.
11. INSTALL PIPE OUTLET WITH SEEPAGE COLLARS.
12. CONSTRUCT EMERGENCY SPILLWAY 300MM ABOVE TOP OF RISER PIPE.
13. INSTALL PIPE OUTLET WITH SEEPAGE COLLARS.
14. PLACE A "FULL OF SEDIMENT" MARKER TO SHOW WHEN LESS THAN 100 PER CENT OF FILL IS REQUIRED.
15. PLACE A "FULL OF SEDIMENT" MARKER TO SHOW WHEN LESS THAN 100 PER CENT OF FILL IS REQUIRED.
16. CONSTRUCT EMERGENCY SPILLWAY 300MM ABOVE TOP OF RISER PIPE.
17. CONSTRUCT EMERGENCY SPILLWAY 300MM ABOVE TOP OF RISER PIPE.
18. CONSTRUCT EMERGENCY SPILLWAY 300MM ABOVE TOP OF RISER PIPE.
19. CONSTRUCT EMERGENCY SPILLWAY 300MM ABOVE TOP OF RISER PIPE.
20. CONSTRUCT EMERGENCY SPILLWAY 300MM ABOVE TOP OF RISER PIPE.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

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NOTES

1. REMOVE ALL VEGETATION AND TOPSOIL FROM UNDER THE DAM WALL AND FROM WITHIN THE STORAGE AREA.

2. FORM A CUT-OFF TRENCH UNDER THE CENTRELINE OF THE EMBANKMENT 600 MM DEEP AND 1200 WIDE EXTENDING TO A POINT ON THE GULLY WALL ABOVE THE RESERVOIR LEVEL.

3. MAINTAIN THE TRENCH FREE OF WATER AND RECOMPACT THE MATERIALS WITH EQUIPMENT TO 95 PER CENT COMPACTION.

4. SELECT FILL THAT IS FREE FROM ROOTS, WOOD, ROCK, LARGE STONES OR FOREIGN MATERIAL.

5. PREPARE THE SITE UNDER THE EMBANKMENT BY RIPPIING AT LEAST 150 MM DEEP TO HELP BOND COMPACTED FILL TO EXISTING SUBSTRATE.

6. SPREAD FILL IN 100 TO 150 LAYERS AND COMPACT AT OPTIMUM MOISTURE CONTENT.

7. CONSTRUCT EMERGENCY SPELLWAY AT SAME TIME AS BASIN CONSTRUCTION.

8. REHABILITATE STRUCTURE IN ACCORDANCE WITH SOIL AND WATER MANAGEMENT PLAN (SWMP).

9. PLACE A "FULL OF SEDIMENT" MARKER TO SHOW WHEN LESS THAN DESIGN CAPACITY OCCURS AND SEDIMENT REMOVAL IS REQUIRED.

10. REFER TO NSW DEPARTMENT OF ENVIRONMENT CLIMATE CHANGE "MANAGING URBAN STORMWATER - SOILS AND CONSTRUCTION" FOR OTHER REQUIREMENTS.

11. ALTERNATE TREATMENTS TO MATTRESS AT INLET AND OUTLET, SUCH AS CONCRETE, GRADING, RIP-RAP AND PLACED ROCK, TO BE DETERMINED ON SITE.
NOTES
1. REMOVE ALL VEGETATION AND TOPSOIL FROM UNDER THE DAM WALL AND FROM WITHIN THE STORAGE AREA.
2. FORM A CUTOFF TRENCH UNDER THE EMBANKMENT 600mm deep and 1200mm wide extending to a point on the other wall, above the top of the rivet pipe level.
3. MAINTAIN THE TRENCH-FREE OF WATER AND RECOMPACT THE MATERIALS WITH EQUIPMENT TO 95 PER CENT COMPACTION.
4. SELECT FILL MATERIAL FROM ROCKS, WOOD, ROCK, LARGE STONES OR FOREIGN MATERIAL.
5. PREPARE THE SITE UNDER THE EMBANKMENT BY SPRINKLING AT LEAST 100mm deep to help bind compacted fill to existing substrate.
6. SPREAD FILL IN 150mm TO 250mm LAYERS AND COMPACT AT OPTIMUM MOISTURE CONTENT.
7. INSTALL PIPE OUTLET WITH SEEPAGE COLLARS.
8. FORM BATTERS AT 2:1(H) UPSTREAM AND 3:1(V) DOWNSTREAM.
9. CONSTRUCT EMERGENCY SPILLWAY 300mm ABOVE TOP OF RIVER PIPE.
10. INSTALL A "FULL OF SEDIMENT" MARKER TO SHOW WHEN LESS THAN 50 PER CENT OF CAPACITY OCCURS AND SEDIMENT REMOVAL IS REQUIRED.
11. REFER TO NSW DEPARTMENT OF ENVIRONMENT CLIMATE CHANGE MANAGING URBAN STORMWATER - SOILS AND CONSTRUCTION FOR OTHER REQUIREMENTS.
12. LOCATION AND LEVEL OF SEDIMENTATION BASIN SHOWN ON THE CONSTRUCTION DRAWINGS REFER TO THIS POINT.
13. ALTERNATE TREATMENTS TO MATTRESS AT INLET AND OUTLETS, SUCH AS CONCRETE, GRADING, RIP-RAP AND PLACED ROCK TO BE ERODING NED ON S/T.
14. MINIMUM REQUIRED CAPACITY SHOWN AS AREAS A, B AND C ARE EQUALLY DEPENDENT ON AMOUNT OF SEDIMENT TO BE CAPTURED. FOR EXAMPLE, IF A VOLUME OF 50,000 LITRES IS REQUIRED TO BE CAPTURED, THEN AREAS A, B, C ARE EACH 6670 LITRES TOTALING 19,000 LITRES.
NOTES
1. CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATION A2. REFER TO RMS SPECIFICATION B80 AND AS3600-2009, FOR CONCRETE STRENGTH GRADE, COVER TO CLASSIFICATION A2. REFER TO RMS SPECIFICATION B80 AND AS3600-2009, FOR CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATIONS B2 & C. PROVIDE DAMP PROOF MEMBRANE FOR STEEL REINFORCEMENT AND FOR OTHER EXPOSURE CLASSIFICATIONS.
2. WEEPHOLES ARE TO BE PROVIDED AT 1800 CENTRES (MAXIMUM) AT OUTLET ONLY.
3. ALL STEEL BARS TO BE GRADE 400Y TO AS4671-2001.
4. MESH: LAPS SHALL BE MADE SO THAT THE TWO OUTERMOST WIRES OF ONE FABRIC OVERLAP THE TWO OUTERMOST WIRES OF THE SHEET BEING LAPPED.

REFERENCED DOCUMENTS:
- AS4671-2001 STEEL REINFORCING MATERIALS
- AS3600-2009 CONCRETE STRUCTURES
- AS3998-1989 CONCRETE WORK FOR BRIDGES

SECTION NOT TO SCALE

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QUANTITIES IN 2 HEADWALLS

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ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

STANDARD DRAWING
R0210 STORMWATER DRAINAGE SERIES - HEADWALLS
CONCRETE HEADWALLS SINGLE CELL Ø300mm TO Ø900mm
WITH CONCRETE APRON (2 TO 1 BATTER OR STEEPER)

CONCRETE N25 (SEE NOTE 1)

STEEL REINFORCEMENT

CONCRETE N25 (SEE NOTE 1)

WEEPHOLES:

OUTLET ONLY.

CONCRETE WORK FOR BRIDGES

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NOTES

1. CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATION A2. REFER TO AS3600-2009, SECTION 4 FOR CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATIONS.

2. WEERHOLES ARE TO BE PROVIDED AT 1800 CENTRES (MAXIMUM) AT OUTLET ONLY.

3. ALL STEEL BARS TO BE GRADE 400Y TO AS4671-2001.

REFERENCED DOCUMENTS:

- AS4671-2001 STEEL REINFORCING MATERIALS
- AS3600-2009 CONCRETE STRUCTURES
- SPECIFICATION R11 - STORMWATER DRAINAGE
- SPECIFICATION B80 - CONCRETE WORK FOR BRIDGES

CONCRETE HEADWALLS SINGLE CELL Ø300mm TO Ø900mm

WITH ROCK MATTRESS PROTECTION 170 mm THICK ROCK MATTRESS UNDERSIDES AND BANDS LINKED WITH GEOTEXTILE.

INLET PROTECTION 170 mm THICK ROCK MATTRESS
OUTLET PROTECTION 230 mm THICK ROCK MATTRESS
OUTLET ONLY.

WALL PROTECTION 170 mm THICK ROCK MATTRESS
INLET PROTECTION 170 mm THICK ROCK MATTRESS
2000 mm深いロックマットレス保護

EXPOSURE CLASSIFICATIONS B2 & C

PROVIDE DAMP PROOF MEMBRANE FOR EXPOSURE CLASSIFICATIONS B2 & C

DAMP PROOF MEMBRANE

NO. REQ LENGTH (mm) NOM COVER (SEE NOTE 1) (mm) NOMINAL PIPE DIAMETER (mm) LENGTH (mm) WEIGHT (kg) (m³)

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APRON DEPTH AT OUTLET
APRON DEPTH AT INLET
WINGWALL LENGTH
HEADWALL LENGTH
HEADWALL WIDTH
WINGWALL WIDTH
APRON WIDTH
APRON DEPTH AT OUTLET

CONCRETE NO3 (SEE NOTE 1)

a 2 TO 1 OR STEEPER

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

STANDARD DRAWING
ROAD DESIGN ENGINEERING
R0210 STORMWATER DRAINAGE SERIES - HEADWALLS
CONCRETE HEADWALLS SINGLE CELL, Ø300mm TO Ø900mm
WITH ROCK MATTRESS PROTECTION 170 mm THICK ROCK MATTRESS

STANDARD DRAWING NO.
REV.
DATE
AMENDMENT / REVISION DESCRIPTION
WVR NO.
APPROVAL

PREPARED BY
© Roads and Maritime Services

ENGINEERING SERVICES
ROAD DESIGN ENGINEERING

CONTRACTOR DRAWN
ISSUED
MANAGER ENGINEERING SERVICES

R0210-02

SEND FEEDBACK ON THIS STANDARD DRAWING TO

transportstandards@rms.nsw.gov.au
### Reinforcement for 2 Headwalls

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<th>Dia (in)</th>
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**Notes:**
1. Concrete thickness grade shown are for Exposure Classifications. Refer to AS2300.8, Section 4 for Concrete Reinforcement Covers and for other Exposure Classifications.
2. Clear cover to outer face of reinforcement 50 mm unless otherwise shown.
3. Concrete grade N25.
4. All bars to be Grade 400Y to AS4671-2001.
1. Concrete strength grades shown are for exposure classification A2. Refer to AS3600-2009, Section 4 for concrete strength grades shown are for exposure classification A2. Refer to AS3600-2009, Section 4 for concrete strength grades shown are for exposure classification A2. Refer to AS3600-2009, Section 4 for concrete strength grades shown are for exposure classification A2. Refer to AS3600-2009, Section 4 for concrete strength grades shown are for exposure classification A2. Refer to AS3600-2009, Section 4 for concrete strength grades shown are for exposure classification A2. Refer to AS3600-2009, Section 4 for concrete strength grades shown are for exposure classification A2. Refer to AS3600-2009, Section 4 for concrete strength grades shown are for exposure classification A2. Refer to AS3600-2009, Section 4 for concrete strength grades shown are for exposure classification A2. Refer to AS3600-2009, Section 4 for concrete strength grades shown are for exposure classification A2. 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**Concrete Headwalls Double Cell Ø300 mm to Ø900 mm**

- **Nominal Pipe Diameter** (mm):
  - Ø300
  - Ø375
  - Ø450
  - Ø525
  - Ø600
  - Ø750
  - Ø900

- **Length** (mm):
  - 310
  - 480
  - 680
  - 850

- **NOM Cover** (mm):
  - 150
  - 200
  - 200
  - 200
  - 200
  - 400
  - 400
  - 400

- **Apron Depth at Outlet** (mm)
  - 2 000
  - 2 000
  - 2 000
  - 2 000
  - 2 000
  - 3 000
  - 3 000
  - 3 000

- **Headwall Length** (mm)
  - 1 440
  - 1 600
  - 1 780
  - 1 940
  - 2 100
  - 2 440
  - 2 800

- **Wingwall Length** (mm)
  - 1 040
  - 1 400
  - 1 780
  - 2 055
  - 2 215
  - 2 555
  - 2 915

- **Wingwall Width** (mm)
  - 2 300
  - 2 600
  - 3 000
  - 3 300
  - 3 700
  - 4 400
  - 5 100

- **Concrete N25** (See Note 1)

**Notes:**
1. Concrete strength grades shown are for exposure classification A2. Refer to AS3600-2009, Section 4 for concrete strength grades, cover to reinforcement, and for other exposure classifications.
2. Weepholes are to be provided at 1800 centres (maximum) at outlet only.
3. All steel bars to be grade 40Y to AS4671-2001.
4. Spacing for multiple pipes as specified in R0240-01.

**References Documents:**
- AS4671-2001 Steel Reinforcing Materials
- AS3600-2009 Concrete Structures
- NSW Roads and Maritime Services

---

**Manufacture and construction must be consistent with R0240-01.**

---

**Document Details:**
- **Issue Date:** January 2017
- **Original Issue Date:**
- **Status:** Issued
- **Contact Details:**
  - technologystandards@rms.nsw.gov.au

---

**QR Code:**
- Scan to check

---

**Standard Drawing:**
- **Series:** R0210 Stormwater Drainage Series - Headwalls
- **Concrete Headwalls Double Cell Ø300 mm to Ø900 mm
- **WITH ROCK MATTRESS PROTECTION IN EXISTING DITCHES BATTER 2 TO 1 OR STEEPER.**

---

**Send Feedback:**
Send feedback on this standard drawing to:
- technologystandards@rms.nsw.gov.au

---

**Manager Road Policy, Specifications & Technology:**
- 02.01.17
- ProjectWise: DS2014_005793
- R0210-05

---

**Road Design Engineering:**
- Transport Road Services
- NSW Roads and Maritime Services
- NSW Government

---

**Scales on A3 Size Drawing:**
- 0 5 1 0 1 5 2 0 2 5 3 0 3 5 4 0 4 5 5 0 mm on A3 Original

---

**Statement:**
- This drawing may be prepared in colour and may be incomplete.

---

**Copyright:**
- © Roads and Maritime Services.
Manufacture and construction with R0240-01 must be consistent with R0240-01.

All dimensions are in millimeters unless otherwise shown.

Sheet A3

W/S Ref: DSR0214-005795

January 2017

SFR Manager Road Policy, Specifications & Technology

Road Design Engineering

R0210 STORMWATER DRAINAGE SERIES - HEADWALLS

Concrete Headwalls (Ø300 mm to Ø900 mm)

With Concrete Apron (2 to 1 Batter or Steeper)

1. Concrete strength grades shown are for exposure classification A2. Refer to AS3600-2009, Section 4 for concrete strength grades shown are for exposure classification A2. Refer to AS3600-2009, Section 4 for concrete strength grades shown are for exposure classification A2. Refer to AS3600-2009, Section 4 for concrete strength grades shown are for exposure classification A2.

2. Apron depth to be graded 9/10/17.

3. Outlet only.

4. Expansion joints shall be made so that the two outermost wires of one fabric overlap the two outermost wires of the sheet to be lapped.

5. Spacing for multiple pipes as specified in R0240-01.

Referenced Documents:

- Specification B80 - Concrete Work for Bridges
- Specification R11 - Stormwater Drainage
- AS3600-2009 Concrete Structures
- AS4671-2001 Steel Reinforcing Materials

NOTES:

1. Concrete strength grades shown are for exposure classification A2. Refer to AS3600-2009, Section 4 for concrete strength grades shown are for exposure classification A2. Refer to AS3600-2009, Section 4 for concrete strength grades shown are for exposure classification A2. Refer to AS3600-2009, Section 4 for concrete strength grades shown are for exposure classification A2.

2. Apron depth to be graded 9/10/17.

3. Outlet only.

4. Expansion joints shall be made so that the two outermost wires of one fabric overlap the two outermost wires of the sheet to be lapped.

5. Spacing for multiple pipes as specified in R0240-01.

Referenced Documents:

- Specification B80 - Concrete Work for Bridges
- Specification R11 - Stormwater Drainage
- AS3600-2009 Concrete Structures
- AS4671-2001 Steel Reinforcing Materials
**CONCRETE HEADWALLS TRIPLE CELL Ø300 mm TO Ø900 mm**

**NOT TO SCALE**

**ELEVATION**

- INLET PROTECTION 170 mm THICK ROCK MATTRESS OUTLET PROTECTION 230 mm THICK ROCK MATTRESS UNDERSIDE AND ENDS LINED WITH GEOTEXTILE
- OUTLET PROTECTION 230 mm THICK ROCK MATTRESS INLET PROTECTION 170 mm THICK ROCK MATTRESS
- EXPOSURE CLASSIFICATIONS B2 & C
- PROVIDE DAMP PROOF MEMBRANE FOR SECTION NOT TO SCALE

**SECTION**

- APRON DEPTH AT OUTLET 2000
- HEADWALL LENGTH 2110
- APRON WIDTH 2950
- WINGWALL LENGTH 1040

**DIMENSIONS (mm)**

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**NOTES**

1. CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATION A2. REFER TO AS3600-2009, SECTION 4 FOR CONCRETE STRENGTH GRADES.
2. ALL STEEL BARS TO BE GRADE 400Y TO AS4671-2001.
3. WEPPHOLES ARE TO BE PROVIDED AT 1800 CENTRES (MAXIMUM) AT OUTLET ONLY.
4. SPACING FOR MULTIPLE PIPES AS SPECIFIED IN R0240-01.

**REFERENCED DOCUMENTS:**

- AS3600-2009 CONCRETE STRUCTURES
- AS4671-2001 STEEL REINFORCING MATERIALS
- SPECIFICATION R11 - STORMWATER DRAINAGE

**SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au**

**MANAGEMENT REVIEW DATED: 20.01.17**
# Reinforcement for 2 Headwalls

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**NOTES**

1. CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATION A2. REFER TO AS4671-2001 FOR CONCRETE STRENGTH GRADE, COVER TO REINFORCEMENT AND FOR OTHER EXPOSURE CLASSIFICATIONS.

2. CLEAR COVER TO OUTER FACE OF REINFORCEMENT 50mm UNLESS OTHERWISE SHOWN.

3. CONCRETE GRADE N25.

4. ALL BARS TO BE GRADE 400Y TO AS4671-2001.

5. SPACING FOR MULTIPLE PIPES AS SPECIFIED IN R026-41.
Manufacture and construction of headwalls must be consistent with R0240-01.

1. CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATION A2. REFER TO AS3600-2009, SECTION 4 FOR CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATION.

2. MESH LAPS SHALL BE MADE SO THAT THE TWO OUTERMOST WIRES OF ONE FABRIC OVERLAP THE TWO OUTERMOST WIRES OF THE SHEET BEING LAPPED.

3. ALL STEEL BARS TO BE GRADE 400Y TO AS4671-2001.

4. MESH LAPS SHALL BE MADE SO THAT THE TWO OUTERMOST WIRES OF ONE FABRIC OVERLAP THE TWO OUTERMOST WIRES OF THE SHEET BEING LAPPED.

5. SPACING FOR MULTIPLE PIPES AS SPECIFIED IN R0240-01.

REFERENCED DOCUMENTS:

- AS4671-2001 STEEL REINFORCING MATERIALS
- AS3600-2009 CONCRETE STRUCTURES
- SPECIFICATION R11 - STORMWATER DRAINAGE
- SPECIFICATION B80 - CONCRETE WORK FOR BRIDGES

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NOTES:

1. CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATION A2. REFER TO AS3600-2009, SECTION 4 FOR CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATION.

2. MESH LAPS SHALL BE MADE SO THAT THE TWO OUTERMOST WIRES OF ONE FABRIC OVERLAP THE TWO OUTERMOST WIRES OF THE SHEET BEING LAPPED.

3. ALL STEEL BARS TO BE GRADE 400Y TO AS4671-2001.

4. MESH LAPS SHALL BE MADE SO THAT THE TWO OUTERMOST WIRES OF ONE FABRIC OVERLAP THE TWO OUTERMOST WIRES OF THE SHEET BEING LAPPED.

5. SPACING FOR MULTIPLE PIPES AS SPECIFIED IN R0240-01.

Referenced Documents:

- AS4671-2001 Steel reinforcing materials
- AS3600-2009 Concretes structures
- Specification R11 - Stormwater drainage
- Specification B80 - Concrete work for bridges
Manufacture and construction of headwalls must be consistent with R0240-01.

REFERENCED DOCUMENTS:
- AS4671-2001 STEEL REINFORCING MATERIALS
- AS3600-2009 CONCRETE STRUCTURES

NOTES:
1. CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATION A2. REFER TO AS3600-2009, SECTION 4 FOR CONCRETE STRENGTH GRADES.
2. WEEPHOLES ARE TO BE PROVIDED AT 1800 CENTRES (MAXIMUM) AT OUTLET ONLY.
3. OUTLET PROTECTION 230 mm THICK ROCK MATTRESS WITH ROCK MATTRESS PROTECTION (2 TO 1 BATTER OR STEEPER).
4. SPACING FOR MULTIPLE PIPES AS SPECIFIED IN R0240-01.

ELEVATION
- AS1219-1503 CONCRETE HEADWALLS FOUR CELL Ø300 mm TO Ø900 mm
- ALL STEEL BARS TO BE GRADE 400Y TO AS4671-2001.
- APRON DEPTH AT OUTLET 2000 mm (MAXIMUM) AT OUTLET ONLY.
- PORTION OF CONCRETE HEADWALL WITH ROCK MATTRESS PROTECTION (2 TO 1 BATTER OR STEEPER).
- PROVIDE DAMP PROOF MEMBRANE FOR EXPOSURE CLASSIFICATIONS B2 & C.

SECTION
- APRON DEPTH AT INLET 2000 mm (MAXIMUM) AT INLET ONLY.
- HEADWALL LENGTH 2680 mm.
- APRON WIDTH 3500 mm.
- PRODUCE DRAINAGE SERIES - HEADWALLS
- SECTION NOT TO SCALE
- PLAN
- ELEVATION
- NOT TO SCALE
1. CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATION A1 TO A3. REFER TO AS3600-2009, SECTION 4 FOR CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATIONS.

2. WEEPHOLES ARE TO BE PROVIDED AT 1800 CENTRES (MAXIMUM) AT EXPOSURE CLASSIFICATIONS.

3. ALL STEEL BARS TO BE GRADE 400Y TO AS4671-2001.

4. MESH LAPS SHALL BE MADE SO THAT THE TWO OUTERMOST WIRES OF ONE FABRIC OVERLAP THE TWO OUTERMOST WIRES OF THE SHEET BEING LAPPED.

5. SPACING FOR MULTIPLE PIPES AS SPECIFIED IN R0240-01.

REFERENCE DOCUMENTS:

- AS4671-2001 STEEL REINFORCING MATERIALS
- AS3600-2009 CONCRETE STRUCTURES
- SPECIFICATION R11 - STORMWATER DRAINAGE
- SPECIFICATION B80 - CONCRETE WORK FOR BRIDGES

NOTES

- CONCRETE HEADWALLS FIVE CELL Ø300 mm TO Ø900 mm
- CONCRETE APRON PROTECTION (2 TO 1 BATTER OR STEEPER)
- BEING LAPPED.
- ONE FABRIC OVERLAP THE TWO OUTERMOST WIRES OF THE SHEET

SPACING FOR MULTIPLE PIPES AS SPECIFIED IN R0240-01.
Manufacture and construction of headwalls

Must be consistent with R0240-01

ELEVATION

PLAN

SECTION

NOT TO SCALE

NOTES

1. Concrete strength grades shown are for exposure classification B1 to R1. Refer to AS3600-2009, Section 4 for concrete strength grades for other exposure classifications.

2. E1 bars are to be provided at 1800 centres (maximum) at outlet only.

3. All steel bars to be grade 400Y to AS4671-2001.

4. Spacing for multiple pipes as specified in R0240-01.

REFERENCED DOCUMENTS:

- Specification R11 - Stormwater Drainage
- AS3600-2009 Concrete Structures
- AS4671-2001 Steel Reinforcing Materials

INLET PROTECTION 110 mm thick rock mattress.

OUTLET PROTECTION 230 mm thick rock mattress.

INLET PROTECTION 170 mm thick rock mattress.

CONCRETE HEADWALLS FIVE CELL Ø300 mm TO Ø900 mm

американский ENGLISH - Официальный перевод
STANDARD DRAWING No.

REV.

DATE

AMENDMENT / REVISION DESCRIPTION

WVR No.

APPROVAL

A3

SCALES ON A3 SIZE DRAWING

0

5

10

15

20

25

30

40

50

mm

ON A3 ORIGINAL

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REVISION

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DRAWING TO :

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technologystandards@rms.nsw.gov.au

SHEET TO DRAWING NUMBER

STANDARD DRAWING ROAD DESIGN ENGINEERING

R0210 STORMWATER DRAINAGE SERIES - HEADWALLS

CONCRETE HEADWALLS SINGLE CELL Ø300 mm TO Ø900 mm

WITH CONCRETE APRON 3 TO 1 BATTER OR FLATTER

SHEET 1 OF 1

ROAD POLICY, SPECIFICATIONS

ENGINEERING SERVICES

1

AND TECHNOLOGY

20.01.17

MANAGER ROAD POLICY, SPECIFICATIONS & TECHNOLOGY

MANAGER ROAD POLICY, SPECIFICATIONS & TECHNOLOGY

ISSUED

SFR

MANAGER ROAD POLICY, SPECIFICATIONS & TECHNOLOGY

MANAGER ROAD POLICY, SPECIFICATIONS & TECHNOLOGY

DOCUMENT VER.

SCAN TO CHECK

ROAD POLICY, SPECIFICATIONS

ENGINEERING SERVICES

MANAGER ROAD POLICY, SPECIFICATIONS & TECHNOLOGY

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MANAGER ROAD POLICY, SPECIFICATIONS & TECHNOLOGY

MANAGER ROAD POLICY, SPECIFICATIONS & TECHNOLOGY

DOCUMENT VER.

SCAN TO CHECK

1. CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATIONS A2 AND B2. REFER TO AS3600-2009 SECTION 4 FOR CONCRETE STRENGTH GRADES, COVER TO REINFORCEMENT AND FOR OTHER EXPOSURE CLASSIFICATIONS.

2. WEEPHOLES TO BE PROVIDED AT 1800 CENTRES (MAXIMUM) AT OUTLET ONLY.

3. ALL STEEL BARS TO BE GRADE 400Y TO AS4671-2001.

4. MESH LAPS SHALL BE MADE SO THAT THE TWO OUTERMOST WIRES OF ONE FABRIC OVERLAP THE TWO OUTERMOST WIRES OF THE SHEET BEING LAPPED.

5. SPACING FOR MULTIPLE PIPES AS SPECIFIED IN R0240-01.

REFERENCES DOCUMENTS:

AS3600-2009 CONCRETE STRUCTURES

AS3700 2019 CONCRETE STRUCTURES

S40-2017 - STORMWATER DRAINAGE

S2-2000 - STEEL REINFORCING MATERIALS

NOTES

1. CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATIONS A2 AND B2. REFER TO AS3600-2009 SECTION 4 FOR CONCRETE STRENGTH GRADES, COVER TO REINFORCEMENT AND FOR OTHER EXPOSURE CLASSIFICATIONS.

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AS3700 2019 CONCRETE STRUCTURES

S40-2017 - STORMWATER DRAINAGE

S2-2000 - STEEL REINFORCING MATERIALS

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AS3700 2019 CONCRETE STRUCTURES

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S2-2000 - STEEL REINFORCING MATERIALS

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REFERENCES DOCUMENTS:

AS3600-2009 CONCRETE STRUCTURES

AS3700 2019 CONCRETE STRUCTURES

S40-2017 - STORMWATER DRAINAGE

S2-2000 - STEEL REINFORCING MATERIALS

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5. SPACING FOR MULTIPLE PIPES AS SPECIFIED IN R0240-01.
**STANDARD DRAWING No. R0210**

**ROAD DESIGN ENGINEERING**

**CONCRETE HEADWALLS SINGLE CELL Ø300 mm TO Ø900 mm**

---

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**CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATIONS A2. REFER TO AS3600-2009, SECTION 4 FOR CONCRETE STRENGTH GRADE, COVER TO REINFORCEMENT AND FOR OTHER EXPOSURE CLASSIFICATIONS**

**NOTES**

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2. WEEPHOLES ARE TO BE PROVIDED AT 1800 CENTRES (MAXIMUM) AT OUTLET ONLY.

3. EXPOSURE CLASSIFICATIONS. PROVIDE DAMP PROOF MEMBRANE FOR ROCK MATERIALS.

**REFERENCED DOCUMENTS:**

- AS4671-2001 STEEL REINFORCING MATERIALS
- AS3600-2009 CONCRETE STRUCTURES
- AS1181-2002 CONCRETE WORK FOR BRIDGES
- SPECIFICATION R11 - STORMWATER DRAINAGE
- SPECIFICATION B80 - CONCRETE WORK FOR BRIDGES
Manufacture and construction of headwalls

STANDARD DRAWING No.

REV
DATE
AMENDMENT / REVISION DESCRIPTION
WVR No.
APPROVAL

SCALES ON A3 SIZE DRAWING

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CONCRETE HEADWALLS DOUBLE CELL Ø300 mm TO Ø900 mm WITH CONCRETE APRON (3 TO 1 BATTER OR FLATTER)

DIAMETERS

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HEADWALL LENGTH

APRON WIDTH

WINGWALL LENGTH

APRON DEPTH

QUANTITIES IN 2 HEADWALLS

NOTES
1. CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATION A2. REFER TO AS3600-2009, SECTION 4 FOR CONCRETE STRENGTH GRADES SHOWN ARE FOR CONCRETE STRENGTH GRADE, COVER TO REINFORCEMENT AND FOR OTHER EXPOSURE CLASSIFICATIONS.
2. WEEPHOLES ARE TO BE PROVIDED AT 1800 CENTRES (MAXIMUM) AT OUTLET ONLY.
3. ALL STEEL BARS TO BE GRADE 400Y TO AS4671-2001.
4. MESH LAPS SHALL BE MADE SUCH THAT THE TWO OUTERMOST WIRES OF ONE FABRIC OVERLAP THE TWO OUTERMOST WIRES OF THE SHEET BEING LAPED.
5. SPACING FOR MULTIPLE PIPES AS SPECIFIED IN R0240-01.

REFERENCED DOCUMENTS:
AS4671-2001 STEEL REINFORCING MATERIALS
AS3600-2009 CONCRETE STRUCTURES
R0209-2009 CONCRETE WORK FOR BRIDGES

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@nsw.gov.au
**NOTES**

1. CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATION A. REFER TO AS3600-2009, SECTION 4 FOR CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATIONS.

2. WEEPHOLES ARE TO BE PROVIDED AT 1800 CENTRES (MAXIMUM) AT OUTLET ONLY.

3. ALL STEEL BARS TO BE GRADE 400Y TO AS4671-2001.

4. SPACING FOR MULTIPLE PIPES AS SPECIFIED IN R0240-01.

**REFERENCED DOCUMENTS:**

- AS4671-2001 STEEL REINFORCING MATERIALS
- AS3600-2009 CONCRETE STRUCTURES
- SPECIFICATION R11 - STORMWATER DRAINAGE

**Dimensions:**

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</table>

**Steel Reinforcement:**

- CONCRETE No25 (SEE NOTE 1)

**Concrete Headwalls Double Cell Ø300 mm to Ø900 mm with Rock Mattress Protection (3 To 1 Batter or Flatter)**

**OUTLET PROTECTION 230 mm THICK ROCK MATTRESS**

**INLET PROTECTION 175 mm Thick Rock Mattress**

**Underside and Ends Lined with Geotextile**

**All dimensions are in millimetres unless otherwise shown.**

**SEND FEEDBACK ON THIS STANDARD DRAWING TO: technologystandards@rms.nsw.gov.au**

**SPECIFIED ISSUE DATE:**

**ISSUED ON:**

**STANDARD DRAWING SERIES:**

**ROAD DESIGN ENGINEERING:**

**STORMWATER DRAINAGE SERIES - HEADWALLS**

**CONCRETE HEADWALLS DOUBLE CELL Ø300 mm to Ø900 mm with Rock Mattress Protection (3 To 1 Batter or Flatter)**

**ENGINEERING SERVICES:**

**MANUFACTURE AND CONSTRUCTION OF HEADWALLS UNDER REVIEW**

**STANDARD DRAWING No.:**

**REV.:**

**DATE:**

**AMENDMENT / REVISION DESCRIPTION:**

**PREPARED BY:**

**APPROVAL:**

**ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.**

**CONTRACT DETAILS:**

**SEND FEEDBACK ON THIS STANDARD DRAWING TO:**

**technologystandards@rms.nsw.gov.au**

**SHEET OF STANDARD DRAWING ROAD DESIGN ENGINEERING **

**ORIGINAL ISSUE DATE:** JANUARY 2017

**DOCUMENT VER.:**

**SCALES ON A3 SIZE DRAWING ON THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED**

**THIS SHEET IS UNDER REVIEW. MANUFACTURE AND CONSTRUCTION OF HEADWALLS UNDER REVIEW. MUST BE CONSISTENT WITH R0240-01.**

**CONTROL NUMBER:**

**MANAGER ROAD POLICY, SPECIFICATIONS & TECHNOLOGY:**

**SFR MANAGER ROAD POLICY, SPECIFICATIONS & TECHNOLOGY:**

**20.01.17**

**/DS2014_005807**

**R0210-18**

**LEASED PROJECTWISEQRCODELAYER**

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**Concrete Headwalls Triple Cell Ø300 mm to Ø900 mm**

**NOTES**
1. Concrete strength grades shown are for exposure classification A2, refer to AS3600-2009, section 4 for concrete strength grades shown are for exposure classification B2 & C.
2. Aprons to be provided at 1800 centres (maximum). All steel bars to be grade 400Y to AS4671-2001.
3. Outlet only.
4. M1 mesh shall be made so that the two outermost wires of one fabric overlap the two outermost wires of the sheet being lapped.
5. Spacing for multiple pipes as specified in R0240-01.

**REFERENCED DOCUMENTS:**
- AS4671-2001 Steel Reinforcing Materials
- AS3600-2009 Concrete Structures
- Specification R011 - Stormwater Drainage
- Specification B80 - Concrete Work for Bridges

**SCHEDULE OF MEASUREMENTS**

<table>
<thead>
<tr>
<th>Nominal Pipe Diameter (mm)</th>
<th>No. REQ</th>
<th>Length (mm)</th>
<th>Nominal Cover (mm)</th>
<th>Spacing</th>
<th>© Roads and Maritime Services</th>
<th>STANDARD DRAWING</th>
<th>ROAD DESIGN ENGINEERING</th>
<th>R0210 STORMWATER DRAINAGE SERIES - HEADWALLS</th>
<th>CONCRETE HEADWALLS TRIPLE CELL Ø300 mm to Ø900 mm</th>
<th>WITH CONCRETE APRON (3 TO 1 BATTER OR FLATTER)</th>
<th>SHEET 1 OF 1</th>
</tr>
</thead>
<tbody>
<tr>
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<td>10</td>
<td>405</td>
<td>116</td>
<td>261.6</td>
<td>9/10/17</td>
<td>R0210-19</td>
<td>R0210-01</td>
<td>STANDARD DRAWING R0210 STORMWATER DRAINAGE SERIES - HEADWALLS</td>
<td>CONCRETE HEADWALLS TRIPLE CELL Ø300 mm to Ø900 mm WITH CONCRETE APRON (3 TO 1 BATTER OR FLATTER)</td>
<td>SHEET 1 OF 1</td>
<td>© Roads and Maritime Services</td>
</tr>
</tbody>
</table>

**Dimensions**
- Headwall Length: 1830 to 2320
- Apron Width: 2580 to 3080
- Wingwall Length: 1560 to 2110
- Apron Depth: 1110

**Steel Reinforcement**
- E1 Bars: Ø12 mm
- M1 Mesh

**Concrete**
- S25

**Damp Proof Membrane**
- Provide damp proof membrane for exposure classifications B2 & C.
Concrete Headwalls Triple Cell Ø300 mm to Ø900 mm

<table>
<thead>
<tr>
<th>Ø12 mm E1 Bars</th>
<th>Qty</th>
<th>Ø100 Weepholes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Notes:**
1. Concrete strength grades shown are for Exposure Classification A refer to AS3600-2009. Section 4 for concrete strength grade, cover to reinforcement and for other exposure classifications.
2. Weepholes are to be provided at 1800 centres (maximum) at Outlet Only.
3. All Steel bars to be grade 400Y to AS4671-2001.
4. Spacing for multiple pipes as specified in R0240-01.

**Referenced Documents:**
- AS4671-2001 Steel Reinforcing Materials
- AS3600-2009 Concrete Structures
- R0210-20 Concrete Headwalls Triple Cell Ø300 mm to Ø900 mm with rock mattress protection

**Specifications:**
- R11 - Stormwater Drainage
**NOTES**

1. **CONCRETE STRENGTH GRADES** shown are for exposure classifications (see AS3600-2009, Section 4) and for other exposure classifications. 
2. **WEEPHOLES** are to be provided at 1800 centres (maximum at outlet only).
3. **ALL STEEL BARS** to be grade 400Y to AS4671-2001.
4. **MESH LAPS** shall be made so that the two outermost wires of one fabric overlap the two outermost wires of the sheet being lapped.
5. **BRACKS** for multiple pipes as specified in R0240-01.

**REFERENCED DOCUMENTS:**

- AS4671-2001 Steel Reinforcing Materials
- AS3600-2009 Concrete Structures
- Specification R11 - Stormwater Drainage
- Specification B83 - Concrete Work for Bridges

### Dimensions

<table>
<thead>
<tr>
<th>Nominal Pipe Diameter (mm)</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
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<tbody>
<tr>
<td>300</td>
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<td>450</td>
<td>525</td>
<td>600</td>
<td>750</td>
<td>900</td>
<td>150</td>
<td>300</td>
<td>300</td>
</tr>
</tbody>
</table>

**Steel Reinforcement:**

- **Concrete N25 (see note 1)**
  - M1 Mesh

**Concrete Headwalls Four Cell Ø300 mm to Ø900 mm with Concrete Apron (3 to 1 Batter or Flatter):**

- **Headwall Length (mm):** 1830, 2320, 2680, 3100, 3460, 3780, 4100, 4780, 5500
- **Apron Width (mm):** 3150, 3830, 4480, 5060, 5660, 6890, 8180
- **Wingwall Length (mm):** 1560, 2110, 2680
- **Apron Depth (mm):** 13180, 14460, 15900, 17180, 21660, 24380, 27260
- **Concrete N25 (see note 1)**

**Sections and Elevations:**

- **Elevation**
- **Plan**
- **Section**

**Scales on A3 Size Drawing:**

- 0.5 mm on A3 Original

**This Sheet is Not to Scale:**

- Referenced drawings and specifications shall be consistent with R0240-01.
CONCRETE HEADWALLS FOUR CELL Ø300 mm TO Ø900 mm

**DIMENSIONS**

<table>
<thead>
<tr>
<th>NOMINAL PIPE DIAMETER (mm)</th>
<th>L1</th>
<th>L2</th>
<th>No. REQ</th>
<th>LENGTH (mm)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>a</th>
<th>b</th>
<th>WINGWALL LENGTH (mm)</th>
<th>APRON WIDTH (mm)</th>
<th>APRON DEPTH AT INLET (mm)</th>
<th>HEADWALL LENGTH (mm)</th>
<th>WEEPHOLES</th>
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<tbody>
<tr>
<td>Ø300</td>
<td>200</td>
<td>200</td>
<td>4</td>
<td>1,980</td>
<td>11.7</td>
<td>12.8</td>
<td>18.3</td>
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<td>21.7</td>
<td>21.7</td>
<td>24.2</td>
<td>13,180</td>
<td>3,750</td>
<td>2,000</td>
<td>2,680</td>
<td>120°</td>
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<td>4</td>
<td>2,215</td>
<td>12.8</td>
<td>13.9</td>
<td>19.3</td>
<td>19.3</td>
<td>22.7</td>
<td>22.7</td>
<td>25.2</td>
<td>14,460</td>
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</table>

**STEEL REINFORCEMENT**

- CONCRETE N25 (SEE NOTE 1)

**NOTES**

1. CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATION A2. REFER TO AS3600-2009, SECTION 4 FOR CONCRETE STRENGTH GRADE, COVER TO REINFORCEMENT AND FOR OTHER EXPOSURE CLASSIFICATIONS.

2. WEEPHOLES ARE TO BE PROVIDED AT 1800 CENTRES (MAXIMUM) AT OUTLET ONLY.

3. EXPOSURE CLASSIFICATIONS.

4. SPACING FOR MULTIPLE PIPES AS SPECIFIED IN R0240-01.

**REFERENCED DOCUMENTS:**

- AS4671-2001 STEEL REINFORCING MATERIALS
- AS3600-2009 CONCRETE STRUCTURES
- SPECIFICATION R11 - STORMWATER DRAINAGE
### Dimensions

<table>
<thead>
<tr>
<th>Nominal Pipe Diameter (mm)</th>
<th>L1 (mm)</th>
<th>L2 (mm)</th>
<th>No. REQ</th>
<th>Length (mm)</th>
<th>W (mm)</th>
<th>a (mm)</th>
<th>b (mm)</th>
<th>S (mm)</th>
<th>W/2 (mm)</th>
<th>a (mm)</th>
<th>b (mm)</th>
<th>S (mm)</th>
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<td>1470</td>
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### Notes

1. Concrete strength grades shown are for exposure classification A refer to AS3600-2009, Section 4 for concrete strength grade, cover to reinforcement and for other exposure classifications.

2. Weepholes are to be provided at 1800 centres (maximum at outlet only).

3. All steel bars to be grade 400Y to AS4671-2001.

4. Mesh laps shall be made so that the two outermost wires of one fabric overlap the two outermost wires of the sheet being lapped.

5. Spacing for multiple pipes as specified in R0240-01.

### Referenced Documents

- AS4671-2001 Steel Reinforcing Materials
- AS3600-2009 Concrete Structures
- Specification R11 - Stormwater Drainage
- Specification B83 - Concrete Work for Bridges
- SPECIFICATION B80 - CONCRETE WORK FOR BRIDGES
- SPECIFICATION R11 - STORMWATER DRAINAGE
- REFERENCED DOCUMENTS:
  - AS3600-2009 CONCRETE STRUCTURES
  - AS4671-2001 STEEL REINFORCING MATERIALS

### Contact Details

Send feedback on this standard drawing to technologystandards@rms.nsw.gov.au
### Dimensions

<table>
<thead>
<tr>
<th>Nominal Pipe Diameter (mm)</th>
<th>L1</th>
<th>L2</th>
<th>No. REQ</th>
<th>Length (mm)</th>
<th>APRON DEPTH AT INLET (mm)</th>
<th>APRON DEPTH AT OUTLET (mm)</th>
<th>HEADWALL LENGTH (mm)</th>
<th>APRON WIDTH (mm)</th>
<th>WINGWALL LENGTH (mm)</th>
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<td>1300</td>
<td>5950</td>
<td>4350</td>
<td>150</td>
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### Notes
1. Concrete strength grades shown are for exposure classification A2. Refer to AS3600-2009, Section 4 for concrete strength grade, cover to reinforcement and for other exposure classifications.
2. Weepholes are to be provided at 1800 centres (maximum) at outlet only.
3. All steel bars to be grade 400Y to AS4671-2001.
4. Spacing for multiple pipes as specified in R0240-01.

### Referenced Documents:
- AS4671-2001 Steel Reinforcing Materials
- AS/NZS 3600-2009 Concrete Structures
- R11 - Stormwater Drainage

### Design Information
- **Type of Structure:** Concrete Headwalls
- **Series:** R0210 Stormwater Drainage Series
- **Headwalls:** Concrete headwalls four cell Ø300 mm to Ø900 mm
- **Protection:** Rock mattress protection

### Additional Information
- Inlet protection: 110 mm thick rock mattress
- Outlet protection: 230 mm thick rock mattress
- Underside and ends lined with geotextile
- Outlet protection 230 mm thick rock mattress
- Inlet protection 170 mm thick rock mattress
- Provide damp proof membrane for exposure classifications B2 & C
- Exposure classifications B2 & C
- Strength grade, cover to reinforcement, and for other exposure classifications

### Authoritative Source
- Roads and Maritime Services
- NSW Government

---

**Manufacture and construction with R0240-01 must be consistent.**

---

**UNDER REVIEW**
**NOTES**

1. Concrete strength grades shown are for exposure classification RL refer to AS 3600-2009. For concrete strength grades, cover to reinforcement and for other exposure classification.

2. All exposed surfaces to be 25 mm chamfer.

3. Concrete grade N25.
A

B

C1

C2

NOT TO SCALE

SECTION

ELEVATION

PLAN

NOTES

1. CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATION A1 referring to AS3600:2009, Section A. FOR CONCRETE STRENGTH GRADE, COVER TO REINFORCEMENT AND FOR OTHER EXPOSURE CLASSIFICATIONS.

2. CONCRETE STRENGTH GRADE N25 FOR EXPOSURE CLASSIFICATIONS B2 AND C.

3. EXPOSED SURFACES TO BE 25 mm CHAMFER.

HEADWALL FOR BOX CULVERT UP TO 600 x 300

CONCRETE m³

DIMENSIONS mm

NOMINAL SIZE mm

<table>
<thead>
<tr>
<th>C1</th>
<th>C2</th>
<th>A</th>
<th>B</th>
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<tr>
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<td>225</td>
<td>1 315</td>
<td>820</td>
</tr>
<tr>
<td>375</td>
<td>300</td>
<td>1 365</td>
<td>820</td>
</tr>
<tr>
<td>450</td>
<td>425</td>
<td>1 400</td>
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<tr>
<td>600</td>
<td>550</td>
<td>1 700</td>
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SDRTS NO. 20.01.17/DS2014_005818

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ELEVATION

SECTION

NOT TO SCALE

PLAN

NOTES
1. CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATION A REFER TO AS3600-2009, SECTION 4 FOR CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATIONS.
2. CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATION A REFER TO AS3600-2009, SECTION 4 FOR CONCRETE STRENGTH GRADES SHOWN ARE FOR EXPOSURE CLASSIFICATIONS.
3. EXPOSED SURFACES TO BE 25 mm CHAMFER.

<table>
<thead>
<tr>
<th>Ø D mm</th>
<th>PIPE</th>
<th>PER HEADWALL</th>
<th>CONCRETE m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>1.383</td>
<td>0.05</td>
<td>0.21</td>
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<tr>
<td>375</td>
<td>1.695</td>
<td>0.36</td>
<td>0.30</td>
</tr>
<tr>
<td>450</td>
<td>2.191</td>
<td>1.300</td>
<td>0.35</td>
</tr>
</tbody>
</table>

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.
NOTES

1. CONCRETE AS PER QA SPECIFICATION R93.
2. COVER INCLUDING EDGE COVER MUST BE 50 mm UNLESS OTHERWISE SHOWN.
3. REINFORCING STEEL TO BE IN ACCORDANCE WITH AZ/NZS 4671.
4. PRECAST UNIT MUST BE SECURED TO CURTAIN WALL IN ACCORDANCE WITH MANUFACTURER'S DESIGN DOCUMENTATION.
5. CAST IN-SITU SLAB MUST PROVIDE UNIFORM BEARING FOR PRECAST UNIT IN ACCORDANCE WITH THE PRECAST HEADWALL MANUFACTURER'S INSTRUCTIONS.
NOTES

1. CONCRETE GRADE N25.
2. SIDE WALLS OF PITS DEEPER THAN 1500 ARE TO BE REINFORCED WITH ONE LAYER OF RL1218 MESH RETURNED 300 INTO BASE.
3. PITS DEEPER THAN 600 TO BE FITTED WITH GALVANISED STEP IRONS.
4. ALL EXPOSED EDGES TO BE ROUNDED WITH 20 RADIUS.
5. MINIMUM COVER OF REINFORCEMENT SHALL BE 50 UNLESS SHOWN OTHERWISE.
6. LOCATION AND LEVEL OF GULLY PIT SHOWN IN THE DRAWINGS REFERS TO THIS POINT.
7. FOR DETAILS OF FRAME AND GRATE SEE R0220-04 AND R0220-05.
8. FOR PITS WITH PIPE DIAMETER GREATER THAN 450MM SEE R0220-28.
9. AT RIGHT ANGLE CHANGE IN PIPE DIRECTION, OUTLET INVERT TO BE 150 BELOW INLET INVERT.
10. DEPTH OF PIT NOT TO EXCEED 3000.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.

CONSTRUCTION MATERIALS

CONCRETE GRADE N25.
NOTES

1. CONCRETE STRENGTH N25.
2. STEEL: HOT DIP GALVANISED IN ACCORDANCE WITH AS4680.
3. SIDE WALLS OF PITS DEEPER THAN 1.5M TO BE REINFORCED WITH ONE LAYER OF 5.2MM MESH AND RETURNED INTO BASE.
4. STEP IRONS ARE REQUIRED WHERE PITS ARE DEEPER THAN 1.2M.
5. FOR DETAIL OF GRATE AND FRAMES SEE R0220-04 AND R0220-05.

GULLY PIT - TYPE SA WITHOUT KERB INLET FOR GRATE RL (CHANNEL INVERT)

1. PROVIDE SUBSURFACE DRAINS INTO PITS AS REQUIRED.
2. PRECAST CONCRETE LINTEL
3. SIDE WALLS OF PITS DEEPER THAN 1.5M TO BE REINFORCED WITH ONE LAYER OF 5.2MM MESH AND RETURNED INTO BASE.
4. STEP IRONS ARE REQUIRED WHERE PITS ARE DEEPER THAN 1.2M.
5. FOR DETAIL OF GRATE AND FRAMES SEE R0220-04 AND R0220-05.
NOTES

1. Steel grates and frames are to be fabricated from mild steel and hot dip galvanised.
2. Grating pattern and bar sizes may vary but shall be class D and bicycle safe in accordance with AS 3996 unless otherwise stated.

WELDED STEEL FRAME

PLAN
WELDED STEEL GRATING

SECTION
NOT TO SCALE

SECTION
NOT TO SCALE

SECTION
NOT TO SCALE
STANDARD DRAWING NO.  R0220-06

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

CONCRETE QUANTITIES

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<td>0.88</td>
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</table>

NOTES

1. CONCRETE GRADE N25
2. SIDE WALLS OF PIT DEEPER THAN 1500 TO BE REINFORCED WITH ONE LAYER OF SL22 MESH RETURNED INTO BASE
3. LOCATION AND LEVEL OF GULLY PIT SHOWN ON PLANS REFER TO THIS POINT

EXPANSION JOINT

GRATING CLEAR OPENING 522 × 407

TOP OF PIT 1 IN 12 SLOPE

PAVEMENT

ASPHALTIC CONCRETE FOR CONC. PAVEMENT SEE DETAIL

REINFORCEMENT WHERE REQUIRED

CONCRETE COVER

RECESS 80 × 25 TO CONTAIN R. 10 1/2 LIFTING BAR

FOR DETAILS OF GRATE AND FRAME SEE R0220-08

PLAN

SECTION NOT TO SCALE

SECTION NOT TO SCALE

DETAIL NOT TO SCALE

SHELL OF STANDARD DRAWING ROAD DESIGN ENGINEERING

PROJECT ORDER - 06

STANDARD DRAWING ROAD POLICY, SPECIFICATIONS AND TECHNOLOGY

EDITED BY MANAGER ROAD DESIGN SPECIFICATIONS & TECHNOLOGY

DATE  20.01.17

RECEIVED BY

SHEET 1 OF 1

ISSUED

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EXPANSION JOINT

GRATING CLEAR OPENING 522 × 407

25mm DEPRESSION AT GRATING

SECTION NOT TO SCALE

SECTION NOT TO SCALE

DETAIL NOT TO SCALE

SHELL OF STANDARD DRAWING ROAD DESIGN ENGINEERING

PROJECT ORDER - 06

STANDARD DRAWING ROAD POLICY, SPECIFICATIONS AND TECHNOLOGY

EDITED BY MANAGER ROAD DESIGN SPECIFICATIONS & TECHNOLOGY

DATE  20.01.17

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NOTES

1. CONCRETE GRADE N25.
2. LOCATION AND LEVEL OF GULLY PIT SHOWN IN THE DRAWINGS REFER TO THIS POINT.
3. SEE WALLS OF ALL PITS DEEPER THAN 1 500 TO BE REINFORCED WITH ONE LAYER OF 8 X 10 M.S. ANGLE.
4. DEPTH OF PIT NOT TO EXCEED 3 500.
5. PITS DEEPER THAN 1 200 TO BE FITTED WITH GALVANISED STEP IRONS.
6. ALL EXPOSED EDGES TO BE ROUNDED WITH 20 RADIUS.
7. CONCRETE GRADE N25.
8. FOR PIPES GREATER THAN 450 DIA. REFER TO R0220-28.
9. ALL EXPOSED EDGES TO BE ROUNDED WITH 20 RADIUS.

PLAN WITH COVER AND GRILLE REMOVED

CONCRETE COVER

ELEVATION OF INLET

SECTION

NOT TO SCALE
NOTES
1. CONCRETE GRADE N25
2. ALL EXPOSED EDGES TO BE ROUNDED WITH 20 mm RADIUS
3. ALL MILD STEEL MATERIAL TO BE GALVANISED ON COMPLETION
4. SEE WALLS OF ALL PITS DEEPER THAN 1.5 M TO BE REINFORCED WITH ONE LAYER OF SL82 MESH RETURNED 300 INTO BASE.
5. DEPTH NOT TO EXCEED 3.5 M
6. PITS DEEPER THAN 1.2 M TO BE FITTED WITH GALVANISED STEEL RAILS.

PROJECTWISE QR CODE
NOTES

1. STEEL GRATES AND FRAMES ARE TO BE FABRICATED FROM MILD STEEL AND HOT DIP GALVANISED.
2. GRATING PATTERN AND BAR SIZES MAY VARY BUT SHALL BE CLASS D AND ELECTRIC SAFE IN ACCORDANCE WITH AS 3688 UNLESS OTHERWISE STATED.

MILD STEEL GRILLE
1 REQUIRED

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au

MANAGER ROAD POLICY, SPECIFICATIONS & TECHNOLOGY
DATE

STANDARD DRAWING
ROAD DESIGN ENGINEERING
R0220 STORMWATER DRAINAGE SERIES - GULLY PITS
STANDARD GULLY PIT TYPE SF GRATINGS AND FRAMES

ISSUED
SIGNATURE
JANUARY 2017

© Roads and Maritime Services
PIPE TO BE ANCHORED TO OUTLET WITH 212 mm ROCK BOLTS.

AREA TO BE TRANSITIONED &STREAM LINED.

E A S E

NOTE:
1. CONCRETE GRADE N25
2. CONSTRUCT GULLY PIT IN REVERSE WHEN FLOW IS IN OPPOSITE DIRECTION.
3. WHERE GULLY PIT IS LOCATED UNDER GUARDRING, COVERS MAY BE OMITTED.
4. TO BE READ IN CONJUNCTION WITH THE SPECIFICATION.
**NOTES**

1. CONCRETE STRENGTH GRADE SHALL BE N25.
2. SEE WALLS OF ALL PITS DEEPER THAN 600 mm ARE TO BE REINFORCED WITH ONE LAYER OF SLD MESH RETURNED 200 MIN. MAYS INTO BASE.
3. DEPTH OF PIT NOT TO EXCEED 2500 mm (SPECIAL DESIGN REQUIRED).
4. ALL EXPOSED EDGES TO BE ROUNDED WITH 20 mm RADIUS.
5. PITS DEEPER THAN 1200 mm TO BE FITTED WITH STEPS.
6. LOCATION AND CHANNEL LEVEL OF GULLY PIT IN PLANS REFER TO THIS POINT.
7. FOR DETAILS OF GRATE AND FRAME SEE R0220-19.
NOTES

1. CONCRETE STRENGTH GRADE SHALL BE N25.
2. ERE WALLS OF ALL PITS DEEPER THAN 1200 mm ARE TO BE REINFORCED WITH ONE LAYER OF SL2 MESH RETURNED 200 mm INWARD.
3. DEPTH OF PIT NOT TO EXCEED 3500 mm (SPECIAL DESIGN REQUIRED).
4. GRATING PATTERNS AND BAR SIZES MAY VARY BUT GRATE SHALL BE CLASS C AND BICYCLE SAFE IN ACCORDANCE WITH AS2882 UNLESS OTHERWISE STATED.
5. PIT DEEPER THAN 1200 mm TO BE FITTED WITH STEPS.
6. LOCATION AND CHANNEL LEVEL OF GULLY PIT IN PLANS REFER TO THIS POINT.
7. MINSUM COVER TO OUTSIDE REINFORCEMENT 50 mm.
8. ALL EXPOSED EDGES TO BE ROUNDED WITH 20 mm RADIUS.

SECTION 1
FOR PIPES ≤ 265 mm I.D.

SECTION 2
FOR PIPES ≤ 462 mm I.D.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
NOTE:
1. CONCRETE STRENGTH GRADE SHALL BE N25.
2. LOCATION AND LEVEL OF GULLY PIT SHOWN IN DRAWINGS REFER TO THIS POINT.
3. SIDE WALLS OF ALL PITS DEEPER THAN 1500 ARE TO BE REINFORCED WITH ONE LAYER OF SL82 MESH RETURNED 300 MINIMUM INTO BASE.
4. DEPTH OF PIT NOT TO EXCEED 3500.
5. TRANSITION FROM TYPE A CATCH DRAIN TO SIDE OPENING IN PIT LENGTH = 2000.
6. ALL EXPOSED EDGES TO BE ROUNDED WITH 20 RADIUS.
7. IRONS.
8. FOR LARGE OR MULTIPLE PIPES REFER R0220-28.
9. FOR DETAILS OF TEMPORARY LID SEE R0220-42.
10. FOR DETAILS OF GRATE AND FRAME SEE R0220-19.

NOTE ON GULLY PITS:
- Temporary Lid
- Transition from Type A Catch Drain to Side Opening in Pit
- Section Views
- Concrete Strength Grade: N25
- All exposed edges to be rounded with 20 radius
- Irons
- For large or multiple pipes: Refer to R0220-28
- For details of Temporary Lid: See R0220-42
- For details of grate and frame: See R0220-19

NOTE ON CONCRETE:
- Concrete strength grade: N25
- Sections show details of concrete placement and reinforcement.
STANDARD DRAWING No.

REV

DATE

AMENDMENT / REVISION DESCRIPTION

WVR No.

APPROVAL

A3

SCALES ON A3 SIZE DRAWING

0 5

1 0

1 5

2 0

2 5

3 0

3 5

4 0

4 5

5 0 m m  O N  A 3  S I Z E  O R I G I N A L

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

PREPARED BY

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ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

NOWORKSHOP QR CODE

NOTES

1. CONCRETE STRENGTH GRADE SHALL BE N25.
2. LOCATION AND LEVEL OF GULLY FIT SHOWN IN DRAWINGS REFER TO THIS POINT.
3. SIDE WALLS OF ALL GULLY FIT DEEPER THAN 1500 ARE TO REINFORCED WITH ONE LAYER OF 82 MESH RETURNED 300 MINIMUM INTO BASE.
4. DEPTH OF PIT NOT TO EXCEED 3500.
5. PITS DEEPER THAN 1200 TO BE FITTED WITH GALVANISED STEEL IRONS.
6. ALL EXPOSED EDGES TO BE ROUNDED WITH 20 RADIUS.
7. FOR LARGE OR MULTIPLE PIPES REFER R0220-28
8. FOR DETAILS OF GRATE AND FRAME SEE R0220-19

TRANSITION

FROM LINED CATCH DRAIN (TYPE A & B)

TO SIDE OPENING PIT (LENGTH = 2000)

TYPE A - 1200

TYPE B - 2000

TYPE A - 950

TYPE B - 1300

TYPE SK1 GULLY PIT

CATCH DRAIN LINED

TYPE B - 1350

TYPE A - 950

NOTE: FOR DETAILS OF GRATE AND FRAME SEE R0220-19

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au

1. LOCATION AND LEVEL OF GULLY PIT SHOWN IN DRAWINGS REFER TO THIS POINT: LOCATION AND LEVEL OF GULLY PIT SHOWN IN DRAWINGS REFER TO THIS POINT.
2. CONCRETE STRENGTH GRADE SHALL BE N25.
3. SIDE WALLS OF ALL GULLY PITS DEEPER THAN 1200 ARE TO BE REINFORCED WITH ONE LAYER OF 82 MESH RETURNED 300 MINIMUM INTO BASE.
4. DEPTH OF PIT NOT TO EXCEED 3500.
5. PITS DEEPER THAN 1200 TO BE FITTED WITH GALVANISED STEEL IRONS.
6. ALL EXPOSED EDGES TO BE ROUNDED WITH 20 RADIUS.
7. FOR LARGE OR MULTIPLE PIPES REFER R0220-28
8. FOR DETAILS OF GRATE AND FRAME SEE R0220-19

NOTE: FOR DETAILS OF GRATE AND FRAME SEE R0220-19

SOURCE: PROJECTWISEQRCODE

ENGINEERING SERVICES ROAD DESIGN ENGINEERING

ROAD POLICY, SPECIFICATIONS AND TECHNOLOGY

ISSUED: JANUARY 2017

STANDARD DRAWING

R0220 STORMWATER DRAINAGE SERIES - GULLY PITS

TYPE SK1 GULLY PIT WITH LINED TYPE (A AND B) CATCH DRAIN INLET

REV

DATE

SHEET 1 OF 1

EDMS No.

STATUS

ISSUED

ISSUED:

20.01.17

R0220-18

12/2014/000939

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NOTES

1. STEEL GRATES AND FRAMES ARE TO BE FABRICATED FROM MILD STEEL
AND HOT DIP GALVANISED.

2. GRATING PATTERN AND BAR SIZES MAY VARY BUT SHALL BE CLASS D
AND BIKE SAFE IN ACCORDANCE WITH AS 3996 UNLESS OTHERWISE
STATED.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN
NOTES
1. CONCRETE STRENGTH GRADE SHALL BE N25.
2. SIDE WALLS OF ALL PITS DEEPER THAN 1.200 M TO BE REINFORCED WITH ONE LAYER OF SL82 MESH RETURNED 200 MM INTO BASE.
3. DEPTH OF PIT NOT TO EXCEED 3.500.
4. PITS DEEPER THAN 1.200 M TO BE FITTED WITH GALVANISED STEP IRONS.
5. ALL EXPOSED EDGES TO BE ROUNDED WITH 20 RADIUS IRONS.
6. LOCATION AND LEVEL OF GULLY PIT SHOWN IN THE DRAWINGS REFER TO THIS POINT.
7. FOR PIPE DIAMETERS GREATER THAN 750 MM OR MULTIPLE PIPES REFER R0220-28.
8. ALL EXPOSED STEEL TO BE GALVANISED IN ACCORDANCE WITH AS1214 AND TO BE 375 g/m².

PRECAST CONCRETE LINTEL
CONCRETE COVER
SUBSURFACE DRAIN
CLEANOUT AND OUTLET
LIFTING BAR.

CONCRETE COVER
TO SL82 MESH.
ANGLE WELDED 76X76X10 M.S.
SL82 MESH
NOTES

1. CONCRETE STRENGTH GRADE SHALL BE N25.
2. SEE WALLS OF ALL PITS DEEPER THAN 1.5M ARE TO BE REINFORCED WITH ONE LAYER OF SLIM MESH RETURNED 200 MM INTO BASE.
3. DEPTH OF PIT NOT TO EXCEED 3.5M (SPECIAL DESIGN REQUIRED).
4. PITS DEEPER THAN 1.25M TO BE FITTED WITH GALVANISED STEP IRONS.
5. ALL EXPOSED EDGES TO BE ROUNDED WITH 20 MM RADIUS.
6. LOCATION AND LEVEL OF GULLY PIT SHOWN IN THE DRAWINGS REFER TO THIS POINT.
7. FOR DETAILS OF GRATE AND FRAME SEE R0220-23.
NOTES
1. CONCRETE STRENGTH GRADE SHALL BE N25.
2. SEE WALLS OF ALL PITS DEEPER THAN 1 200 TO BE REINFORCED WITH ONE LAYER OF SL82 MESH RETURNED 200 MM MUM INTO BASE.
3. DEPTH OF PIT NOT TO EXCEED 3 500 (SPECIAL DESIGN REQUIRED).
4. PITS DEEPER THAN 1 200 TO BE FITTED WITH GALVANISED STEP IRONS.
5. ALL EXPOSED EDGES TO BE ROUNDED WITH 20 RADIUS.
6. LOCATION AND LEVEL OF GULLY PIT SHOWN IN PLANS REFER TO THIS POINT.
7. MINIMUM COVER TO OUTSIDE REINFORCEMENT 50.
8. FOR DETAILS OF GRADE AND FRAME SEE R0220-23.

SEND FEEDBACK ON THIS STANDARD TO technologystandards@rms.nsw.gov.au

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STANDARD DRAWING ROAD DESIGN ENGINEERING R0220 STORMWATER DRAINAGE SERIES - GULLY PITS STANDARD GULLY PIT SD2

SEE R0240-01 FOR SPACING OF MULTIPLE PIPES.

LARGE OR MULTIPLE PIPES

WELDING DETAILS
NOT TO SCALE

SECTION
NOT TO SCALE
FOR PIPES ≤ 500 mm I.D.

SECTION
NOT TO SCALE
FOR PIPES ≤ 400 mm I.D.

PLAN
PIT DETAILS

1540
1840
1 5 0
1 5 0

FRAME OVERALL
INVERT
SHOULDER

C-12
500
O.D. + 200 (MIN)
O.D.

C-12 410Y AT 200 SPACING

50
150
100
100
150
150

100 DIA. HOLE FOR CLEANOUT WHERE REQUIRED.
100 DIA. HOLE FOR S/BIGG DRAIN OUTLET WHERE REQUIRED.

FRAME
SHOULDER

CHANNEL

PIT DETAILS
GRATING
REMOVED

INVERT

WELDING DETAILS
NOT TO SCALE

SECTION
NOT TO SCALE
FOR PIPES ≤ 500 mm I.D.

SECTION
NOT TO SCALE
FOR PIPES ≤ 400 mm I.D.

FRAME OVERALL
INVERT
SHOULDER

C-12
500
O.D. + 200 (MIN)
O.D.

C-12 410Y AT 200 SPACING

50
150
100
100
150
150

100 DIA. HOLE FOR CLEANOUT WHERE REQUIRED.
100 DIA. HOLE FOR S/BIGG DRAIN OUTLET WHERE REQUIRED.

FRAME
SHOULDER

CHANNEL

PIT DETAILS
GRATING
REMOVED

INVERT

WELDING DETAILS
NOT TO SCALE

SECTION
NOT TO SCALE
FOR PIPES ≤ 500 mm I.D.

SECTION
NOT TO SCALE
FOR PIPES ≤ 400 mm I.D.

FRAME OVERALL
INVERT
SHOULDER

C-12
500
O.D. + 200 (MIN)
O.D.

C-12 410Y AT 200 SPACING

50
150
100
100
150
150

100 DIA. HOLE FOR CLEANOUT WHERE REQUIRED.
100 DIA. HOLE FOR S/BIGG DRAIN OUTLET WHERE REQUIRED.

FRAME
SHOULDER

CHANNEL

PIT DETAILS
GRATING
REMOVED

INVERT

WELDING DETAILS
NOT TO SCALE

SECTION
NOT TO SCALE
FOR PIPES ≤ 500 mm I.D.

SECTION
NOT TO SCALE
FOR PIPES ≤ 400 mm I.D.

FRAME OVERALL
INVERT
SHOULDER

C-12
500
O.D. + 200 (MIN)
O.D.

C-12 410Y AT 200 SPACING

50
150
100
100
150
150

100 DIA. HOLE FOR CLEANOUT WHERE REQUIRED.
100 DIA. HOLE FOR S/BIGG DRAIN OUTLET WHERE REQUIRED.

FRAME
SHOULDER

CHANNEL

PIT DETAILS
GRATING
REMOVED

INVERT

WELDING DETAILS
NOT TO SCALE

SECTION
NOT TO SCALE
FOR PIPES ≤ 500 mm I.D.
NOTES

1. Steel grates and frames are to be fabricated from mild steel and hot-dip galvanised.
2. Grating pattern and bar sizes may vary but shall be class D and bicycle safe in accordance with AS 3996 unless otherwise stated.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
NOTES

1. CONCRETE GRADE N25.
2. SEE WALLS OF ALL PITS DEEPER THAN 1,000 mm ARE TO BE REINFORCED WITH ONE LAYER OF 6.3 MESH RETURNED 200 mm INTO BASE.
3. DEPTH OF PIT NOT TO EXCEED 2,500 mm, SPECIAL DESIGN REQUIRED WHERE DEPTH GREATER THAN 1,500 mm.
4. PITS DEEPER THAN 1,200 mm TO BE FITTED WITH STEP IRONS.
5. WHERE LONGITUDINAL PIPE DIAMETER EXCEEDS 600 mm, PIT WALLS TO BE STEPPED IN ACCORDANCE WITH DSD24X00544.
6. LOCATION AND LEVEL OF REFERENCE POINT SHOWN ON DESIGN PLANS.
7. FOR DETAILS OF GRATE AND FRAME SEE R0220-05

All dimensions are in millimetres unless otherwise shown.
SECTION NOT TO SCALE

SECTION NOT TO SCALE

PIT REFERENCE POINT

PIT REFERENCE POINT

FLOW

FLOW

150
150
620 MIN

150
150
620 MIN

SECTION

SECTION

FOR GRATE AND FRAME DETAILS

SEE R0220-26

SEE R0220-26

1

2

1

2

1

2

NOTES

1. CONCRETE STRENGTH N25.
2. STEEL GRATES AND FRAMES TO BE MILD STEEL AND HOT DIPPED GALVANIZED.

150
520
150
NOTES
1. STEEL GRATES AND FRAMES ARE TO BE FABRICATED FROM MILD STEEL
   AND HOT DIP GALVANISED.
2. GRATING PATTERN AND BAR SIZES MAY VARY BUT SHALL BE CLASS D
   AND BIKE SAFE IN ACCORDANCE WITH AS 3996 UNLESS OTHERWISE
   STATED.
3. FOR DETAILS OF GRATES SEE R0220-08

FOR DETAILS OF GRATES SEE R0220-08

STEEL GRATES AND FRAMES ARE TO BE FABRICATED FROM MILD STEEL
AND HOT DIP GALVANISED.

GRATING PATTERN AND BAR SIZES MAY VARY BUT SHALL BE CLASS D
AND BIKE SAFE IN ACCORDANCE WITH AS 3996 UNLESS OTHERWISE
STATED.

FOR DETAILS OF GRATES SEE R0220-08
NOTES

1. LOCATION AND LEVEL OF THE PIT SHOWN IN THE DRAWINGS REFERS TO THIS POINT:
   - LOCATION AND LEVEL OF THE PIT SHOWN IN THE DRAWINGS REFERS TO
   - REFERENCE POINT
   - LOCATION AND LEVEL OF THE PIT SHOWN IN THE DRAWINGS REFERS TO

2. CONCRETE STRENGTH GRADE SHALL BE N25.
   - THIS POINT:
   - LOCATION AND LEVEL OF THE PIT SHOWN IN THE DRAWINGS REFERS TO

3. MINIMUM COVER TO REINFORCEMENT TO BE 50 mm UNLESS SHOWN OTHERWISE.
   - MINIMUM COVER TO REINFORCEMENT TO BE 50 mm UNLESS SHOWN OTHERWISE.

4. PITS DEEPER THAN 1200 mm ARE TO BE FITTED WITH STEP IRONS.
   - PITS DEEPER THAN 1200 mm ARE TO BE FITTED WITH STEP IRONS.

5. DEPTH OF PIT IS NOT TO EXCEED 3500 mm (SPECIAL DESIGN REQUIRED).
   - DEPTH OF PIT IS NOT TO EXCEED 3500 mm (SPECIAL DESIGN REQUIRED).

6. SIDEWALLS OF PITS DEEPER THAN 1500 mm ARE TO BE REINFORCED WITH 6 mm STEEL.
   - SIDEWALLS OF PITS DEEPER THAN 1500 mm ARE TO BE REINFORCED WITH 6 mm STEEL.

7. ONE LAYER OF SL82 MESH RETURNED 300 mm INTO THE BASE.
   - ONE LAYER OF SL82 MESH RETURNED 300 mm INTO THE BASE.

8. TO PROVIDE ON BOTH SIDES OF THE PIT.
   - TO PROVIDE ON BOTH SIDES OF THE PIT.

9. CONCRETE STRENGTH GRADE SHALL BE N25.
   - CONCRETE STRENGTH GRADE SHALL BE N25.

10. FOR DETAILS OF GRATE AND FRAME SEE DS1500/005853.

11. FOR DETAILS OF GRATE AND FRAME SEE R0220-33.

12. WHERE PIPE DIAMETER EXCEEDS 575 mm, PIT WALLS TO BE STEPPED IN ACCORDANCE WITH R0220-28.

13. WHERE PIT IS LOCATED IN A SAG, INLET DEPRESSIONS ARE TO BE PROVIDED ON BOTH SIDES OF THE PIT.

14. FOR DETAILS OF GRATE AND FRAME SEE R0220-33.

15. ONE LAYER OF SL82 MESH RETURNED 300 mm INTO THE BASE.

16. DEPTH OF PIT IS NOT TO EXCEED 3500 mm (SPECIAL DESIGN REQUIRED).

17. MINIMUM COVER TO REINFORCEMENT TO BE 50 mm UNLESS SHOWN OTHERWISE.

18. TO PROVIDE ON BOTH SIDES OF THE PIT.

19. CONCRETE STRENGTH GRADE SHALL BE N25.

20. FOR DETAILS OF GRATE AND FRAME SEE R0220-33.
NOTES

1. CONCRETE GRADE N25
2. SIDE WALLS OF ALL PITS DEEPER THAN 1.5 m TO BE REINFORCED WITH ONE LAYER OF SL2 MESH RETURNING 200 mm INTO BASE.
3. DEPTH OF PIT SHALL NOT EXCEED 3.5 m.
4. PITS DEEPER THAN 1.2 m TO BE FITTED WITH GALVANISED STEP IRONS.
5. WHERE PIPES ENTER PIT ON A SKEW OD = HORIZONTAL SKEW.

5. DEPTH OF PIT SHALL NOT EXCEED 3.5 M.
3. DEPTH OF PIT SHALL NOT EXCEED 3.5 M.
2. SIDE WALLS OF ALL PITS DEEPER THAN 1.5 M TO BE REINFORCED WITH ONE LAYER OF SL2 MESH RETURNING 200 MM INTO BASE.
1. CONCRETE GRADE N25

PIVES > 450: \( \star = \text{OD} + 200 \)
MULTIPLE PIVES: \( \star = \text{OD} + (n-1) \text{OD}/2 + 200 \)
WHERE \( n \) = NUMBER OF LINES

RETURN MINIMUM 300.
AS 1324 F17M MESH
RETURN MINIMUM 200.

100 DIA. CORED HOLE FOR SURFACE DRAIN CLEANOUT WHERE REQUIRED.
100 DIA. CORED HOLE FOR SURFACE DRAIN CLEANOUT WHERE REQUIRED.

12 DIA. DEFORMED REINFORCEMENT BARS AT 100 CENTRES
(WHEN MOUNTED IN TWO DIRECTIONS)

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

PROJECTWISEQRCODELAYER
1. CONCRETE GRADE N.S.
2. PRECAST CONCRETE COVERS TO BE REINFORCED WITH DIA. 6 M.S. R0220-29 AT 130 CENTRES, PLACED LONGITUDINALLY AND TRANSVERSELY, OR SLAT MESH.
3. LOCATION AND LEVEL OF JUNCTION BOX SHOWN IN THE DRAWINGS REFER TO THIS POINT.
4. SIDE WALLS OF ALL PITS DEEPER THAN 1500 TO BE REINFORCED WITH ONE LAYER OF SLAT MESH RETURNED 300 INTO BASE.
5. AT RIGHT ANGLE CHANGE IN PIPE DIRECTION OUTLET INVERT TO BE 150 BELOW INLET INVERT.
6. DEPTH OF JUNCTION BOX NOT TO EXCEED 1500.
7. MINIMUM COVER OF REINFORCEMENT SHALL BE 90 UNLESS SHOWN OTHERWISE.

NOTES

ELEVATION

PLAN

REFERENCE POINT

FLOW

NATURAL SURFACE

PRECAST CONCRETE COVER

150 EA. HOLE FOR SUBSURFACE
DRAIN OUTLET WHERE REQUIRED

100 EA. HOLE FOR SUBSURFACE
DRAIN OUTLET WHERE REQUIRED

REINFORCEMENT TO BE CENTRALLY
LOCATED.

SECTION NOT TO SCALE

100

SECTION NOT TO SCALE

100

100

NOT TO SCALE

100

100

100

100

100

100

100

100

100

100
PIT TYPES

M.G.S.G. - MEDIAN GULLY PIT SINGLE GRATE
M.G.D.G. - MEDIAN GULLY PIT DOUBLE GRATE
M.G.T.G. - MEDIAN GULLY PIT TRIPLE GRATE
M.G.Q.G. - MEDIAN GULLY PIT QUADRUPLE GRATE.

NOTES

1. INLET OUTLET PIPES TO BE LOCATED AS PER DRAINAGE PLANS.
2. PIPES TO BE CONNECTED TO PIT IN ACCORDANCE WITH R0220-43.
3. WHERE THE GULLY PIT IS LOCATED IN A SAG, INLET DEPRESSIONS ARE TO BE PROVIDED ON BOTH SIDES OF THE GULLY PIT.
4. MATERIAL IN FRAMES AND GRATINGS TO BE MILD STEEL, HOT-DIP GALVANIZED IN ACCORDANCE WITH AS 1650.
5. USE CONCRETE GRADE N25.
6. SIDEWALLS OF PITS DEEPER THAN 1500 TO BE REINFORCED WITH ONE LAYER OF SL82 MESH RETURNED 300 INTO BASE.
7. PITS DEEPER THAN 1200 TO BE FITTED WITH GALVANIZED STEP IRONS.
8. PROVIDE SUBSOIL DRAINS INTO PITS AS REQUIRED.
9. DEPTH OF PIT NOT TO EXCEED 3500 mm.
10. FOR DETAILS OF FRAME AND GRATE SEE R0220-33.

INLET DEPRESSION

REFERENCES LEVEL

MEDIAN LEVEL

SECTION NOT TO SCALE

SECTION NOT TO SCALE

SECTION NOT TO SCALE

REFERENCES LEVEL

MEDIAN LEVEL

SECTION NOT TO SCALE

REFERENCES LEVEL

MEDIAN LEVEL

SECTION NOT TO SCALE

REFERENCES LEVEL

MEDIAN LEVEL

SECTION NOT TO SCALE

INLET DEPRESSION

MEDIAN FLOW

PLAN

INLET DEPRESSION

MEDIAN FLOW

PLAN

INLET DEPRESSION

MEDIAN FLOW

PLAN

INLET DEPRESSION

MEDIAN FLOW

PLAN
NOTES
1. INLET OUTLET PIPES TO BE LOCATED AS PER DRAINAGE PLANS.
2. PIPES TO BE CONNECTED TO PIT IN ACCORDANCE WITH R0220-43
3. WHERE THE GULLY PIT IS LOCATED IN A SAG, INLET DEPRESSIONS ARE TO BE PROVIDED ON BOTH SIDES OF THE GULLY PITS.
4. MATERIAL IN FRAMES AND GRATES TO BE MILD STEEL, HOT DIP GALVANISED.
5. USE CONCRETE GRADE N25.
6. LAYER OF SL82 MESH RETURNED 300 INTO BASE.
7. PITS DEEPER THAN 1200 TO BE FITTED WITH GALVANISED STEP IRONS.
8. PROVIDE SUBSOIL DRAINS INTO PITS AS REQUIRED.
9. DEPTH OF PIT NOT TO EXCEED 3500 mm.
11. FOR DETAILS OF FRAME AND GRATE SEE R0220-33
**NOTES**

1. CONCRETE GRADE N25.
2. LOCATION AND LEVEL OF GULLY PIT SHOWN IN THE DRAWINGS REFER TO THIS POINT.
3. FOR DETAILS OF GRATE AND FRAME SEE R0220-33.
4. SUITABLE FOR SINGLE, DOUBLE, TRIPLE AND QUAD PITS (R0220-30).
NOTES

1. STEEL GRATES AND FRAMES ARE TO BE FABRICATED FROM MILD STEEL AND HOT DIP GALVANISED.

2. THE GRATING SHOWN ON THIS DRAWING IS TO BE USED ONLY WHERE THERE IS NO PEDESTRIAN OR PEDAL CYCLIST MOVEMENTS AND WHERE THERE IS A PROBABILITY OF BLOCKAGE DUE TO MAINTENANCE PROCEDURES.

3. GRATING PATTERN AND BAR SIZES MAY VARY BUT SHALL BE CLASS D AND BIKE SAFE IN ACCORDANCE WITH AS 3996 UNLESS OTHERWISE STATED.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
NOTES

1. CONCRETE GRADE N25

2. LOCATION AND LEVEL OF REFERENCE POINT SHOWN ON DESIGN PLANS.

3. STEEL GRATES AND FRAMES ARE TO BE FABRICATED FROM MILD STEEL AND HOT DIP GALVANISED.

4. GRATING PATTERN AND BAR SIZES MAY VARY BUT SHALL BE CLASS D AND BICYCLE SAFE IN ACCORDANCE WITH AS 3996 UNLESS OTHERWISE STATED.

5. DETAILS OF APPROPRIATE GRATING AND FRAME STRUCTURES ARE AVAILABLE THROUGH SOURCING PROPRIETARY PRODUCTS.
CAST IRON FRAME AND COVER, CLASS 'D' OR SIMILAR, SIZED TO SUIT CONNECTING PIPES.

STEEL MESH: SL82 PLACED CENTRALLY WITH MAIN BARS HORIZONTAL.

MINIMUM PIT SIZE

<table>
<thead>
<tr>
<th>Depth</th>
<th>Single</th>
<th>Double</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 1200</td>
<td>762 × 762</td>
<td>762 × 1295</td>
</tr>
<tr>
<td>1200 - 2400</td>
<td>762 × 1295</td>
<td>762 × 1600</td>
</tr>
<tr>
<td>OVER 2400</td>
<td>762 × 1600</td>
<td>762 × 1600</td>
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</tbody>
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CAST IRON FRAME & COVER SIZE

<table>
<thead>
<tr>
<th>Size</th>
<th>Single</th>
<th>Double</th>
</tr>
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<tr>
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<td>762 × 1600</td>
</tr>
<tr>
<td>914 × 914</td>
<td>914 × 1295</td>
<td>914 × 1605</td>
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</tbody>
</table>

NOTES
1. CONCRETE GRADE N25.
2. WALL THICKNESS AND REINFORCEMENT SHOWN SHALL APPLY TO ALL PITS UP TO 1200 DEEP.
3. PITS DEEPER THAN 1200 TO BE FITTED WITH GALVANISED STEP IRONS.
4. ALL REINFORCEMENT LAPS TO BE 300 LONG.
5. 150 dia. hole for subsoil drain outlets to be located 150 above invert level of the stormwater pipes.
6. LOCATION AND LEVEL OF GULLEY PIT SHOWN IN THE DRAWINGS REFER TO THIS POINT.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au
NOTES
1. CONCRETE GRADE N25
2. LOCATION AND LEVEL OF INLET BUMP SHOWN IN THE DRAWINGS REFER TO THE PROJECT.
3. SIDE WALLS OF ALL PITS DEEPER THAN 1500 TO BE REINFORCED WITH ONE LAYER OF 4.8 MESH RETURNING 300 INTO BASE.
4. AT RIGHT ANGLE CHAIN IN PIPE DIRECTION OUTLET INVERT TO BE 150 BELOW INLET INVERT.
5. DEPTH OF JUNCTION BOX NOT TO EXCEED 350.
6. MINIMUM COVER OF REINFORCEMENT SHALL BE 50 UNLESS SHOWN OTHERWISE.

REFERENCE POINT

GALVANISED SURCHARGE PT COVER

INLET DRAIN INSERT OR NATURAL SURFACE

150dia. HOLE FOR SURFACE/RAINFALL DRIP OUTLET WHERE REQUIRED

INTERNAL PIT OPENING SIZE
600mm x 600mm
900mm x 900mm
1200mm x 900mm
1200mm x 1200mm
LARGER PIT SIZES REQUIRE SPECIAL SURCHARGE PIT COVER.

SECTION
NOT TO SCALE

SECTION
NOT TO SCALE

REFERENCE POINT

PLAN
(GRATES NOT SHOWN)

ELEVATION

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

STANDARD DRAWING
ROAD DESIGN ENGINEERING
R0220 STORMWATER DRAINAGE SERIES - GULLY PITS
INLET SUMP WITH RAISED STEEL GRATE

DATE 20.01.17

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@nsw.gov.au

STANDARD DRAWING
R0220-36

© Roads and Maritime Services
Increase side opening depth to 450 mm to take transition from lined catch drain (Types A and B).

SECTION 1
SECTION 2
SECTION 3
SECTION 4
SECTION 5

Transitions:
- Transition to side opening pit (length = 2000)
- Transition to front opening pit (length = 2000)

NOTES:
1. Location and level of gully pit shown in drawings refer to this point.
2. Side walls of all pits deeper than 150 mm are to be reinforced with one layer of S82 mesh returning 300 mm into base.
3. Pits deeper than 1200 mm to be fitted with galvanised step irons.
4. For pipes greater than 450 mm, refer to R0220-28.
5. All exposed edges to be rounded with 20 mm radius.
6. Concrete grade N35.
7. Depth of pit not to exceed 3500 mm.
8. For temporary lid detail, refer to Specification R0220-42.

COVER REINFORCED WITH SL81 CENTRALLY PLACED

DETAIL OF ALTERNATE INLET ARRANGEMENT

ONE INLET
TWO INLETS

NOTE:
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

REINFORCED WITH SL81 CENTRALLY PLACED

COVER
NOTES
1. CUT INLET AND OUTLET PIPES TO BE SHAPED AROUND MANHOLE WITH REINFORCEMENT LEFT EXPOSED AND CUT TO LAP INTO CHAMBER REINFORCEMENT.

2. APPROPRIATE HOLES TO BE CUT INTO MANHOLE CHAMBER SECTIONS (MINIMUM 222 mm TO TOP OR BOTTOM OF UNIT).

3. CUT EXPOSED CHAMBER REINFORCEMENT AT INLET TO LAP WITH INLET PIPE REINFORCEMENT AND CONNECT REINFORCEMENT BY WELDING.

4. FILL REMAINING GAP WITH AN EPOXY RESIN MORTAR, POLYESTER RESIN MORTAR OR MAGNESIUM PHOSPHATE CEMENT MORTAR.

5. AT OUTLET, TURN EXPOSED CHAMBER REINFORCEMENT OUT AND INCLUDE IN THE CONCRETE SURROUND. DO NOT ENCLOSE THE RUBBER RING JOINT IN THE CONCRETE SURROUND.

6. PLASTER INTERIOR OF OUTLET INCLUDING EXPOSED PIPE REINFORCEMENT.

7. STANDARD STEP IRONS TO BE GALVANISED MALLEABLE CAST IRON 200 WIDE FIXED INTO REINFORCED CONCRETE CHAMBER.

8. CONCRETE BASE, SLAB, ROOF SLAB AND MANHOLE GULLY PIT TO BE CONCRETE GRADE N25. BASE SLABS TO BE CONSTRUCTED IN NATURAL MATERIALS OF SAFE BEARING CAPACITY OF 60 kPa.

9. CONCRETE BACKFILL/REINFORCEMENT AROUND INLET AND OUTLET PIPES TO BE CONCRETE GRADE N25.

10. COVER TO REINFORCEMENT FOR INLET CONCRETE TO BE 10 mm.

11. PREFACT MANHOLE CHAMBERS TO BE CONSTRUCTED FROM CLASS 2 CONTINUOUS CIRCULAR REINFORCED CONCRETE PIPES DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH AS 4133.

12. PREFACT MANHOLE CHAMBERS TO BE MANUFACTURED USING CONCRETE GRADE N50 WITH MINIMUM COVER TO REINFORCEMENT OF 15 mm.

13. MANHOLE CHAMBER JOINTS TO BE INTERNAL FLUSH JOINTS, MORTARIZED SMOOTH WITH EPOXY MORTAR PREPARED AND APPLIED IN ACCORDANCE WITH THE MANUFACTURER’S RECOMMENDATIONS.

14. LENGTH AND LOCATION OF PREFACT UNITS TO SUIT INVERT LEVELS OF GULLY PIT GRATES AND PIPES.

15. FOR DETAILS OF GULLY PITS REFER TO R0220-30.

16. BACKFILLING AROUND SIDES OF MANHOLE TO BE PERFORMED IN ACCORDANCE WITH ESTABLISHED SITE CONTRACT PROCEDURES AND SPECIFICATIONS AS DEFINED BY THESE SPECIFICATIONS. BACKFILL SHALL BE A SELECTED BACKFILL AND THE BACKFILLING PROCESS SHALL CONFORM TO THE SPECIFICATION FOR "BACKFILLING AND COMPACTION AGAINST THE SIDES OF COULVERTS AND WINGWALLS" MORTAR GOVERNS DUSTING AROUND THE CIRCUMFERENCE OF THE STRUCTURE TO AVOID DIFFERENTIAL LOADING.

17. ALL METAL INSERTS, FITTINGS, GRATES, HANDRAILS, BOLTS ETC. AND STRUCTURES TO BE SUPPLIED HOT DIP GALVANISED UNLESS NOTED OTHERWISE. ALL MASONRY ANCHORS AND BOLTS NOTED AS "S/S" TO BE STAINLESS STEEL GRADE 316 OR SIMILAR.

18. GRAVING PATTERNS AND BAR SIZES MAY VARY BUT SHALL BE GLASS AND BICYCLE SAFE IN ACCORDANCE WITH AS 3500 UNLESS OTHERWISE STATED.

19. DEPTH NOT GREATER THAN 6.5 m INLET AND OUTLET PIPES NOT GREATER THAN 600 mm DIA.
NOTES
1. CUT INLET AND OUTLET PIPES TO BE SHAPED AROUND MANHOLE WITH REINFORCEMENT LEFT EXPOSED AND CUT TO LAP INTO CHAMBER REINFORCEMENT.
2. APPROPRIATE HOLES TO BE CUT INTO MANHOLE CHAMBERS SECTIONS (MINIMUM 300 mm TO TOP OR BOTTOM OF UNIT)
3. CUT EXPOSED CHAMBER REINFORCEMENT AT INLET TO LAP WITH INLET PIPE REINFORCEMENT AND CONNECT REINFORCEMENT BY WELDING.
4. FILL REMAINING GAP WITH AN EPOXY RESIN MORTAR, POLYESTER RESIN MORTAR OR MAGNESIUM PHOSPHATE CEMENT NO-TAX.
5. AT OUTLET, TURN EXPOSED CHAMBER REINFORCEMENT OUT AND INCLUDE IN THE CONCRETE SURROUND. DO NOT ENCIRCLE THE RUBBER RING JUNCTURE IN THE CONCRETE SURROUND.
6. PLASTIC INTERIOR OF OUTLET INCLUDING EXPOSED PIPE REINFORCEMENT.
7. STANDARD STEP IRONS TO BE GALVANISED MALLEABLE CAST IRON 300 WIDE, FIXED INTO REINFORCED CONCRETE CHAMBER.
8. CONCRETE BASE, SLAB, ROOF SLAB AND MANHOLE GULLY PIT TO BE CONCRETE GRADE N25. BASE SLABS TO BE CONSTRUCTED IN NATURAL MATERIALS OF SAFE REARING CAPACITY OF 800 kPa.
9. CONCRETE BACKFILL/REINFORCEMENT AROUND INLET AND OUTLET PIPES TO BE CONCRETE GRADE N25.
10. COVER REINFORCEMENT FOR INLET CONCRETE TO BE 15 mm.
11. PRECAST MANHOLE CHAMBERS TO BE CONSTRUCTED FROM CLASS 2 CONTINUOUS CIRCULAR REINFORCED CONCRETE PIPES DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH AS 4133.
12. PRECAST MANHOLE CHAMBERS TO BE MANUFACTURED USING CONCRETE GRADE N25 WITH MINIMUM COVER TO REINFORCEMENT OF 15 mm.
13. MANHOLE CHAMBER JOINTS TO BE INTERNAL FLUSH JOINTS, MORTARED SMOOTH WITH EPOXY MORTAR PREPARED AND APLID IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
14. LENGTH AND LOCATION OF PRECAST UNITS TO SUIT INVERT LEVELS OF GULLY PIT OUTLET.
15. FOR DETAILS OF GULLY PITS REFER TO R0220-30.
16. BACKFILLING AROUND SIDES OF MANHOLE CHAMBERS TO BE PERFORMED IN ACCORDANCE WITH ESTABLISHED SITE CONTRACT PROCEDURES AND SPECIFICATIONS AS DEFINED BY THESE SPECIFICATIONS. BACKFILL SHALL BE A SELECTED BACKFILL AND THE BACKFILLING PROCEDURE SHALL CONFORM TO THE SPECIFICATION FOR "BACKFILLING AND COMPACTION AGAINST THE SIDES OF TUBES OR PIPE." WATER LAYERS ARE ADDED AND COMPACTED SIMULTANEOUSLY AROUND THE CIRCUMFERENCE OF THE STRUCTURE TO AVOID DIFFERENTIAL LOADING.
17. ALL MASONRY ANCHORS AND BOLTS NOTED AS "TO AVOID DIFFERENTIAL LOADING.
18. GAGING PATTERN AND BAR SIZES MAY VARY BUT SHALL BE CLASS D AND BIKE SAFE, IN ACCORDANCE WITH AS 3996 UNLESS OTHERWISE STATED.
19. DEPTH NOT GREATER THAN 900 mm DIA.

**ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN**
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

NOTES
1. CONCRETE GRADE N25
2. DIMENSIONS X AND Y TO SUIT ULTIMATE PIT TYPE.
CONCRETE PIT

RUBBER RING JOINT

CLOSED CELL POLYETHYLENE EXPANSION JOINT FILLER.

CLOSED CELL POLYETHYLENE EXPANSION JOINT FILLER.

# 600 mm FOR PIPE DIA. UP TO 450 mm
1200 mm FOR PIPE DIA. OVER 450 mm

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

SEND FEEDBACK ON THIS STANDARD DRAWING TO:
technologystandards@rms.nsw.gov.au
INVERT SLAB

ELEVATION

SIDE ELEVATION

NOTES
1. WHERE THE PIPE IS TO BE CONNECTED, STEEL REINFORCEMENT IN THE PRECAST BOX WILL BE EXPOSED CUT AND BENT INTO THE SUPPORT BLOCK.
NOTES

1. PITS DEEPER THAN 600 mm MUST BE FITTED WITH INDIVIDUAL-RUNG LADDERS.
2. INDIVIDUAL-RUNG LADDERS MUST BE LOCATED:
   - DIRECTLY BELOW THE OPENING OF THE COVER.
   - DESIRABLY ON A WALL WITHOUT PIPE OPENINGS.
   - DESIRABLY ON ONE OF THE LONG SIDES OF THE PIT.
3. INDIVIDUAL-RUNG LADDERS MUST COMPLY WITH AS1657.
4. INDIVIDUAL-RUNG LADDERS MUST HAVE SHARP EDGES ROUNDED AND BE HOT DIP GALVANISED AFTER FABRICATION.
5. PROPRIETARY PLASTIC ENCAPSULATED INDIVIDUAL-RUNG LADDERS (OR APPROVED ALTERNATIVE) MAY BE USED.
6. INDIVIDUAL-RUNG LADDERS MUST HAVE SHARP EDGES ROUNDED AND BE HOT DIP GALVANISED AFTER FABRICATION.
7. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.

STEP IRON DETAILS

- 24 DIA. BAR
- MIN. 200
- MAX 350 mm
- STEP UP
- MIN 250
- MAX 300 mm
- STEP-DOWN
- MIN 250
- MAX 300 mm
- FACE OF WALL
NOTE:
1. CONCRETE GRADE N25 AT 28 DAYS.
2. SIDE WALLS OF ALL PITS DEEPER THAN 150 mm ARE TO BE REINFORCED WITH ONE LAYER OF SL82 MESH RETURNED 300 mm INTO BASE.
3. DEPTH OF PIT NOT TO EXCEED 3500 mm.
4. PITS DEEPER THAN 1300 mm TO BE FITTED WITH GALVANISED STEEL IRONS.
5. ALL EXPOSED EDGES TO BE ROUNDED WITH 200 mm RADIUS.
6. MEDIAN WIDTH AS SHOWN IS FOR MINIMUM CONDITIONS.
7. ALL REINFORCEMENT LAPS 300 mm LONG.
8. FOR USE WITH FLEXIBLE PAVEMENT ONLY.
Break in median for drainage location as indicated on plans. 

1. Location as indicated on plans.
NOTES

1. FOUNDATION AND TRENCH BASES MUST COMPLY WITH RMS R11 STORMWATER DRAINAGE SPECIFICATION.
2. RUBBER BAND MUST COMPLY WITH AS 1646.
3. CONCRETE COLLAR MUST BE CLASS 4.
4. CONCRETE COLLAR SIZE MUST BE TWO SIZES ABOVE THE NEW PIPE TO PROVIDE 25mm ALL AROUND FOR POLYURETHANE FOAM.
5. BACKFILL MATERIAL TO BE AS SPECIFIED IN RMS R11 SPECIFICATION.
6. PROVIDE 25mm ALL AROUND FOR POLYURETHANE FOAM.
7. BACKFILL MATERIAL TO BE AS SPECIFIED IN RMS R11 SPECIFICATION.
8. FLOWABLE FILL IN ACCORDANCE WITH RMS R11 SPECIFICATION.
NOTES

1. CONCRETE GRADE N25.
2. SIDE WALLS OF PITS DEEPER THAN 1500 ARE TO BE REINFORCED WITH ONE LAYER OF RL1218 MESH RETURNED 300 INTO BASE.
3. PITS DEEPER THAN 1200 TO BE FITTED WITH GALVANISED STEP IRONS.
4. ALL EXPOSED EDGES TO BE ROUNDED WITH 20 RADIUS.
5. MINIMUM COVER OF REINFORCEMENT TO BE 50 UNLESS SHOWN OTHERWISE.
6. LOCATION AND LEVEL OF GULLY PIT SHOWN IN THE DRAWINGS REFER TO THIS POINT.
7. FOR DETAILS OF FRAME AND GRATE SEE R0220-35.
8. FOR PITS WITH PIPE DIAMETER GREATER THAN 450MM SEE R0220-28.
9. AT RIGHT ANGLE CHANGE IN PIPE DIRECTION, OUTLET INVERT TO BE 150 BELOW INLET INVERT.
10. DEPTH OF PIT NOT TO EXCEED 3000.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
NOTES

GULLY PIT:
1. INLET OUTLET PIPES TO BE LOCATED AS PER DRAINAGE PLANS.
2. PIPES TO BE CONNECTED TO PIT IN ACCORDANCE WITH R0220-43.
3. WHERE THE GULLY PIT IS LOCATED IN A SAG, INLET DEPRESSIONS ARE TO BE PROVIDED ON BOTH SIDES OF THE GULLY PIT.
4. USE CONCRETE GRADE N25.
5. SIDEWALLS OF PITS DEEPER THAN 1200 TO BE REINFORCED WITH ONE LAYER OF SL82 MESH RETURNED 300 INTO BASE.
6. PITS DEEPER THAN 1200 TO BE FITTED WITH GALVANIZED STEP IRONS.
7. PROVIDE SUBSOIL DRAINS INTO PITS AS REQUIRED.
8. DEPTH OF PIT NOT TO EXCEED 3500 mm.

GRATE AND FRAME:
1. STEEL GRATES AND FRAMES ARE TO BE FABRICATED FROM MILD STEEL AND NOT HOT GALVANIZED.
2. THE GRATING SHOWN ON THIS DRAWING IS TO BE USED ONLY WHERE THERE IS NO PEDESTRIAN OR PEDAL CYCLIST MOVEMENTS AND WHERE THERE IS A PROBABILITY OF BLOCKAGE DUE TO MAINTENANCE PROCEDURES.
3. GRATING PATTERN AND BAR SIZES MAY VARY BUT SHALL BE CLASS D AND BICYCLE SAFE IN ACCORDANCE WITH AS 3996 UNLESS OTHERWISE STATED.

DEPRESSED LONGITUDINAL MEDIAN GULLY PITS (MGLG) GRATES AND FRAMES

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
SEE CONSTRUCTION PLANS FOR OFFSET

CONCRETE QUANTITY = 2.5 m³

ROCK MATTRESS 230 THICK

GRATE ATTACHED TO HEADWALL

2.75-12
1130

SECTION

NOT TO SCALE

PLAN

(INLET GRATE REMOVED)

SL82 REINFORCING MESH

1210 APPROX

ELEVATION

GALVANISED GRATE

(REMOVABLE - 2 REQUIRED)

200 Ø12 HOLE

Ø25 PIPE

300 300 300

ELEVATION END ELEVATION

NOTES

1. CLEAR COVER TO OUTER FACE OF REINFORCEMENT 50 mm.
2. CONCRETE GRADE N25.
3. FOR FURTHER DETAILS OF GRATE, GULLY PITS, INVERT LEVELS AND PIPE DIAMETER SEE CONSTRUCTION PLANS OR STANDARD DRAWINGS.

CONCRETE QUANTITY = 2.5 m³

ROCK MATTRESS 230 THICK

GRATE ATTACHED TO HEADWALL

2.75-12
1130

SECTION

NOT TO SCALE

PLAN

(INLET GRATE REMOVED)

SL82 REINFORCING MESH

1210 APPROX

ELEVATION

GALVANISED GRATE

(REMOVABLE - 2 REQUIRED)

200 Ø12 HOLE

Ø25 PIPE

300 300 300

ELEVATION END ELEVATION

NOTES

1. CLEAR COVER TO OUTER FACE OF REINFORCEMENT 50 mm.
2. CONCRETE GRADE N25.
3. FOR FURTHER DETAILS OF GRATE, GULLY PITS, INVERT LEVELS AND PIPE DIAMETER SEE CONSTRUCTION PLANS OR STANDARD DRAWINGS.
NOTES

1. CONCRETE STRENGTH N25.
2. CONSTRUCT GULLY PIT TO SUIT DIRECTION OF FLOW.
3. PLACE GEOTEXTILE FILTER FABRIC AS SPECIFIED UNDER ALL ROCK FILLED WIRE MATTRESS.
4. ON ROCK FACED BATTERS TERMINATE DRAIN AT TOP OF ROCK FACING.

SECTION 1

NOT TO SCALE

ROCK MATTRESS (OR EQUIVALENT) TO BE SECURED TO CONCRETE OUTLET STRUCTURE.

SECTION 2

NOT TO SCALE

ROCK FILLED WIRE MATTRESS (OR EQUIVALENT), MINIMUM THICKNESS 170 mm WITH AN INVERT DEPTH OF 30 mm NEAR THE TOP WITH THE DEPTH INCREASING TO 300 mm 1 m FROM THE TOP AND BEYOND.

APPROXIMATE HINGE POINT

ROCK FILLED WIRE MATTRESS (OR EQUIVALENT), MINIMUM THICKNESS 170 mm

SECTION

NOT TO SCALE

DETAIL OF SPILLWAY OUTLET

PLAN

FLOW

ROCK MATTRESS (OR EQUIVALENT) TO BE ANCHORED AT EACH CORNER WITH A 1350 STAR PICKET.

DETAIL OF SPILLWAY OUTLET

ROCK FILLED MATTRESS (OR EQUIVALENT) TO BE SECURED TO CONCRETE OUTLET STRUCTURE.

EXPANSION JOINT

EXPANSION JOINT

DEVOLVER

GUARDFENCE

GUARDFENCE

SHOULDER

SHOULDER

SLIP MESH

SLIP MESH

ROCK FILLED MATTRESS (OR EQUIVALENT) WITH A 1350 STAR PICKET.

ROCK FILLED MATTRESS (OR EQUIVALENT), MINIMUM THICKNESS 170 mm

ROCK FILLED MATTRESS (OR EQUIVALENT) MINIMUM THICKNESS 170 mm

NOTES

ON ROCK FACED BATTERS TERMINATE DRAIN AT TOP OF ROCK FACING.

ROCK FILLED WIRE MATTRESS.

PLACE GEOTEXTILE FILTER FABRIC AS SPECIFIED UNDER ALL ROCK FILLED WIRE MATTRESS.

CONCRETE STRENGTH N25.

CONSTRUCT GULLY PIT TO SUIT DIRECTION OF FLOW.

PLACE GEOTEXTILE FILTER FABRIC AS SPECIFIED UNDER ALL ROCK FILLED WIRE MATTRESS.

ON ROCK FACED BATTERS TERMINATE DRAIN AT TOP OF ROCK FACING.

NOTES

1. CONCRETE STRENGTH N25.
2. CONSTRUCT GULLY PIT TO SUIT DIRECTION OF FLOW.
3. PLACE GEOTEXTILE FILTER FABRIC AS SPECIFIED UNDER ALL ROCK FILLED WIRE MATTRESS.
4. ON ROCK FACED BATTERS TERMINATE DRAIN AT TOP OF ROCK FACING.

SECTION 1

NOT TO SCALE

ROCK MATTRESS (OR EQUIVALENT) TO BE SECURED TO CONCRETE OUTLET STRUCTURE.

SECTION 2

NOT TO SCALE

ROCK FILLED WIRE MATTRESS (OR EQUIVALENT), MINIMUM THICKNESS 170 mm WITH AN INVERT DEPTH OF 30 mm NEAR THE TOP WITH THE DEPTH INCREASING TO 300 mm 1 m FROM THE TOP AND BEYOND.

APPROXIMATE HINGE POINT

ROCK FILLED WIRE MATTRESS (OR EQUIVALENT), MINIMUM THICKNESS 170 mm

SECTION

NOT TO SCALE

DETAIL OF SPILLWAY OUTLET

PLAN

FLOW

ROCK MATTRESS (OR EQUIVALENT) TO BE ANCHORED AT EACH CORNER WITH A 1350 STAR PICKET.

DETAIL OF SPILLWAY OUTLET

ROCK FILLED MATTRESS (OR EQUIVALENT) TO BE SECURED TO CONCRETE OUTLET STRUCTURE.

EXPANSION JOINT

EXPANSION JOINT

DEVOLVER

GUARDFENCE

GUARDFENCE

SHOULDER

SHOULDER

SLIP MESH

SLIP MESH

ROCK FILLED MATTRESS (OR EQUIVALENT) WITH A 1350 STAR PICKET.

ROCK FILLED MATTRESS (OR EQUIVALENT) MINIMUM THICKNESS 170 mm

ROCK FILLED MATTRESS (OR EQUIVALENT) MINIMUM THICKNESS 170 mm

NOTES

ON ROCK FACED BATTERS TERMINATE DRAIN AT TOP OF ROCK FACING.

ROCK FILLED WIRE MATTRESS.

PLACE GEOTEXTILE FILTER FABRIC AS SPECIFIED UNDER ALL ROCK FILLED WIRE MATTRESS.

CONCRETE STRENGTH N25.

CONSTRUCT GULLY PIT TO SUIT DIRECTION OF FLOW.

PLACE GEOTEXTILE FILTER FABRIC AS SPECIFIED UNDER ALL ROCK FILLED WIRE MATTRESS.

ON ROCK FACED BATTERS TERMINATE DRAIN AT TOP OF ROCK FACING.
NOTES

1. TOP LIP OF HALF ROUND CORRUGATED STEEL PIPE TO BE INSTALLED FLUSH WITH THE COMPACTED BATTER SURFACE.
2. ROCK FILLED MATTRESS TO BE PEGGED AT EACH CORNER WITH A 1350 mm STAR PICKET.
3. HALF ROUND CORRUGATED STEEL Pipe TO BE FASTENED WITH 8 GAUGE WIRE TO TWO 1350 mm STAR PICKETS AT BOTH INLET AND OUTLET ENDS OF PIPE.

FUTURE FINISHED SURFACE

CONTRACT LEVEL

NO CONCRETE

SLOPE VARIABLE

450 DIA. HALF ROUND CORRUGATED STEEL PIPE.

TOP OF EMBANKMENT

SECTION

2 TO 1

2 TO 1

750

BATTER EMBANKMENT

SECTION

NOT TO SCALE

DETAIL OF EARTH DYKE (SEALED)

LONGITUDINAL SECTION

FILTER CLOTH

SHADE ROCK FILLED MATTRESS TO SUIT HALF ROUND CORRUGATED STEEL PIPE

SECTION

NOT TO SCALE

PERSPECTIVE

SIDE NO. 20, 75 mm THICK.

MASS CONCRETE APRON AND SIDES NO. 75 mm THICK.

MAKE CONCRETE APRON AND SIDES NO. 75 mm THICK.

PLAN

SHAPE CONCRETE APRON TO MATCH PIPE PATTERN
PIPE TO BE ANCHORED TO OUTLET WITH 2 - 13 mm ROCK BOLTS LOCATED AT 30° FROM INVERT.

PIPE TO BE ANCHORED TO OUTLET WITH 2 - 12 mm ROCK BOLTS LOCATED AT 30° FROM INVERT.

SHAPE INVERT TO SUIT PIPE. SEE SCHEDULE FOR DIAMETER.

PIPE DIAMETER

HALF ROUND CORRUGATED STEEL PIPE. SEE SCHEDULE FOR DIAMETER.

PIPE DIAMETER

HALF ROUND CORRUGATED STEEL PIPE.

SHAPE ROCK FILLED MATTRESS TO SUIT HALF ROUND CSP.

SECTION NOT TO SCALE

FILTER CLOTH

NOTES
1. TOP OF HALF ROUND CORRUGATED STEEL PIPE TO BE INSTALLED FLUSH WITH THE COMPACTED BATTER SURFACE.
2. ROCK FILLED MATTRESS TO BE PLACED AT EACH CORNER WITH A 1350 mm STAR PICKET.
3. HALF ROUND CORRUGATED STEEL PIPE TO BE FASTENED WITH 14 mm WIRE TO TWO 1350 mm STAR PICKETS AT LOWER END OF CORRUGATED STEEL PIPE (CSP).
4. 1350 mm STAR PICKETS TO BE PROVIDED AT POINTS MARKED ▼ (FOR FASTENING PURPOSES).
5. CONCRETE STRENGTH TO BE N25.

CONCRETE STRENGTH TO BE N25 (FOR FASTENING PURPOSES).

ROCK FILLED MATTRESS TO BE PEGGED AT EACH CORNER WITH A 1350 mm STAR PICKET.

FILTER CLOTH TO SUIT PIPE.

FLUSH WITH THE COMPACTED BATTER SURFACE.

TOP LIP OF HALF ROUND CORRUGATED STEEL PIPE TO BE INSTALLED FLUSH WITH THE COMPACTED BATTER SURFACE.

FILTER CLOTH

SECTION NOT TO SCALE

FILTER CLOTH

SECTION NOT TO SCALE

SCHEDULE

<table>
<thead>
<tr>
<th>PIPE DIAMETER</th>
<th>CSP DIAMETER</th>
<th>#</th>
<th>CONCRETE QUANTITY m³</th>
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<tr>
<td>900</td>
<td>830</td>
<td>1100</td>
<td>0.50</td>
</tr>
</tbody>
</table>

# DESIRABLE MINIMUM ONLY

REFER TO DRAINAGE PLAN FOR ACTUAL DIAMETER.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.

TRANSPORT ROADS & MARITIME SERVICES
ROAD DESIGN ENGINEERING
R0230 STORMWATER DRAINAGE SERIES - BATTER DRAINS
PIPE HEADWALL AND CORRUGATED STEEL PIPE
BATTER DRAIN

NOTES

Send feedback on this standard drawing to technicalstandards@rms.nsw.gov.au

Send feedback on this standard drawing to technicalstandards@rms.nsw.gov.au
1. Top up of half round corrugated steel pipe to be installed flush with the compacted batter surface.
2. Rock filled mattress to be pegged at each corner with a 150 mm star point.
3. Half round corrugated steel pipe to be fastened with b-gauge wire to two 1350 mm star pickets at outlet end of pipe.
4. Concrete strength grade shall be N25.
5. Construct guilty pit to suit direction of flow.
6. Place filter fabric under all rock filled mattresses.
7. Where corrugated batter drain connects to a concrete lined catch drain ensure adequate scour protection at joint.
NOTES

1. Top lip of half round corrugated steel pipe to be installed flush with the compacted batter surface.
2. Concrete strength grade shall be N25.
3. Construct gully pit to suit direction of flow.
**NOTES**

1. Minimum Grade of Bank 1.5%.
2. Bank to be rubble protected for first 3.3 m.
3. Bank should outlet to undisturbed area.

1. No part of installed UPVC pipe to be exposed to direct sunlight.
2. All UPVC pipe & fittings to be sewer grade.

1. Cut appropriate hole in top of pipe culvert at minimum 300 mm from end of pipe.
2. Fill gap around joint with an epoxy resin mortar or polyester resin mortar.

**BATTER DRAIN OUTLET**

1. Various outlets for UPVC batter drains.
2. Batter drain outlet into top of pipe culvert and joint grouted.

**CONCRETE PIPE CULVERT**

- Batter drain outlet to graded earth bank.
- Batter drain outlet into concrete catch drain.

**Mass Concrete**

- Graded bank.
- Natural surface contour.
- Rubble protection.

**EMBANKMENT**

- Batter drain outlet into top of pipe culvert.
- Batter drain outlet into concrete catch drain.

**NOTES**

1. Batter drain outlet to graded earth bank.
2. Batter drain outlet into concrete catch drain.

**SECTION**

- Batter drain outlet into top of pipe culvert and joint grouted.

**DETAIL**

- Batter drain outlet into top of pipe culvert and joint grouted.

**PLAN**

- Batter drain outlet to graded earth bank.
- Batter drain outlet into concrete catch drain.

**3D BATTER DRAIN**

- Batter drain outlet into top of pipe culvert and joint grouted.
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**STANDARD DRAWING**

- **STANDARD DRAWING No.:** A3
- **SHEET OF:**
  - **ROAD DESIGN ENGINEERING**
  - **ORIGINAL ISSUE DATE:** JANUARY 2017
  - **DOCUMENT VER.:**
  - **SCAN TO CHECK:**

**NOTE:**
This drawing may be prepared in colour and may be incomplete if copied.

**TABLE:**

<table>
<thead>
<tr>
<th>PIPE SIZE (mm)</th>
<th>MINIMUM DEPTH (mm)</th>
<th>MINIMUM DISTANCE (mm)</th>
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<td>NOMINAL INTERNAL DIA.</td>
<td>BED</td>
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<tr>
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<td>100</td>
<td>150</td>
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**INSTALLATION CONDITION - SINGLE PIPE**

- **EMBANKMENT CONDITION**
- **TRENCH CONDITION**

**INSTALLATION CONDITION - MULTIPLE PIPE**

- **EMBANKMENT CONDITION**
- **TRENCH CONDITION**

**LEGEND**

- BACKFILL OR EMBANKMENT ZONE
- OVERLAY ZONE
- SIDE ZONE
- BASE ZONE
- BED ZONE
- NATURAL SURFACE OR COMPACTED FILL

**NOTES**

1. WHERE THE PIPE INSTALLATION CONDITION IS SPECIFIED AS EITHER "TRENCH CONDITION" OR "EMBANKMENT CONDITION", CONSTRUCT FIRST THE EMBANKMENT IN ACCORDANCE WITH CLAUSE 4.3.1 OF ROADS AND MARITIME SERVICES SPECIFICATION R11 PRIOR TO EXCAVATION OF THE TRENCH FOR THE PIPE INSTALLATION.

2. WHERE THE MINIMUM DISTANCE BETWEEN INDIVIDUAL PIPES OR BETWEEN PIPES AND TRENCH WALLS SPECIFIED FOR STANDARD INSTALLATIONS IN THE TABLE ABOVE CANNOT BE ACHIEVED, A CONTROLLED LOW STRENGTH MATERIAL (CLSM) MAY BE USED, UTILISING THE LESSER DISTANCES SET OUT FOR CLSM INSTALLATION IN THE "TRENCH CONDITION" OR "EMBANKMENT CONDITION", CONSTRUCT FIRST WHERE THE PIPE INSTALLATION CONDITION IS SPECIFIED AS EITHER "TRENCH CONDITION" OR "EMBANKMENT CONDITION".
<table>
<thead>
<tr>
<th>TYPE</th>
<th>TYPICAL USE</th>
<th>VOLUME $\text{m}^3/\text{m}$</th>
<th>PROFILE AND DIMENSIONS</th>
<th>TYPE</th>
<th>TYPICAL USE</th>
<th>VOLUME $\text{m}^3/\text{m}$</th>
<th>PROFILE AND DIMENSIONS</th>
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<tr>
<td>SA</td>
<td>BARRIER KERB AND CHANNEL ADJACENT TO FOOTWAY</td>
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<td>SL</td>
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<td>URBAN ALLOWS VERGE / FOOTWAY PAVING</td>
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<td>MEDIAN BARRIER FOR APPROVED BARRIERS REFER TO ROADS AND MARITIME SERVICES SAFETY BARRIER ACCEPTED PRODUCT LIST</td>
<td>0.240</td>
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<td>CHANNEL ADJACENT TO SHOULDERS IN CUTTINGS VARIABLE MINIMUM</td>
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### NOTES
1. ALL EXPOSED EDGES, EXCEPT TYPE F BARRIER, TO BE ROUNDED TO 5 mm RADIUS MAXIMUM.
2. EDGES OF TYPE F BARRIER TO BE ROUNDED TO 25 mm RADIUS.
3. FOR KERB CONSTRUCTED ON CONCRETE PAVEMENT REFER TO ROADS AND MARITIME SERVICES RIGID PAVEMENT STANDARD DRAWINGS.
4. RECESSES AT BASE OF KERB MAY BE REQUIRED FOR SUBBASE LAYER.

All dimensions are in millimetres unless otherwise shown.
NOTES

1. FOR DETAILS OF KERB AND CHANNEL SHAPES AND DIMENSIONS
SEE R0300-01
NOTES

1. All dimensions are in millimetres.
2. Drawing not to scale.
3. Location as indicated on plans.
NOTES

1. ALL RADIUS TO BE 20mm.
2. FOR DETAIL OF KERB AND CHANNEL SEE R0300-01
3. CONCRETE GRADE STRENGTH SHALL BE IN ACCORDANCE WITH RMS SPECIFICATION R33.

TYPICAL LOCATIONS

FOOTWAY CROSSfall

PROPERTY

ENTRANCE

LINE

DIRECTION OF TRAFFIC FLOW

PRIVATE PREMISES

BUSINESS AND COMMERCIAL PREMISES

TYPICAL TREATMENTS

FOOTWAY CROSSfall

PROPERTY

LINE

HIGH LEVEL

LOW LEVEL

EASE

DESIRABLE MAX 4%

DESIRABLE MIN 2%

MAX 6 TO 1

LOW LEVEL

EASE

DESIRABLE MAX 4%

DESIRABLE MIN 2%

HIGH LEVEL

NOTES

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3. CONCRETE GRADE STRENGTH SHALL BE IN ACCORDANCE WITH RMS SPECIFICATION R33.

TYPICAL LOCATIONS

FOOTWAY CROSSfall

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SA KERB

LIP OF CHANNEL

TRANSITION 3.0 m

SM KERB

TOP OF KERB

INVERT OF KERB

LINE OF PAVEMENT

TOP OF CHANNEL

INVERT OF CHANNEL

ISOMETRIC VIEW
OF KERB TRANSITION

SA KERB

TOP OF KERB

INVERT OF CHANNEL

SM KERB

TOP OF CHANNEL

INVERT OF CHANNEL

ELEVATION

PLAN

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au

MANAGER ROAD DESIGN ENGINEERING SERVICES

DATE 20.01.17

PROJECTWISER0300-06

A3

STANDARD DRAWING

ROAD DESIGN ENGINEERING

R0300 KERB AND CHANNEL SERIES

KERB TRANSITION TYPE SA KERB TO TYPE SM KERB

SHEET 1 OF 1

© Roads and Maritime Services
FOR DETAILS OF KERB AND CHANNEL SEE R0300-01
NOTE

1. FOR DETAILS OF KERB AND CHANNEL SHAPES AND DIMENSIONS SEE RES30-41.
TRAFFIC SIGNAL POST
(REFER TO TRAFFIC SIGNAL DESIGN GUIDE)

TRAFFIC SIGNAL CROSSING WIDTH
(REFER TO TRAFFIC SIGNAL DESIGN GUIDE)

PEDESTRIAN CROSSING LINE
(REFER TO TRAFFIC SIGNAL DESIGN GUIDE)

PLAN
TRAFFIC SIGNAL CROSSING WIDTH
NOT TO SCALE

PLAN
PEDESTRIAN CROSSING (ZEBRA) WIDTH
NOT TO SCALE
Kerb ramps with adjacent crossings

Kerb ramp for obtuse intersection

Align kerb ramps

See kerb ramp for obtuse intersection

Back of kerb ramp to be parallel to face of kerb line (as shown)

Parallel line to direction of travel

Back of kerb ramp to be parallel to face of kerb line

Direction of travel (obtuse line)

45° (#)

REDUCED TO 30° WHERE CONSTRAINTS DICATE THE ANGLE MAY BE REDUCED TO 30°

7° min

70° min

110° max

OBTUSE INTERSECTION

SEE KERB RAMP FOR OBTUSE INTERSECTION

DESIRE LINE

EDGES OF

DESIRE LINE

LIP LINE

FACE OF KERB

INNER RAMP
APEX

INNER RAMP
APEX
<table>
<thead>
<tr>
<th>№</th>
<th>DESCRIPTION</th>
<th>LOCATION</th>
<th>TYPE OF MARK</th>
<th>COLOUR</th>
<th>REMARKS</th>
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<tr>
<td>1</td>
<td>CLEARING STAKE</td>
<td>LIMIT OF CLEARING</td>
<td>25 × 25 STAKE</td>
<td>TOP 650 mm - PINK</td>
<td>-</td>
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<tr>
<td>2</td>
<td>FILL BATTER PROFILE</td>
<td>TOE OF FILL BATTER</td>
<td>50 × 50 POSTS WITH T5 × 25 RAIL PARALLEL TO BATTER</td>
<td>ORANGE</td>
<td>1000 mm VERTICAL ABOVE BATTER</td>
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<tr>
<td>3</td>
<td>CUT SLOPE PROFILE</td>
<td>ADJACENT TO CUT SLOPE PEG</td>
<td>50 × 50 POSTS WITH T5 × 25 RAIL PARALLEL TO BATTER</td>
<td>DARK BLUE</td>
<td>300 mm VERTICAL ABOVE BATTER</td>
</tr>
<tr>
<td>4</td>
<td>CUT SLOPE PEG</td>
<td>EDGE OF CUT</td>
<td>50 × 50 PEG</td>
<td>DARK BLUE</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>ROCK SLOPE PEG</td>
<td>EDGE OF ROCK CUT</td>
<td>50 × 50 PEG PEG OR STEEL ROD (ø20)</td>
<td>DARK BLUE</td>
<td>ACCURATELY LOCATE FOR PRESPLIT DRILLING</td>
</tr>
<tr>
<td>6</td>
<td>MEDIAN DRAIN PEG</td>
<td>INSERT OF MEDIAN DRAIN</td>
<td>50 × 50 POST</td>
<td>WRITE WITH BLACK LINE TO INDICATE R/L OF DRAIN INVERT</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>FORMATION PEG</td>
<td>500 mm FROM EDGE OF FORMATION</td>
<td>50 × 50 PEG</td>
<td>SUB-GRADE LEVEL AND SELECTED SUB-GRADE THICKNESS-LIGHT GREEN</td>
<td>SUFFICIENT HEIGHT TO PROTECT X-FALL ACROSS TOTAL FORMATION</td>
</tr>
<tr>
<td>8</td>
<td>RECOVERY MARK AND INDICATOR</td>
<td>IMMEDIATELY CLEAR OF EARTHWORKS</td>
<td>EACH IN 90 × 50 × 200 POSTS 50 × 1 × 500 POST</td>
<td>WHITE AND RED</td>
<td>PEG DRIVEN FLUSH WITH GROUND CHAINAGE AND OFFSET: WRITTEN ON STAKE</td>
</tr>
</tbody>
</table>

**TYPICAL CROSS SECTION**

All dimensions are in millimetres unless otherwise shown.

Send feedback on this standard drawing to transportstandards@rms.nsw.gov.au

Manager Roads & Urban Infrastructure Specifications & Technology

Date: 20.01.17

Road Policing, Specifications & Technology

Transport, Roads & Maritime Services

R0400-02

Road Design Engineering

Setting out Diagram for Rural Roads

Sheet 1 of 1

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NOTES

1. SIZE OF ROCK FILL: 80 MINIMUM, 150 MAXIMUM.
2. ROCK FILLED MATTRESS AND BATTER SLOPE TO BE IN ACCORDANCE WITH BRIDGE PLANS.
3. MATTRESSES TO BE FABRICATED OF GALVANISED WIRE OR SYNTHETIC MESH.

EMBANKMENT

EXISTING SURFACE

MIN 600

FILTER CLOTH

ROCK FILLED MATTRESS

SIDE ELEVATION

SECTION

NOT TO SCALE

MIN 600

ROCK FILLED MATTRESS

MIN 600

EXISTING SURFACE

BRIDGE

ELEVATION

PLAN

MIN 900

MIN 900

2 TO 1

3 TO 1
NOTES

1. CONCRETE IN FOOTINGS AND EDGE STRIPS TO BE MINIMUM OF 20 MPa AT 28 DAYS.
NOTES

1. BATTERS TO BE GRADED ON COMPLETION
2. MOUND TO BE 500 MINIMUM ABOVE CONTROL LINE LEVEL.
NOTES
1. THE SIZE OF THE MAIN C.B. IS TO SUIT THE PARTICULAR INSTALLATION.
2. THE NUMBER OF FINAL SUBCIRCUIT C.B's WILL VARY TO SUIT THE PARTICULAR INSTALLATION. THE MINIMUM SIZE ALLOWABLE FOR THE FINAL SUBCIRCUIT C.B. IS 25 AMP TYPE B CURRENTLY RCD PROTECTION IS NOT REQUIRED WHEN 25 AMP CIRCUIT BREAKERS ARE USED SEE AS/NZS 3000 FOR RCD PROTECTION REQUIREMENTS FOR FINAL SUBCIRCUITS HAVING A RATED CURRENT NOT EXCEEDING 20 AMPS. 
3. WHEN A REMOTELY OPERATED RELAY IS FITTED A SIGN IS TO BE AFFIXED ADJACENT TO IT INDICATING THE COIL IS FED FROM ANOTHER SUPPLY SWITCHBOARD.
4. CUTLER HAMMER CONTACTOR SIZE:
   LIGHTING LOAD UP TO 11.5kW - SIZE 0, LIGHTING LOAD UP TO 28.5kW - SIZE 1, LIGHTING LOAD UP TO 36kW - SIZE 2.
5. EACH STREET LIGHTING CIRCUIT IS TO BE PROTECTED BY A SEPARATE CIRCUIT BREAKER, THE STREET LIGHTING CIRCUITS ARE DESIGNATED 1, 2, 3 ETC. ON THE STREET LIGHTING DRAWING.
6. THE ABOVE ARRANGEMENT WILL BE ACCEPTED BY THE SUPPLY AUTHORITY PROVIDING THE FOLLOWING IS CARRIED OUT.
   (a) THE THREE PHASE MAIN SWITCH CIRCUIT BREAKER BE OF ADEQUATE SIZE TO PROTECT THE CIRCUIT CONDUCTORS.
   (b) A LABEL IS TO BE LOCATED IN A POSITION AND OF A TYPE TO BE PROMINENT TO ANY PERSON PREPARING TO WORK ON THE SWITCHBOARD WHICH STATES:
      1) A COMMON NEUTRAL IS USED ON THE LIGHT CIRCUITS.
     2) DUE TO FEEDBACK POSSIBILITIES, THE MAIN CIRCUIT BREAKER MUST BE SWITCHED OFF PRIOR TO COMMENCEMENT OF WORK ON THE STREET LIGHTS.

GENERAL ARRANGEMENT OF PANEL

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

Transport Roads & Maritime Services

STANDARD DRAWING
R0600 STREET LIGHTING SERIES
STREET LIGHTING SUPPLY SWITCHBOARD
ELECTRICAL DETAILS

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@nsw.gov.au

MANAGER MANAGEMENT ENGINEERING SERVICES

DATE: 20.01.17

DRAWN: DS2014_005920

RE: ProjectWiseQRCodeLayer

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NOTES

1. Plug will be withdrawn from receptacle by sudden tension on the flex at any angle up to 30° from axis of pins.
**CONCRETE PLINTH ASSEMBLY FOR FREEWAY LIGHTING COLUMNS**

- **Type**: PVC or CPVC conduit
- **Impression in Lid**: DULMISON Cat No.s IMPRESSED IN THE LID. WITH 'ELECTRICITY'.
- **Plastic Cable Pit**: Type P2 VIPIT
- **Conduit**: 40mm category (to allow pit to drain)
- **Dowel**: CCPLAS2L (LID), CCPLAS2 (PIT)
- **Plinth Foundation**: 20MPa

**NOTES**

1. If it is the last pit on a down hill run, the drain shall be located in a lower location to allow pit to drain.
2. For surface column, the pit is to sit higher so that it finishes level with finish level of plinth.

**Drawings**

- **Section**: Not to scale
- **Plan**: Plan view

**Dimensions**

- Minimum in sound rock: 1500
- Minimum in earth: 1000
- 150mm DIA. PVC conduit to rubble drain or drain (to allow pit to drain)
- Sandbag filled with gravel (approximate location)
- 20MPa concrete

**Send feedback on this standard drawing to** technologystandards@rms.nsw.gov.au

**Manager Road Policy, Specifications & Technology**

**Document Version**: 0.1

**Issue Date**: January 2017

**Status**: Issued

**Road Design Engineering**

**R0600 STREET LIGHTING SERIES**

**Concrete Plinth Assembly for Freeway Lighting Columns**

**Sheet 1 of 2**

© Roads and Maritime Services
50mm PVC 45° BEND

20mm DIA. PVC CONDUIT TO
RUBBLE DRAIN OR DRAIN
(TO ALLOW PIT TO DRAIN)

SANDBAG FILLED WITH GRAVEL
(APPROXIMATE LOCATION)

50mm DIA. PVC CONDUIT
PROTRUDING INSIDE CABLE PIT

20mm HOLE CUT IN PIT
WITH HOLE SAW

25mm CONCRETE

SECTION

NOT TO SCALE
NOTES

1. CONCRETE 20MPa MINIMUM.

SECTION NOT TO SCALE

---

Ø20mm hand driven copper Earth Rod.

---

Ø80mm category 'A' orange heavy duty uPVC inlet and outlet conduits. Orientation of conduits to suit site conditions. On some installations more than one conduit may be required for outgoing circuits.

---

PLAN OF PLINTH FOR CONTROL CABINET

---

SIDE ELEVATION WITH CONTROL CABINET IN PLACE
1. Hinges to be capable of supporting at least 20 kilograms.
2. Hinges, screws, nut & washer material to be non-corrosive steel.
3. Locate the hinges in the approximate positions shown.
4. Drill the holes for the hinge screws to suit the hinges chosen.
5. Position the holes for the root nuts to suit any pre-existing holes in the panel or in the approximate positions shown.
6. Mount the meter board in approx position as shown in Sheet 1.

NOTE:
- Hinges to be capable of supporting at least 20 kilograms.
- Hinges, screws, nut & washer material to be non-corrosive steel.
- Locate the hinges in the approximate positions shown.
- Drill the holes for the hinge screws to suit the hinges chosen.
- Position the holes for the root nuts to suit any pre-existing holes in the panel or in the approximate positions shown.
- Mount the meter board in approximate position as shown in Sheet 1.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
**Standard Drawing No.**

**Rev.**

**Date**

**Amendment / Revision Description**

**WVR No.**

**Approval**

---

**Scales on A3 Size Drawing**

0
5
10
15
20
25
30
35
40
45
50

**ON A3 ORIGINA L**

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

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**Prepared By**

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**All Dimensions Are in Millimetres Unless Otherwise Shown**

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**Send Feedback on this Standard Drawing to**

technologystandards@rms.nsw.gov.au

---

**DESIGN GUIDE**

1. **Table and Notes Below Indicate the Absolute Minimum Clearances Required**

<table>
<thead>
<tr>
<th>Speed (km/h)</th>
<th>SLIP BASE CLEARANCE REQUIRED</th>
<th>IMPACT ABSORBING</th>
<th>STANDARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-60</td>
<td>NA</td>
<td>1/4 (see 'A')</td>
<td>3m (see 'F &amp; 'D')</td>
</tr>
<tr>
<td>61-80</td>
<td>2m (see 'A')</td>
<td>1/4 (see 'A')</td>
<td>3m (see 'D')</td>
</tr>
<tr>
<td>81-100</td>
<td>NA</td>
<td>2m (see 'A')</td>
<td>NA</td>
</tr>
<tr>
<td>101-110</td>
<td>2m (see 'A')</td>
<td>NA</td>
<td>11m (see 'D')</td>
</tr>
</tbody>
</table>

*A* INDICATES FROM EDGE OF NEAREST TRAFFIC LANE.

*B* INDICATES BEHIND KERB FACE.

*C* INDICATES 2.5m IS RESTRICTED AREA FROM KERB FACE TO FACE OF POLE (SEE STREETS OPENING CONFERENCE AND/OR SECTION 3 OF THE ROAD DESIGN GUIDE).

**2. Street Lighting Columns Behind Barriers Are to be Located at a Minimum Outside the Deflection of the Barrier. Deflection Values Are Found on the Roads and Maritime Services Safety Barrier Acceptance Documents.**

**3. For Aesthetic Reasons, Street Lighting Columns Shall Be Located in a Line Parallel to the KERB Line, Maintaining the Minimum Details Requirements.**

---

**NOTES**

1. A 2.5mm² TWIN & EARTH (STRAINED COPPER) TPVC CABLE TO BE RUN TO THE LUMINARE.

   THE WEIGHT OF THE CABLE SHALL BE SUPPORTED BY A NYLON CORD (MINIMUM 3mm DIA) TIED TO THE LUMINARE.

   THE CABLE SHALL BE TAPED SECURELY TO THE NYLON CORD EVERY TWO METRES WITH BLACK ELECTRICAL TAPE.

   BLACK CABLE TO BE LEFT BETWEEN TAPED POINTS SO THAT THE NYLON CORD TAKES ALL THE WEIGHT.

2. LAMP CONTROL, LAPP WIRE TO BE MOUNTED ON STRAPS WITHIN COLUMN, HANGS ON TOP STRAP SCREWED TO BOTTOM STRAP.

---

**Transport**

Roads and Maritime Services

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**ROAD DESIGN ENGINEERING**

R0600 STREET LIGHTING SERIES

ERECUTION AND INSTALLATION DETAILS FOR LIGHT COLUMNS

---

**DOCUMENT VER.**

**SCAN TO CHECK**

---

**ASSIGNMENT: PROFESSIONAL SERVICE**

Transport"
TYPICAL PLAN

TYPICAL CROSS SECTION
ALONG CONDUIT CROSSING OF FREEWAY

DETAIL
NOT TO SCALE

ALLE DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN
FOR NEW FOOTINGS, USE THE FOLLOWING TABLE

<table>
<thead>
<tr>
<th>LIGHTING COLUMN HEIGHT (meters)</th>
<th>PCD 'B' (mm)</th>
<th>THREAD C x THREAD PITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>6, 10, 12, 13.5 AND 15</td>
<td>350</td>
<td>M24 x 3.0</td>
</tr>
<tr>
<td></td>
<td>350</td>
<td>M30 x 3.5</td>
</tr>
</tbody>
</table>

NOTES
1. FOR CONCRETE PLINTH ASSEMBLY REFER TO SEPARATE DRAWING.
2. ALL JOINTS TO BE 5mm FILLET WELD AND ARE TO BE FULLY WELDED.
3. ANCHOR BOLT ASSEMBLY TO BE HOT-DIPPED GALVANISED AFTER FABRICATION. ALL OBSTRUCTIVE GALVANISING TO BE REMOVED FROM THREADS.
4. THIS ASSEMBLY IS SUITABLE FOR TYPE P2 VIPIT PLASTIC CABLE PITS DULMISON CAT No. CCPLAS2 (PIT) CCPLAS2L (LID).
5. FOR INFORMATION PURPOSES ONLY. EXISTING POSTS MAY HAVE BEEN INSTALLED USING FOUNDATION AND/OR BOLTS WITH THE FOLLOWING CONFIGURATION.

NOTE: THREADS.

NOTE: THESE ANCHOR BOLT CONFIGURATIONS EXCEPT THE 350 ARE NOT TO BE USED FOR NEW LIGHTING CONFIGURATIONS.

NOTE: ALL ITEMS AND MANUFACTURING METHODS TO BE DONE TO THE LATEST AUSTRALIAN STANDARDS.
<table>
<thead>
<tr>
<th>ITEM</th>
<th>SHEET</th>
<th>DESCRIPTION</th>
<th>QTY</th>
<th>MATL</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N.D.</td>
<td>WEATHER/PROOF BASE CL/PSAL</td>
<td>1</td>
<td>Plastic CL/PSAL 6656910</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>RECEPTACLE BASE</td>
<td>1</td>
<td>W.S.</td>
<td>GALV</td>
</tr>
<tr>
<td>3</td>
<td>N.D.</td>
<td>SET SCREW HEX HD MIN 1/4G</td>
<td>3</td>
<td>W.S.</td>
<td>GALV</td>
</tr>
<tr>
<td>4</td>
<td>N.D.</td>
<td>SCREW METAL 1/8&quot; CSK HD SLOTTED</td>
<td>4</td>
<td>M.S.</td>
<td>B.S.W. × 1&quot; LG</td>
</tr>
<tr>
<td>5</td>
<td>N.D.</td>
<td>NUT, HEX.</td>
<td>4</td>
<td>M.S.</td>
<td>B.S.W.</td>
</tr>
</tbody>
</table>

**GENERAL ARRANGEMENT**

1. WEATHER/PROOF BASE CL/PSAL
2. RECEPTACLE BASE
3. SET SCREW HEX HD MIN 1/4G
4. SCREW METAL 1/8" CSK HD SLOTTED
5. NUT, HEX.

**Drawing Details**

- **Sheet Number**: A3
- **Drawing Title**: STREET LIGHTING COLUMN FABRICATED DISCONNECT PLUG RECEPTACLE G.A. AND DETAILS
- **Original Issue Date**: JANUARY 2017
- **Issued Date**: 24/11/17
- **Manager**: ROAD POLICY, SPECIFICATIONS & TECHNOLOGY

**Notes**

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- **Scan to check**

**All dimensions are in millimeters unless otherwise shown.**

**Rev.**

- **Prepared By**: © Roads and Maritime Services

**QR Code**

- ProjectWiseQRCodeLayer

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**Revisions**

- Power Socket Model Changed

**Document Version**

- **Scan to check**

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**Status**

- **Issued**

---

**Manager Road Policy, Specifications & Technology**

- **Date**: 24/11/17

---

**Standard Drawing**

- **Road Design Engineering**
- **Street Lighting Column Fabricated Disconnect Plug Receptacle G.A. and Details**
- **Sheet 1 of 2**
- **Rev. R0600-09**
- **Standard Drawing**
- **Issued**: 09/01/2017
1. REMOVE ALL BURRS & SHARP EDGES AFTER FABRICATION.

ITEM 2 RECEPTACLE BASE
1 REQ'D M.S.GALV

65mm DIA N.B. PIPE x 4.5 WALL

40 DIA HOLE

DRILL 3 HOLES 90°, EQUALLY SPACED
WELD M8 NUTS CENTRAL

DRILL 4 HOLES 5.5mm DIA

45
50
74
100
50
45
27.5

NOTES

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN
NOTES

1. POSTS ARE FROM 4.3 BMT PLATE GRADE H300 STEEL, TO AS 1594. CROSS-SECTION DIMENSIONS FOR POSTS ARE SHOWN ON R0710-01.

2. STEEL BASE PLATE ARE TO AS 269, GRADE H250. POSTS AND PLATES HOT DIP GALVANISED TO AS 4680 AFTER FABRICATION.

3. HEXAGON BOLTS TO AS 1111, GRADE 4.6. BLACK STEEL WASHERS, SERIES TO AS 1214. WASHERS ARE TO BE HOT DIP GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1214.

4. TWO BOLTS ARE REQUIRED TO FASTEN THE BASE PLATE TO A RIGID SURFACE. THE CONFIGURATION OF THE BOLT LOCATIONS SHALL BE AS SHOWN WHERE BASE PLATES ARE USED FOR MEDIAN APPLICATIONS. WHEN DIFFERENT LOCATIONS ARE USED, THEN DIFFERENT LOCATIONS ARE USED.

5. BOLTS SHALL BE SNUG TIGHT TO AS 4100.

6. DIMENSIONS ARE SUBJECT TO MANUFACTURERS' TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCES ARE NOMINATED.
STIFFENER (B002)

RAIL (B001)

19x64 SLOTTED HOLE FOR SPLICE BOLTS

19x64 SLOTTED HOLE FOR POST BOLT

35x29 SLOTTED HOLE FOR SPLICE BOLTS


NOTES
1. RAIL AND STIFFENING PIECES ARE FROM 2.7 BMT GRADE HA350 STEEL TO AS 1594 AND HOT DIP GALVANISED TO AS 4680 AFTER FABRICATION.
2. FLAME CUTTING TO RAIL IS NOT PERMITTED RAIL TO BE STAMPED 250/2.7 BMT OR SIMILAR.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURER'S TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCES ARE NOMINATED.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au
THREE BEAM TERMINAL CONNECTOR
(DOSS SECTION TO MEET WITH THREE BEAMS)

13MM SLOTTED HOLES
(OPTIONAL)

23X29 SLOTTED HOLES
FOR SPlice BOLTS

625 HOLE
(OPTIONAL)

FOR SPLICE BOLTS

THREE BEAM TERMINAL CONNECTOR
INTENDED USE

THESE TERMINAL CONNECTORS ARE USED
TO ATTACH THREE BEAM TO RIGID BARRIERS
AND STRUCTURES.

NOTES

1. TERMINAL CONNECTORS ARE FROM 2.7 BMT GRADE HA350 STEEL TO
AS1594 AND NOT DIP GALVANISED TO AS 4492 AFTER FABRICATION.
2. FLAME CUTTING TO TERMINAL CONNECTORS IS NOT PERMITTED.
   TERMINAL CONNECTORS TO BE STAMPED 2.7 BMT (OR SIMILAR).
3. BMT = BASE METAL THICKNESS
4. DIMENSIONAL TOLERANCES NOT SHOWN OR IMPLIED ARE INTENDED TO
   BE THOSE CONSISTENT WITH THE PROPER FUNCTIONING OF THE PART,
   INCLUDING ITS APPEARANCE, AND ACCEPTED MANUFACTURING
   PRACTICES.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

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MANAGER ROAD DESIGN ENGINEERING SERVICES
R0710 SAFETY BARRIER SERIES - SEMI-RIGID
THREE BEAM SAFETY BARRIER TERMINAL CONNECTORS

STANDARD DRAWING
ROAD DESIGN ENGINEERING
R0710-08
THREE BEAM SAFETY BARRIER TERMINAL CONNECTORS

© Roads and Maritime Services
W BEAM TO THREE BEAM TRANSITION RAIL

(B007)

NOTES
1. TRANSITION RAIL PIECES FROM 2.7 BMTHASS1 STEEL TO AS 1654
   AND HOT DIPPED GALVANISED TO AS 4680 AFTER FABRICATION. PLANS
   CUTTING TO TRANSITION IS NOT PERMITTED. TRANSITION TO BE
   STAMPED 350/2.7 BMTHOR SIMILAR.
2. BMTH = BASE METAL THICKNESS
3. DIMENSIONAL TOLERANCES NOT SHOWN OR IMPLIED ARE INTENDED TO BE
   THOSE CONSISTENT WITH THE PROPER FUNCTIONING OF THE PART,
   INCLUDING ITS APPEARANCE, AND ACCEPTED MANUFACTURING
   PRACTICES.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

SEND FEEDBACK ON THIS STANDARD DRAWING TO:
techstandards@rms.nsw.gov.au
W BEAM NESTING RAIL (B009)

19x54 SLOTTED HOLE FOR POST BOLT.

W BEAM HALF LENGTH RAIL (B008)

19x54 SLOTTED HOLE FOR POST BOLT.

SECTION THROUGH RAIL AND STIFFENER

POSITION OF SLOTTED HOLES SHOWN

NOTES

1. RAILS ARE FROM 2.7 BMT (GRADE HA350) STEEL TO AS 1594 AND HOT DIP GALVANISED TO AS 4680 AFT FABRICATION. FLAME CUTTING TO RAIL IS NOT PERMITTED. RAIL TO BE STAMPED 350/2.7 BMT (OR SIMILAR).
2. BMT = BASE METAL THICKNESS.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURERS TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCES ARE NOMINATED.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au
THREE BEAM RAIL FOR TRANSITION TO RIGID BARRIER (B027 - 3.5BMT)

THREE BEAM 3.5 BMT RAIL FOR TRANSITION TO RIGID BARRIER

NOTES

1. RAIL B027 FROM 3.5BMT. RAIL SHALL BE GRADE HA350 STEEL TO AS 1594 AND NOT 275 GALVANISED TO AS 4680 AFTER FABRICATION. FLAME CUTTING TO RAIL IS NOT PERMITTED. RAIL B027 TO BE STAMPED 350/3.5 (OR SIMILAR).

2. BMT = BASE METAL THICKNESS.

3. DIMENSIONS ARE SUBJECT TO MANUFACTURER'S TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCES ARE NOMINATED.

SEND FEEDBACK ON THIS STANDARD:

managerstandards@rms.nsw.gov.au

FIRST ISSUED:

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ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

1. RAIL B027 FROM 3.5BMT. RAIL SHALL BE GRADE HA350 STEEL TO AS 1594 AND NOT 275 GALVANISED TO AS 4680 AFTER FABRICATION. FLAME CUTTING TO RAIL IS NOT PERMITTED. RAIL B027 TO BE STAMPED 350/3.5 (OR SIMILAR).

2. BMT = BASE METAL THICKNESS.

3. DIMENSIONS ARE SUBJECT TO MANUFACTURER'S TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCES ARE NOMINATED.
NOTES

1. ANCHOR PLATE IS FROM 8.0 BMT PLATE GRADE HA250 STEEL TO AS 1594.
2. END PLATE IS FROM 12.0 BMT PLATE GRADE HA250 STEEL TO AS 3678.
3. WELDING IS TO AS 1554.1. FABRICATED PRODUCT AND HOT DIP GALVANISED TO AS 4980.
4. DIMENSIONS ARE SUBJECT TO MANUFACTURERS TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCES ARE NOMINATED.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au

MANAGER ROAD POLICY, SPECIFICATIONS & TECHNOLOGY

DATE  20.01.17

PROJECTWISEQRCODELAYER
NOTES

1. RAIL AND RAIL STIFFENING PIECES ARE FROM 2.7 BMG GRADE HA350 STEEL TO AS 1594 AND HOT DIP GALVANISED TO AS 4680 AFTER FABRICATION. FLAME CUTTING TO RAIL IS NOT PERMITTED. RAIL TO BE STAMPED 350/2.7 BMG OR SIMILAR BMG = BASE METAL THICKNESS.

2. DIMENSIONS ARE SUBJECT TO MANUFACTURERS TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCES ARE NAMED.

3. MAINTENANCE RAIL (B030) SHALL BE POSITIONED IN THE SAFETY BARRIER INSTALLATION SO THAT THE MODIFIED END IS LOCATED AT THE BACK OF AN OVERLAP.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
MUSHROOM HEAD POST BOLT (FB01) & NUT (FN01) FOR RAIL CONNECTION TO BLOCKOUT PIECE

MUSHROOM HEAD SPlice BOLT (FB03) AND OVERSIZED NUT (FN02) FOR RAIL TO RAIL CONNECTION

MUSHROOM HEAD POST BOLT (FB01) & NUT (FN01) FOR RAIL CONNECTION TO TIMBER POST #1 IN MELT

NOTES:
1. POST BOLTS FB01 & FB07 TO HAVE PHYSICAL PROPERTIES IDENTICAL TO AS 1111 (GRADE 4.6), HEXAGON NUT FN01 TO AS 1112 (GRADE 8). HEXAGON POST BOLT 1903 AND NUT FN12 TO HAVE PHYSICAL PROPERTIES IDENTICAL TO AS 1252 (CLASS 8.8). NUTS SHALL BE TAPPED TO SUIT GALVANISED THREADS. BOLTS, NUTS AND WASHERS TO BE TREATED TO AS 1627 AND SHALL BE HOT-DIP GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1234.
2. THE LENGTH OF THREAD ON MUSHROOM HEADED BOLTS FB01 & FB07 TO BE SUCH THAT THE NUT SHALL TOUCH THE OVAL SHOULDER WHEN TIGHTENED BY HAND. NUTS SHALL BE SNUG TIGHT TO AS 4100.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURER'S TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCES ARE NOMINATED.
M16x80 BOLT (FB05)
(ALTERNATIVE FOR FB04)

M20x100 BOLT WITH SHANK TURNED DOWN (FB10)
AND WASHER (FW02) FOR
BASE PLATE CONNECTION TO CONCRETE SURFACE

M20x100 BOLT (FB11) AND WASHER (FW01)
BOTTOM PLATE (PL03) CONNECT TO CONC. SURFACE

RECTANGULAR WASHER (FW02)

NOTES
1. HEXAGONAL BOLTS TO AS 1111 (GRADE 4.6), HEXAGON NUTS TO AS 1112 (GRADE 5). NUTS SHALL BE TAPPED TO SUIT GALVANISED THREADS.
2. BLACK STEEL WASHERS, LARGE SERIES TO AS 1237. BOLTS, NUTS AND WASHERS TO BE TREATED TO AS 1247 AND SHALL BE HOT DIP GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1244.
3. BOLTS FB01 AND FB03 SHALL BE SNUG TIGHT TO AS 1110.
4. WASHERS TO BE TREATED TO AS 1627 AND SHALL BE HOT DIP BLACK STEEL WASHERS, LARGE SERIES TO AS 1237. BOLTS, NUTS AND WASHERS TO BE TREATED TO AS 1247 AND SHALL BE HOT DIP GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1244.
5. BOLTS FB09 AND FB10 SHALL BE SNUG TIGHT TO AS 1110.
6. GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1244.
7. WASHERS TO BE TREATED TO AS 1627 AND SHALL BE HOT DIP BLACK STEEL WASHERS, LARGE SERIES TO AS 1237. BOLTS, NUTS AND WASHERS TO BE TREATED TO AS 1247 AND SHALL BE HOT DIP GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1244.
8. BOLTS FB09 AND FB10 SHALL BE SNUG TIGHT TO AS 1110.
9. WASHERS TO BE TREATED TO AS 1627 AND SHALL BE HOT DIP BLACK STEEL WASHERS, LARGE SERIES TO AS 1237. BOLTS, NUTS AND WASHERS TO BE TREATED TO AS 1247 AND SHALL BE HOT DIP GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1244.
10. BOLTS FB09 AND FB10 SHALL BE SNUG TIGHT TO AS 1110.
11. GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1244.
12. WASHERS TO BE TREATED TO AS 1627 AND SHALL BE HOT DIP BLACK STEEL WASHERS, LARGE SERIES TO AS 1237. BOLTS, NUTS AND WASHERS TO BE TREATED TO AS 1247 AND SHALL BE HOT DIP GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1244.
13. BOLTS FB09 AND FB10 SHALL BE SNUG TIGHT TO AS 1110.
14. GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1244.
15. WASHERS TO BE TREATED TO AS 1627 AND SHALL BE HOT DIP BLACK STEEL WASHERS, LARGE SERIES TO AS 1237. BOLTS, NUTS AND WASHERS TO BE TREATED TO AS 1247 AND SHALL BE HOT DIP GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1244.
16. BOLTS FB09 AND FB10 SHALL BE SNUG TIGHT TO AS 1110.
17. GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1244.
18. WASHERS TO BE TREATED TO AS 1627 AND SHALL BE HOT DIP BLACK STEEL WASHERS, LARGE SERIES TO AS 1237. BOLTS, NUTS AND WASHERS TO BE TREATED TO AS 1247 AND SHALL BE HOT DIP GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1244.
19. BOLTS FB09 AND FB10 SHALL BE SNUG TIGHT TO AS 1110.
20. GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1244.
21. WASHERS TO BE TREATED TO AS 1627 AND SHALL BE HOT DIP BLACK STEEL WASHERS, LARGE SERIES TO AS 1237. BOLTS, NUTS AND WASHERS TO BE TREATED TO AS 1247 AND SHALL BE HOT DIP GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1244.
22. BOLTS FB09 AND FB10 SHALL BE SNUG TIGHT TO AS 1110.
23. GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1244.
24. WASHERS TO BE TREATED TO AS 1627 AND SHALL BE HOT DIP BLACK STEEL WASHERS, LARGE SERIES TO AS 1237. BOLTS, NUTS AND WASHERS TO BE TREATED TO AS 1247 AND SHALL BE HOT DIP GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1244.
25. BOLTS FB09 AND FB10 SHALL BE SNUG TIGHT TO AS 1110.
26. GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1244.
27. WASHERS TO BE TREATED TO AS 1627 AND SHALL BE HOT DIP BLACK STEEL WASHERS, LARGE SERIES TO AS 1237. BOLTS, NUTS AND WASHERS TO BE TREATED TO AS 1247 AND SHALL BE HOT DIP GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1244.
DELINEATION UNIT CONNECTION TO BLOCKOUT PIECE

- M6X25 BOLT (FB12), WASHER (FW04) AND M6 NUT (FN03)

NOTES
1. DEFORMATION UNITS ARE USUALLY NOT REQUIRED WHERE STREET LIGHTING EXISTS.
2. THE MATERIAL USED FOR MOUNTING PLATES MUST BE A HIGH IMPACT, ULTRA VIOLET STABLE MATERIAL (SUCH AS ACRYLONITRILE-BUTADIENE-STYRENE POLYMER (ABS-P)).
3. ON TWO-WAY CARREAGENIC THE MOUNTING PLATE SHALL HAVE RED AND WHITE RETROREFLECTORS ATTACHED ON OPPOSITE EDGES (P008). ON ONE WAY CARREAGENIC THE MOUNTING PLATE SHALL HAVE THE RETROREFLECTOR ATTACHED TO ONE SIDE ONLY. A RED RETROREFLECTOR SHALL BE ATTACHED FOR MEASURABLE INSTALLATION (P008), A YELLOW RETROREFLECTOR SHALL BE ATTACHED FOR OFFSIDE INSTALLATION (P010).
4. MOUNTING PLATES SHALL BE ATTACHED TO THE INSIDE OF BLOCKOUTS (OR POSTS) USING M6X25 HEXAGONAL BOLT WITH NUT AND WASHER OR AN APPROVED FASTENING SYSTEM, HEXAGONAL BOLTS TO AS 1111 (GRADE 4.6), HEXAGON NUTS TO AS 1112 (GRADE 5). NUTS SHALL BE TAPPED TO SUIT GALVANIZED THREADS. BLACK STEEL WASHERS, NORMAL SERIES TO AS 1237, BOLTS, NUTS AND WASHERS TREATED TO AS 1237 AND NOT OF GALVANISING IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1237.

R0710-18

ROAD DESIGN ENGINEERING
R0710 SAFETY BARRIER SERIES - SEMI-RIGID
W BEAM AND THREE BEAM SAFETY BARRIER
DELINEATION UNIT

Send feedback on this standard drawing to technologystandards@rms.nsw.gov.au
## SCHEDULE OF COMPONENTS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>REF. DRAWING</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>P001</td>
<td>R0710-01</td>
<td>1800 STEEL POST FOR W BEAM</td>
<td>2</td>
</tr>
<tr>
<td>P002</td>
<td>R0710-01</td>
<td>360 BLOCKOUT PIECE FOR W BEAM</td>
<td>2</td>
</tr>
<tr>
<td>B001</td>
<td>R0710-06</td>
<td>4000 W BEAM RAIL</td>
<td>1</td>
</tr>
<tr>
<td>B002</td>
<td>R0710-06</td>
<td>300 W BEAM STIFFENING PIECE</td>
<td>1</td>
</tr>
<tr>
<td>FB01</td>
<td>R0710-15</td>
<td>M16 × 50 MUSHROOM HEAD BOLT - POST</td>
<td>6</td>
</tr>
<tr>
<td>FB02</td>
<td>R0710-15</td>
<td>M16 × 30 HEXAGON BOLT - POST</td>
<td>8</td>
</tr>
<tr>
<td>FB03</td>
<td>R0710-15</td>
<td>M16 × 32 MUSHROOM HEAD BOLT - SPLICE</td>
<td>6</td>
</tr>
<tr>
<td>FN01</td>
<td>R0710-15</td>
<td>M16 NUT</td>
<td>8</td>
</tr>
<tr>
<td>FN02</td>
<td>R0710-15</td>
<td>M16 OVERSIZED NUT (18 DEEP)</td>
<td>8</td>
</tr>
</tbody>
</table>

### NOTES

1. RAIL LAP, POST AND BLOCKOUT ORIENTATION IN RELATION TO TRAFFIC DIRECTION AS SHOWN IS ESSENTIAL.
NOTES
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<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>P003</td>
<td>- R0710-01</td>
<td>2100 STEEL POST FOR THREE BEAM</td>
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<tr>
<td>P004</td>
<td>- R0710-01</td>
<td>550 BLOCKOUT PIECE FOR THREE BEAM</td>
<td>2</td>
</tr>
<tr>
<td>B003</td>
<td>- R0710-07</td>
<td>4000 THREE BEAM RAIL</td>
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</tr>
<tr>
<td>B004</td>
<td>- R0710-07</td>
<td>334 THREE BEAM STIFFENING PIECE</td>
<td>1</td>
</tr>
<tr>
<td>FB01</td>
<td>- R0710-15</td>
<td>M16 × 50 MUSHROOM HEAD BOLT - POST</td>
<td>6</td>
</tr>
<tr>
<td>FB02</td>
<td>- R0710-15</td>
<td>M16 × 50 HEXAGON BOLT - POST</td>
<td>6</td>
</tr>
<tr>
<td>FB03</td>
<td>- R0710-15</td>
<td>M16 × 50 MUSHROOM HEAD BOLT - SPLICE</td>
<td>12</td>
</tr>
<tr>
<td>FN01</td>
<td>- R0710-15</td>
<td>M16 NUT</td>
<td>12</td>
</tr>
<tr>
<td>FN02</td>
<td>- R0710-15</td>
<td>M16 OVERSIZED NUT (18 DEEP)</td>
<td>12</td>
</tr>
</tbody>
</table>

1. RAIL LAP, POST AND BLOCKOUT ORIENTATION IN RELATION TO TRAFFIC DIRECTION AS SHOWN IS ESSENTIAL.
**SCHEDULE OF COMPONENTS**

<table>
<thead>
<tr>
<th>ITEM NO</th>
<th>DESCRIPTION</th>
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</thead>
<tbody>
<tr>
<td>P003</td>
<td>DS2014/005929 2100 STEEL POST FOR THRIE BEAM</td>
</tr>
<tr>
<td>P006</td>
<td>DS2014/005930 430 NOTCHED BLOCKOUT PIECE FOR THRIE BEAM (VERGE APPLICATION)</td>
</tr>
<tr>
<td>P007</td>
<td>DS2014/005930 430 NOTCHED BLOCKOUT PIECE FOR THRIE BEAM (MEDIAN APPLICATION)</td>
</tr>
<tr>
<td>B003</td>
<td>DS2014/005936 4000 THRIE BEAM RAIL</td>
</tr>
<tr>
<td>B004</td>
<td>DS2014/005936 300 THRIE BEAM STIFFENING PIECE</td>
</tr>
<tr>
<td>FB01</td>
<td>DS2014/005950 M16 × 50 MUSHROOM HEAD BOLT - POST</td>
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<tr>
<td>FB02</td>
<td>DS2014/005950 M16 × 30 HEXAGON BOLT - POST</td>
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<td>FB03</td>
<td>DS2014/005950 M16 × 32 MUSHROOM HEAD BOLT - SPLICE</td>
</tr>
<tr>
<td>FN01</td>
<td>DS2014/005950 M16 NUT</td>
</tr>
<tr>
<td>FN02</td>
<td>DS2014/005950 M16 OVERSIZED NUT (18 DEEP)</td>
</tr>
</tbody>
</table>

**NOTES**

1. RAIL, LAY, POST AND BLOCKOUT ORIENTATION IN RELATION TO TRAFFIC DIRECTION AS SHOWN IS ESSENTIAL.
NOTES
1. RAIL LAP, POST AND BLOCKOUT ORIENTATION IN RELATION TO TRAFFIC DIRECTION AS SHOWN IS ESSENTIAL.
2. FASTENERS FOR BLOCKOUT TO POST AND RAIL TO RAIL CONNECTIONS NOT SHOWN ON THIS DRAWING.

RAIL POLICY, SPECIFICATIONS AND TECHNOLOGY

SEND FEEDBACK ON THIS STANDARD DRAWING TO: technologystandards@rms.nsw.gov.au

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN
1. Wire Rope Safety Barrier including anchorage detail shall be installed as per manufacturer's specifications.

2. Refer to R0730-06 for MELT details.

3. Refer to R0730-08 for TT details.

**Notes:**
- The overlap of Points of Redirection for each system is critical for maintaining a continuous safety barrier system.
- Refer to R0730-08 for MELT details.
- Refer to R0730-06 for TT details.
W = WIDTH OF TOP TYPE F BARRIER

6 mm BMT PLATE

60 X 60 X 6 EQUAL ANGLE STIFFENER

END ELEVATION - SINGLE SIDED BARRIER

END ELEVATION - MEDIAN BARRIER

ELEVATION

TYPE F BARRIER - GALVANISED COVER ASSEMBLY (B023)
AT OPENING FOR POWER SUPPLY PIT

OCCUPATIONAL HEALTH AND SAFETY NOTE

APPROXIMATE MASS OF THESE UNITS ARE:
MEDIAN BARRIER UNIT - 115 kg
SINGLE SIDED BARRIER UNIT (W = 150) - 52 kg
SINGLE SIDED BARRIER UNIT (W = 230) - 56 kg
MIN TWO PERSON LIFT IS RECOMMENDED.

NOTES

1. COVER PLATES SHALL BE BENT FROM ONE PLATE WITH 3/32 MIN AT BENDS.
   COVER ASSEMBLY FROM 6.0 BMT GRADE 250 STEEL TO AS 3678 AND AS 3679.1 AND HOT DIPPED GALVANISED TO THICKNESS OF 230 TO AS 4680.
2. WELDING SHALL BE TO AS 1554.1. WELDING SYMBOLS TO AS 1101.3
3. DIMENSIONS ARE SUBJECT TO MANUFACTURER'S TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCES ARE NOMINATED.
4. SEE DS2014/005960 FOR ASSEMBLY DETAILS.
5. "UNIBAM" M12X40 BUTTON HEAD SOCKET SCREWS, OR EQUIVALENT, TO BE W/O PLYER REQUIRED FOR FASTENING COVER ASSEMBLY TO STEEL ANGLE ATTACHED TO THE TYPE "F" CONCRETE BARRIER.

© Roads and Maritime Services
TYPE 'VCB' VERTICAL SAFETY BARRIER

1. Minimum offset from toe of barrier to edge line = 500.
2. Barrier shall be set in a continuous keyed foundation as shown.
3. Terminal treatments vary with speed zone.
4. Minimum concrete strength at 28 days shall be 32.5MPa. Clear cover to reinforcement shall be 50. On concrete pavement joints will be compatible with and coincide with joints in the adjoining base. Otherwise provide joints at 4.5 m.
5. Lateral reinforcement - suitably supergrade strands to AS 1311. Minimum cover at openings, expansion joints and ends shall be 50.
6. All edges shall be rounded with a 25 R except as shown.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

TYPE 'VCB' AGAINST WALLSPIERS

"Y" - working width which varies with crossfall, speed and design vehicle. For appropriate value refer to Austroads Guide to Road Design - Part 6: Roadside Design, Safety and Barriers.
SINGLE SIDED BARRIER

SECTION 1

- 100 x 100 x 6 equal rolled steel angle
- Tack weld M12 nut to angle
- 108x73x15 compressed 12mm cement sheet
- M12x40 Button Head Socket Screw

SECTION 2

- 100 x 100 x 6 equal rolled steel angle
- Tack weld M12 nut to angle
- M12x40 Button Head Socket Screw

SECTION 3

- 100 x 100 x 6 equal rolled steel angle
- Tack weld M12 nut to angle
- M12 approved chemical anchor. 100mm minimum embedment
- 100 x 100 x 6 equal rolled steel angle
- M12 approved chemical anchor. 100mm minimum embedment
- 100x100x6 equal rolled steel angle
- M12 approved chemical anchor. 100mm minimum embedment

ELEVATION

- Extruded or precast barrier
- Cable pit to be located centrally in opening
- Finished surface at concrete barrier
- 100 dia PVC conduits.

NOTES
1. Barrier ends at openings shall be finished to the longitudinal grade of the pavement so that cover plates can fit square to the barrier.
3. Steel angle shall be grade 250 to AS 4680 and hot-dipped galvanized to thickness Z600 in AS 4602.
4. Barrier may be prepared in colour and may be incomplete if copied.
**NOTES**

1. Minimum offset from Type F base to edge line - 500.
2. Barrier shall be placed in front of compacted backfill as shown or dowelled to rigid pavement at 1000 C/C using Ø 28 dowels (240 long).
3. Terminal treatments vary with speed zone.
4. Minimum concrete strength at 28 days shall be 32MPa clear in conjunction with joints in the adjoining base, otherwise provide contraction joints.
5. Hinge point, backfill shall be compacted 250mm minimum above ground obstruction.
6. Hinge point, backfill shall be compacted 250mm minimum above ground obstruction.
7. All edges shall be rounded with a 25 mm radius except as shown.
8. Longitudinal reinforcement: 2/Ø 12.7 STANDS per 4.5m (max).
9. Minimum cover at openings, expansion joints and ends shall be 50.
10. Concrete pavement joints will be compatible with and coincide with joints in the adjoining base, otherwise provide contraction joints at 4.5m.
11. Contraction joints shall be sawn at 56mm deep into the barrier face.
12. Test levels (TL) noted are in accordance with the manual for assessing safety hardware (MASH).

**NOTES**

1. Maximum offset from Type F base to edge line - 500.
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11. Contraction joints shall be sawn at 56mm deep into the barrier face.
12. Test levels (TL) noted are in accordance with the manual for assessing safety hardware (MASH).
NOTES
1. FOR MATERIAL AND SPACING REQUIREMENTS REFER TO SPECIFICATION R132.
2. WIDE MEDIAN APPLICATION REQUIRES SLASH ON APPROACH SIDE ONLY.
3. VERGE APPLICATION WILL REQUIRE SLASH ON BOTH SIDES IN TWO LANE - TWO WAY SITUATIONS.

PLAN

SECTION NOT TO SCALE

NARROW MEDIAN APPLICATION
("SLASH" FRONT AND BACK, SEE NOTE 2)

SECTION NOT TO SCALE

VERGE APPLICATION
("SLASH" APPROACH SIDE ONLY, SEE NOTE 3)

CONCRETE BARRIER DELINEATION UNIT

ROAD DESIGN ENGINEERING
R0720 SAFETY BARRIER SERIES - RIGID CONCRETE BARRIER DELINEATION UNIT

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au

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EXTENT OF TRANSITION FOR SCHEDULE OF QUANTITY PURPOSES INCLS RAIL COMPONENTS B007, B012 (2 OFF)/B027 AND B006.

EXTENT OF TRANSITION FOR SCHEDULE OF QUANTITY PURPOSES INCLS RAIL COMPONENTS B007, B012 (2 OFF)/B027 AND B006.

NOTES
1. BRIDGE PARAPETS / TYPE F BARRIER MUST BE OF ADEQUATE STRENGTH TO ACCEPT FULL IMPACT LOADING.
2. SNITCHED BLOCKOUT PIECE, PARAPET NOT TO BE USED IN THIS TRANSITION.

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au
NOTES

1. MINIMUM OFFSET FROM KERB/BARRIER BASE TO EDGE LINE IS 50.

2. THIS TYPE OF TERMINAL TREATMENT IS ONLY SUITABLE WITH SPEED
   ZONES AT OR BELOW 70 km/h.

3. MIN CONCRETE STRENGTH AT 28 DAYS SHALL BE 32MPa. CLEAR COVER
   TO REINFORCEMENT SHALL BE 50. REINFORCEMENT AS SHOWN IN
   R0720-09.

4. ALL EDGES SHALL BE ROUNDED WITH A 25 R EXCEPT WHERE SHOWN.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.

SEND FEEDBACK ON THIS STANDARD DRAWING TO:
transferstandards@nsw.gov.au

DATE: 20.01.17
MANAGER ROAD POLICY, SPECIFICATIONS & TECHNOLOGY

R0720 SAFETY BARRIER SERIES - RIGID
TYPE 'F' CONCRETE SAFETY BARRIER
TRANSITION TO TYPE 'SF'

STANDARD DRAWING
ROAD DESIGN ENGINEERING
ROAD POLICY, SPECIFICATIONS AND TECHNOLOGY

R0720-08
A3
1 OF 1
1/2/17
REV.

EXPECTED ISSUED:
20.01.17

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JANUARY 2017

CONTRACT: 98214 (X0085)

© Roads and Maritime Services
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2. THIS TYPE OF TERMINAL TREATMENT IS ONLY SUITABLE WITH SPEED ZONES AT OR BELOW 70 km/h.
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4. CLEAR COVER TO REINFORCEMENT SHALL BE 50.
5. ALL EDGES SHALL BE ROUNDED WITH A 25 R EXCEPT WHERE SHOWN.

SECTION A
# DEPTH DEPENDENT ON PAVEMENT TYPE, MIN 80 mm.

ALTERNATE TRANSITION NARROW MEDIAN

EDGE OF PAVEMENT ELSHOLZ KERB

SECTION A

EDGE OF PAVEMENT
ELSCHOLZ KERB

SECTION A

SECTION A

SECTION A
R0730 SAFETY BARRIER SERIES - TERMINALS
MODIFIED ECCENTRIC LOADER TERMINAL (MELT)
POST, TUBE AND YOKE DETAILS

NOTES
1. DIMENSIONS ARE SUBJECT TO MANUFACTURER’S TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCES ARE NOMINATED.
2. STEEL TUBES AND SOIL PLATES SHALL BE FABRICATED FROM STEEL GRADE 250 IN ACCORDANCE WITH AS/NZS 1594.
3. ALL TIMBER POSTS TO BE GRADE F8 AUSTRALIAN SLASH PINE PRESERVATIVE TREATED TO HAZARD LEVEL H4 IN EXTREME WET CONDITIONS TO AS 1604.

DESIGN POLICY SPECIFICATIONS AND TECHNOLOGY

Transport Roads and Maritime Services

MODIFIED ECCENTRIC LOADER TERMINAL (MELT)
POST, TUBE AND YOKE DETAILS

DATE: 01.01.17

Send feedback on this standard drawing to technologystandards@rms.nsw.gov.au

MANAGER ROAD POLICY, SPECIFICATIONS & TECHNOLOGY

NSW, AUS

R0730-01

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Road Design Engineering

ProjectWiseQRCodeLayer
TERMINAL RAIL 1 - ANCHOR RAIL (B016)

SLOTTED HOLES FOR SPlice BOLTS 23 WIDE X 28 LONG

SLOTTED HOLES FOR POST BOLT 19 WIDE X 84 LONG

SETOUT DIMENSIONS ON ANCHOR RAIL BEFORE CURVING

TERMINAL RAIL 2 (B017)

SLOTTED HOLES FOR SPlice BOLTS 23 WIDE X 28 LONG

SLOTTED HOLES FOR POST BOLT 19 WIDE X 84 LONG

8 SLOTTED HOLES FOR SPlice BOLTS 23 WIDE X 28 LONG

8 SLOTTED HOLES FOR SPlice BOLTS 23 WIDE X 28 LONG

NOTES

1. RAIL IS FROM 2.7 BMT GRADE HA350 STEEL TO AS 1594 AND HOT DIPPED GALVANIZED TO AS 4789 AFTER FABRICATION. FLAME CUTTING TO RAIL IS NOT PERMITTED. RAIL TO BE STAMPED 350/2.7 BMT (OR SIMILAR) BMT = BASE METAL THICKNESS.

2. DIMENSIONS ARE SUBJECT TO MANUFACTURER’S TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCES ARE NOMINATED.

3. FOR SECTION DIMENSIONS SEE DRAWING DS2014/005943.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

CONTACT DETAILS

PREPARED BY

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DOCUMENT VER.

SCAN TO CHECK

STANDARD DRAWING ROAD DESIGN ENGINEERING R0730 SAFETY BARRIER SERIES - TERMINALS MELT AND TT TERMINALS - W BEAM RAIL TERMINAL RAIL DETAIL SHEET 1 OF SHEETS 1 R0730-02

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au

MANAGER ROAD DESIGN ENGINEERING SERVICES

MANAGER ROAD DESIGN ENGINEERING SERVICES

MANAGER ROAD DESIGN ENGINEERING SERVICES

TR MELT AND TT TERMINALS - W BEAM RAIL TERMINAL RAIL DETAIL

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NOTE:
1. BUFFERED END SECTION FROM 2.7 BMT GRADE HA350 STEEL TO AS 1594 AND NOT GALVANISED TO AS 4680 AFTER FABRICATION.
2. DIMENSIONS ARE SUBJECT TO MANUFACTURER’S TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCES ARE NOMINATED.
3. BOLTS / NUTS SHALL BE SNUG TIGHT TO AS 4100.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN
M24 NUT FOR CABLE ASSEMBLY (FN05)

Ø 24 GALV ROUND WASHER (FW05)

NOTES
1. CABLE TO BE MINIMUM Ø 25 KTS OR Ø 22 KTS WIRE STRAND CORE OR INDEPENDENT WIRE ROPE CORE, GALVANISED, RIGHT REGULAR LAY TO AS 3569.
2. CABLE SHALL BE SUPPLIED WITH TWO M24 THICK M4 HEXAGON GALVANISED STEEL NUTS AND TWO 5 THICK GAL STEEL WASHERS.
3. HEXAGON NUTS TO AS 1132 (GRADE 5) NUTS SHALL BE TAPPED TO SUIT GALVANISED THREAD BLACK STEEL WASHERS, LARGE SERIES TO AS 1227. NUTS AND WASHERS TO BE TREATED TO AS 1627 AND SHALL BE HOT DIP GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1237. GALVANISED STEEL NUTS AND TWO 5 THICK GAL. STEEL WASHERS.
4. CABLE TO BE MINIMUM Ø 20 6X19 OR 6X25 WIRE STRAND CORE OR INDEPENDENT WIRE ROPE CORE, GALVANISED, RIGHT REGULAR LAY TO AS 3569.
5. ALL NUTS SHALL BE SNUGTIGHT TO AS 4100.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au
R0730 SAFETY BARRIER SERIES - TERMINALS

MODIFIED ECCENTRIC LOADER TERMINAL (MELT)

GENERAL ARRANGEMENT

NOTES

1. ALL TIMBER POSTS SHALL BE GRADE AUSTRALIAN BLASP PINE.
2. ALL TIMBER POSTS SHALL BE TREATED TO HAZARD LEVEL 1M (H5 IN EXTREME WET CONDITIONS) TO AS 1664.
3. FLAME CUTTING OF GALVANIZED POSTS AND RAIL IS NOT PERMITTED.
4. TOTAL LENGTH OF MELT IS 12 m; HOWEVER FOR SCHEDULES OF QUANTITY AND PAYMENT THE MELT SYSTEM EXTENDS FROM POST #1 TO POST #6, A LENGTH OF 8 METRES.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au
1. Dimensions are subject to manufacturers' tolerances except where allowable tolerances are nominated.
2. All nuts shall be snug tight to AS 4100.
3. Refer to DS2014/005971 for post installation.
4. This drawing to be read in conjunction with DS2014/005971.
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

1. ALL NUTS SHALL BE SNUG TIGHT TO AS 4100.
2. FLAME CUTTING OF GALVANISED POST AND RAIL IS NOT PERMITTED.
3. END POSTS (P015) ARE FROM 4.3 BMT PLATE GRADE HA300 STEEL.
4. REFER TO DS2014_005973 FOR END POST INSTALLATION.

TT TO BE USED ON DEPARTURE END OF SAFETY BARRIER ONLY.
TT NOT TO BE USED WITHIN CLEAR ZONE OF OPPOSING TRAFFIC.

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au

TT NOT TO BE USED WITHIN CLEAR ZONE OF OPPOSING TRAFFIC.

NOTES

1. ALL NUTS SHALL BE SNUG TIGHT TO AS 4100.
2. FLAME CUTTING OF GALVANISED POST AND RAIL IS NOT PERMITTED.
3. END POSTS (P015) ARE FROM 4.3 BMT PLATE GRADE HA300 STEEL.
4. REFER TO DS2014_005973 FOR END POST INSTALLATION.

TT TO BE USED ON DEPARTURE END OF SAFETY BARRIER ONLY.
TT NOT TO BE USED WITHIN CLEAR ZONE OF OPPOSING TRAFFIC.
NOTE:

1. The maximum base dimension of 80 mm is to allow for subsequent pavement overlays.
2. Minimum offset from sloped end unit base to edge line is 60 mm.
3. Barrier shall be set in a continuous keyed foundation or dowelled to a foundation at 1000 C/C using Ø 28 dowels (12 mm long).
4. Min concrete strength at 28 days shall be 32 MPa.
5. Joints in concrete safety barriers (including sloped end terminals) shall be compatible with and coincide with joints in the adjoining base.
6. Steel bars (dowels) shall be grade 250R to AS 1302.
7. Ø 16 galv dowsels shall be super grade to AS 1311.
8. Ø 12.7 strands shall be super grade to AS 1311.
9. Cast-in-situ type 'F' concrete safety barrier shall be used in each location dependent on pavement design.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
This unit is not to be used as an approach terminal in speed zones in excess of 70 km/h. An appropriate, approved crash cushion shall be used in such locations.

NOTES
1. The maximum base dimension of 80 is to allow for subsequent pavement overlays.
2. Minimum offset from sloped end unit base to edge line is 500.
3. Barrier shall be set in a continuous keyed foundation.
4. Minimum concrete strength at 28 days shall be 32 MPa.
5. Clear cover to reinforcement shall be 50.
6. Joins in concrete safety barriers (including sloped end terminals) shall be compatible with and coincide with joints in the adjoining base.
7. Steel bars shall be grade 250 to AS 1322.
8. 12.7 mm strands shall be super grade to AS 1311.
10. Bar size is the nominal diameter in millimetres. Minimum cover at openings, expansion joints and ends shall be 30.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN
Under Review – please contact technologystandards@rms.nsw.gov.au
PRESTRESSED CONCRETE POSTS

- 150 x 100 concrete (prestressed) strain post (type PRI POST)
- 150 x 60 concrete (prestressed) intermediate post (type PRI POST)
- 150 x 60 concrete (prestressed) strain post (type PRI POST)

SOFTWOOD POSTS

- 125 x 150 softwood strain post (type TTS POST)
- 125 x 150 softwood intermediate post (type TTS POST)

HARDWOOD POSTS

- Ø 250 hardwood strain post (type TTI POST)
- Ø 250 hardwood intermediate post (type TTI POST)

STAR PICKET STEEL POSTS

- Ø 150 steel post 1800 long (type SP POST)
- Ø 150 steel post 2400 long (type SP POST)

GALVANIZED STEEL POSTS

- Ø 165 galvanized steel post 2400 long (type GSS POST)
- Ø 150 steel post 2400 long (type GSS POST)

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

NOTES

1. DRILLING OF POSTS SHALL BE TO SUIT SPACING OF WIRES FOR EACH FENCE TYPE.

2. FOR DETAILS OF PANEL AND FENCE TYPES SEE R0800_005986

3. FENCES ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE SPECIFICATION - R0800.

4. STRAINER POSTS MUST BE USED AT:
   - ENDS OF FENCING
   - ANGLES IN FENCING
   - ABUTMENT CHANGES IN GRADE
   - INTERSECTIONS WITH OTHER FENCING
   - GATES AND OTHER INTERMEDIATE POINTS ALONG A STRAIGHT FENCE LINE WHICH MUST NOT EXCEED 120 m (80 m FOR RETENTION OF CATTLE).

5. STRAINER POST MUST BE BRACED AGAINST AN INTERMEDIATE POST IN 2 DIRECTIONS FOR ALL CASES, EXCEPT FOR ENDS OF FENCES AND GATES WHERE ONLY 1 DIRECTION IS SUITABLE.

6. FOR METHOD OF ERECTING POSTS IN EARTH OR ROCK SEE SPECIFICATION - R0800.

7. BRACES ARE TO BE 150 X 100 STEEL POSTS TO BE GALVANISED.

8. ANY CUT STEEL SURFACES SHALL BE PAINTED WITH AN APPROVED ZINC RICH PRIMER PRIOR TO THEIR INSTALLATION AND A GALVANIZE STEEL CAP FITTED TO THE TOP OF EACH TUBULAR POST.

9. DIMENSIONS SHOWN BELOW GROUND ARE MINIMUM DEPTHS.

10. DEPTHS SHOWN FOR ROCK FENCING ARE FOR CONCRETE, TREATED TIMBER OR STEEL POSTS ONLY IF PERMITTED IN CASES WHERE THESE POSTS ARE MANUFACTURED AND SUPPLIED TO THE CORRECT LENGTH, OTHERWISE THE DEPTH OF SINKING MUST BE THE SAME AS FOR EARTH.

11. SWIM HARDWOOD INTERMEDIATE POSTS SHALL BE 150 x 100.

12. SPLIT HARDWOOD INTERMEDIATE POSTS SHALL BE FOUR BORED WITH NO AVERAGE CROSS SECTIONAL DIMENSION LESS THAN 100 mm AND NO OUTSIDE DIMENSION LESS THAN 65 mm CROSS SECTIONAL AREA SHALL NOT BE LESS THAN 10 000 mm².

13. CYPRESS PINE POSTS SHALL BE ROUND AND HAVE A MINIMUM CROSS SECTIONS 320 mm².

14. STAR PICKET STEEL POSTS TO BE GALVANISED.

15. GALVANIZED STEEL POSTS TO BE 2400 LONG.

16. TYPICAL POST TERMINOLOGY:
   - PRESTRESSED CONCRETE POSTS - (PR / PRI)
   - GALVANIZED STEEL POSTS - (GSS / GSI)
   - SOFTWOOD POSTS - (TTS / TTI)
   - HARDWOOD POSTS - (TT / TTI)

17. FOR SPLIT HARDWOOD INTERMEDIATE POSTS REFER TO NOTE 12.

CONTACT DETAILS

technologystandards@rms.nsw.gov.au
SEND FEEDBACK ON THIS STANDARD DESIGNATION
ROAD DESIGN ENGINEERING
ENGINEERING SERVICES
RURAL ROAD BOUNDARY FENCING
ROAD POLICY, SPECIFICATIONS AND TECHNOLOGY

STANDARD DRAWING
A3
R8000-01
RURAL ROAD BOUNDARY FENCING
TYPICAL POST DETAILS

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NOTES

1. FENCE IS TO BE STRAINED AT INTERVALS NOT EXCEEDING 12 M METRES - 90 METRES FOR CATTLE PROOF FENCES.

2. FOR METHOD OF ERECTING POSTS IN EARTH OR ROCK SEE SPECIFICATION.

3. FOR POST TYPE DETAIL REFER TO DS2014/005986

4. FOR GATE FITTING DETAIL REFER TO DS2014/005988

5. FOR FASTENING WIRE DETAIL REFER TO DS2014/005989

6. SPECIFICATION - R 201.

7. SPECIAL REQUIREMENTS MAY APPLY TO THE ERECTION PROCEDURES.

8. FENCES INSTALLED NEAR HIGH VOLTAGE TRANSMISSION LINES.

9. THE RELEVANT ELECTRICITY AUTHORITY SHOULD BE CONTACTED PRIOR TO THE INSTALLATION OF THE FENCE.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
TYPICAL STRAINER POST DETAIL

STEEL POST STRAINER TREATMENT
TRIANGULATED POST ASSEMBLY

FOR BACKFILLING OF POSTHoles
ACCORDING TO STANDARD, REFER TO SPECIFICATION.

STAY PLATE
TO PRESTRESSED CONCRETE POSTS

FASTENING OF WIRES AT STRAINER POST
GALVANIZED PIPE
BRACE TO BE 50 DN
FIFTH POST OR HTI POST

FOR BACKFILLING OF POSTHoles
ACCORDING TO STANDARD, REFER TO SPECIFICATION.

ALTERNATIVE STRAINER POST TREATMENT - STAY PLATE DETAIL

STEEL POST STRAINER TREATMENT
TRIANGULATED POST ASSEMBLY

FASTENING OF BARBED WIRES TO STAR PICKETS

NOTES

1. PRESTRESSED CONCRETE POSTS - (PRS / PRI)
2. GALVANIZED STEEL POSTS - (GSS / GSI)
3. HARDWOOD POSTS - (HTS / HTI)
4. SOFTWOOD POSTS - (TTS / TTI)
5. PRESTRESSED CONCRETE POSTS - (PRS / PRI)

TYPICAL STRAINER PANEL DETAIL FOR:

1. PRESTRESSED CONCRETE POSTS - (PRS / PRI)
2. GALVANIZED STEEL POSTS - (GSS / GSI)
3. HARDWOOD POSTS - (HTS / HTI)
4. SOFTWOOD POSTS - (TTS / TTI)
5. PRESTRESSED CONCRETE POSTS - (PRS / PRI)
**GATE FITTINGS FOR PRESTRESSED CONCRETE POSTS**

- **Upper Support Bracket**
- **Lower Support Bracket**
- **Locking Bracket**

**GATE FITTINGS FOR TIMBER POSTS**

- **Type PRS Post**
  - On GSS Post or HTS Post or TTS Post

**TYPICAL POST TERMINOLOGY:**

1. **Pre-Stressed Concrete Posts** - (PRS / PRI)
2. **Galvanized Steel Posts** - (GSS / GSI)
3. **Softwood Posts** - (TTS / TTI)
4. **Hardwood Posts** - (HTS / HTI)
5. **Star Picket Posts** as Line Posts - (SP)

**NOTES:**

3. **All Bolts and Nuts** to be Zinc Plated 8 X 40 unless otherwise shown.
4. **All Brackets for Steel and Treated Timber** must be proprietary items manufactured in accordance with the specification.
5. **Chain** to be Galvanized.

**TYPICAL RABBIT PROOF GATE PANEL DETAILS**

- **Ground**
- **Nutting to Match Fence Netting**
- **Max Gap Each Side and Below Gate** = 25 mm

**TYPICAL GATE PANEL DETAILS TIMBER ROUND POSTS**

- **Ground**
- **Support Brackets**
- **Distance to Suit Gate**
- **Locking Bracket**

**TYPICAL GATE PANEL DETAILS**

- **Ground**
- **Support Brackets**
- **Distance to Suit Gate**
- **Locking Bracket**

**TYPICAL HINGE ASSEMBLY** - (125 Post)

**TYPICAL STRAP HINGE DETAIL**

**DIAMETER TO SUIT PIPE**

- **Ø 10 mm**
- **Ø 25 mm**
- **Ø 30 mm**
- **Ø 40 mm**

**R6 X 50**

**GALVANISED W/BOLT WITH NUT & WASHER**

**4 GALVANISED M.S. STRAP BENT TO SUIT GATE PIPE**

**CHAN 500 - 550 LONG**

**500 - 550 LONG CHAIN**

**CHAIN WELDED ONTO COLLAR**

**WELDED ONTO COLLAR Ø 10**

**GATE FITTINGS FOR GALVANIZED STEEL POSTS**

- **Hinge Assembly** - (125 Post)
- **Hinge Clamp** - (125 Post)

**DIAMETER TO SUIT PIPE**

- **Ø 10 mm**
- **Ø 15 mm**
- **Ø 20 mm**
- **Ø 25 mm**
- **Ø 30 mm**
- **Ø 35 mm**
- **Ø 40 mm**
- **Ø 45 mm**
- **Ø 50 mm**

**CONTACT DETAILS**

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au

**STANDARD DRAWING NO.**

**R0800-04**

**ENGINEERING SERVICES**

**ROAD POLICY, SPECIFICATIONS AND TECHNOLOGY**

**PROJECT**

**ROAD DESIGN ENGINEERING**

**Issued Date**

**January 2017**

**Standard Drawing Issued Date**

**January 2017**

**Manager Road Policy, Specifications and Technology**

**Send Feedback on this Standard Drawing to:**

**transportstandards@rms.nsw.gov.au**
NOTE S

1. FENCING MATERIALS ARE TO BE IN ACCORDANCE WITH THE SPECIFICATION - R 201.

2. SPECIAL REQUIREMENTS MAY APPLY TO THE ERECTION PROCEDURES FOR FENCES INSTALLED NEAR HIGH VOLTAGE TRANSMISSION LINES. THE RELEVANT ELECTRICITY AUTHORITY SHOULD BE CONTACTED PRIOR TO THE INSTALLATION OF THE FENCE.
RURAL ROAD BOUNDARY FENCE

TREATMENT AT SMALL CREEK CROSSINGS

CONCAVE CHANGE IN GRADE SITES

NOTES
1. GALVANIZED SHEET MAY BE JOINED BY BUTTING BETWEEN THE CENTRAL VERTICAL TIMBERS.
2. M12 BOLTS USED THROUGHOUT UNLESS OTHERWISE SHOWN.
3. THIS TREATMENT TO BE USED ON RABBITPROOF AND OTHER RURAL ROAD FENCING INCORPORATING NETTING OR FABRIC.
4. FENCING TO BE IN ACCORDANCE WITH SPECIFICATION R 201.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au

TRANSPORT ENGINEERING SERVICES
ROADPOLICY SPECIFICATIONS AND TECHNOLOGY

STANDARD DRAWING
R0800 FENCING SERIES
RURAL ROAD BOUNDARY FENCING TREATMENTS AT SMALL CREEK CROSSINGS AND CONCAVE CHANGE IN GRADE SITES SHEET 1 OF 1

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For Next - km

BOUNDARY SIGN

TO BE ERECTED AT THE FENCELINE AT THE START OF THE CONTROLLED ACCESS ROAD. SET PARALLEL TO THE ROAD CENTRELINE AND FACING THE CONTROLLED ACCESS ROAD. REPEATER SIGNS 500 X 200 TO BE AT APPROXIMATELY 2 km INTERVALS AND TO OMIT LEGEND “FOR NEXT - km.”

NOTES
1. FENCING MATERIALS ARE TO BE USED IN ACCORDANCE WITH THE SPECIFICATION - R 201.
2. ALL CONCRETE TO BE 20 MPa.
3. JOINTS TO BE WELDED AND PAINTED WITH A ZINC RICH PRIMER.
4. FOR VEHICULAR GATE DETAIL REFER TO DS2014_005993
5. SPECIAL REQUIREMENTS MAY APPLY TO THE ERECTION PROCEDURES FOR FENCES INSTALLED NEAR HIGH VOLTAGE TRANSMISSION LINES. THE RELEVANT ELECTRICITY AUTHORITY SHOULD BE CONTACTED PRIOR TO THE INSTALLATION OF THE FENCE.
**NOTES**

1. **FENCING MATERIALS** are to be in accordance with the specification - R 201.
2. **THIS FENCE** is similar to Type 1-T - LB - T Class 1 Security Fencing to AS 1729. For other designs refer to AS 1729.
3. **SPECIAL REQUIREMENTS** may apply to the erection procedures for fences installed near high voltage transmission lines. The relevant electricity authority should be contacted prior to the installation of the fence.

**SPECIFICATION** - R 201.

**THIS FENCE** is similar to a Type 1 - R - LB - T Class 1 Security Fencing to AS 1729. For other designs refer to AS 1729.

**SPECIAL REQUIREMENTS** may apply to the erection procedures for fences installed near high voltage transmission lines. The relevant electricity authority should be contacted prior to the installation of the fence.
### PANEL

<table>
<thead>
<tr>
<th>TYPE</th>
<th>LOCATION</th>
<th>EMBELLISHMENT</th>
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<tbody>
<tr>
<td></td>
<td>VERGE TYPE</td>
<td>MEDIAN TYPE</td>
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<tr>
<td>1</td>
<td>R0800 - 15</td>
<td>R0800 - 16</td>
</tr>
<tr>
<td>2</td>
<td>R0800 - 17</td>
<td>R0800 - 18</td>
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<td>3</td>
<td>R0800 - 19</td>
<td>R0800 - 20</td>
</tr>
<tr>
<td>5</td>
<td>R0800 - 23</td>
<td>R0800 - 24</td>
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</tbody>
</table>

### POST

<table>
<thead>
<tr>
<th>TYPE</th>
<th>FOOTING</th>
<th>CAP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CONCRETE</td>
<td>BASE PLATE</td>
</tr>
<tr>
<td>END</td>
<td>R0800 - 11</td>
<td>R0800 - 12</td>
</tr>
<tr>
<td>INTER.</td>
<td>R0800 - 13</td>
<td>R0800 - 14</td>
</tr>
</tbody>
</table>

# NOTES
1. FENCE LIMITED TO GRADES OF 10%.
2. REFLECTIVE SHEETING IS TO BE USED TO DELINEATE PEDESTRIAN FENCING. SHEETING IS TO BE INSTALLED ON THE TOP OF THE PANEL SUPPORT POST. SHEETING ALSO TO BE INSTALLED ON THE LEAD PANEL SUPPORT.
3. FOR FENCE WITH INTERMEDIATE POSTS REQUIRING BASE PLATE, FENCE LIMITED TO GRADES OF 5%.

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1. SCALES AS SHOWN.
2. STEEL PLATE SHALL BE GRADE 250 TO AS / NZS 3678.
3. STEEL SECTIONS SHALL BE GRADE 300 TO AS NZS 3679.1.
4. COMMERCIAL BOLTS AND SCREWS SHALL CONFORM TO AS 1111.
5. BLACK STEEL WASHERS (NORMAL AND LARGE SERIES) SHALL CONFORM TO AS 1112.
6. ALL WELDED CONNECTIONS SHALL BE 6 mm FILLET WELDS IF NO SYMBOL SHOWN.
7. THE WELD CATEGORY SHALL BE SP IN ACCORDANCE WITH AS 1554 PART 1.
8. WELDING SYMBOLS ARE TO AS 1237.
9. PANEL DRAWINGS. AND PANEL SEE ANGLE BRACKETS FOR DETAILS OF PANEL DRAWINGS.
10. PERIODIC TREATMENT SHALL BE ROUNDED TO A RADIUS OF 1.5 mm UNLESS SPECIFIED OTHERWISE.
11. ALL DIMENSIONS ARE BASE METAL THICKNESS.
12. ALL COMPONENTS SHALL BE HOT-DIP GALVANIZED.
13. AFTER FABRICATION IN ACCORDANCE WITH THE SPECIFICATION.
14. BOLTS, NUTS AND WASHERS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AS 1274.

FOOTING DETAIL

END POST WITH CONCRETE FOOTING

ACCORDANCE WITH AS 1214.

BOLTS, NUTS AND WASHERS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH THE SPECIFICATION.

NOTE: 1. SCALES AS SHOWN.
2. STEEL PLATE SHALL BE GRADE 250 TO AS / NZS 3678.
3. STEEL SECTIONS SHALL BE GRADE 300 TO AS NZS 3679.1.
4. COMMERCIAL BOLTS AND SCREWS SHALL CONFORM TO AS 1111.
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13. AFTER FABRICATION IN ACCORDANCE WITH THE SPECIFICATION.
14. BOLTS, NUTS AND WASHERS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AS 1274.

END POST WITH CONCRETE FOOTING
END ELEVATION

INTERMEDIATE POST

DETAIL A

SECTION

DETAIL OF BOTTOM RAIL CONNECTION

FOOTING DETAIL

FENCE LIMITED TO GRADES OF UP TO 10%.

M16 BOLT, NUT AND WASHERS. LENGTH 30 WITH SINGLE RAIL CONNECTION, LENGTH 60 WITH DOUBLE RAIL CONNECTION.

FOR DETAILS OF ANGLE BRACKETS AND PANEL SEE PANEL DRAWINGS.

Ø 14 HOLE TYP

FOOTING Ø 400, 600 DEEP

IN SOFT GROUND USE CONCRETE FOOTING Ø 200 20 MPa

FOOTING DETAIL

Details of the bottom rail connection and the section of the intermediate post are shown. The fence is limited to grades of up to 10%. The intermediate post includes details of bolts, nuts, and washers for both single and double rail connections. Angle brackets and panel details are referenced in the panel drawings. The footing detail includes a 400 mm diameter footing in soft ground with a 20 MPa concrete footing depth of 600 mm.
Fence limited to grades up to 5%.
1584 M20 SPACING BETWEEN TOPS OF PICKETS

ELEVATION

SECTION 1

DETAIL

TRAFFIC SIDE AND DIRECTION

ANGLE BRACKETS

VIEW 2

INTERMEDIATE POST

END POST

Detailed dimensions and specifications are included in the drawing, including spacing, angles, and material requirements for the pedestrian fence. The drawing also includes views of the elevation, section, and detail, providing a comprehensive representation of the design.

Send feedback on this standard drawing to transportstandards@rns.wa.gov.au.

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All dimensions are in millimetres unless otherwise shown.
DETAIL OF INTERMEDIATE GABLE POST CAP
NOTE: FABRICATED FROM NOM. 1.6 SHEET.

DETAIL OF INTERMEDIATE CROWN POST CAP
NOTE: FABRICATED FROM NOM. 1.6 SHEET.

DETAIL OF INTERMEDIATE SPHERICAL POST CAP
NOTE: FABRICATED FROM NOM. 1.6 SHEET.
NOTE:

THIS DRAWING SHOWS THE TYPICAL CIRCLE EMBELLISHMENTS FOR FENCE TYPES 3, 4, 5 AND 6.
STANDARD DRAWING No.
REV.
DATE
AMENDMENT / REVISION DESCRIPTION
WVR No.
APPROVAL

Q3 X 450 CONCRETE STRIP FOR FULL LENGTH OF FENCE

SCALES ON A3 SIZE DRAWING


ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au

NOTES
1. STEEL SECTIONS MUST BE HOT-DIP GALVANISED INTERNALLY AND EXTERNALLY IN ACCORDANCE WITH THE REQUIREMENTS OF AS 4792.
2. ALL WELDED CONNECTIONS MUST BE SP WELD CATEGORY IN ACCORDANCE WITH AS 1554.1.
3. REFER TO AUSTRALIAN GUIDE TO ROAD DESIGN PART 6A WHERE THE DISTANCE FROM EDGE OF FOOTPATH / SHARED PATH IS LESS THAN 5m FROM A VERTICAL FALL OR BATTER SLOPE FOR REQUIREMENTS.
4. HANDRAIL DETAILS ARE APPLICABLE FOR FOOTPATH OR SHARED PATH GRADIENT OF 1 IN 33 OR SHALLOWER.

PROJECTWISERETCODE

300 MIN.

1500 OR 2000

300 MIN.

42.4 mm OD X 3.2 mm WALL M.S. TUBE

FOOTPATH

42.4 mm OD X 3.2 mm WALL M.S. TUBE

SHARED PATH

250 O.A. X 600 DEEP
MASS CONCRETE FOOTING
20MPa

250 O.A. X 600 DEEP
MASS CONCRETE FOOTING
20MPa

20.01.17
/
DS2014_006016
R0800-29

FOOTPATH

SHARED PATH
**FAUNA PROTECTION DRAINAGE DETAILS**

**GENERAL**

- Posts set in 200 dia. concrete footing [see Sheet 2 for details]
- Footing Box X 200
  - Applies where post RLS vary by more than 600

**ELEVATION INTERMEDIATE POST AT LOW POINT**

- For vertical curve Sags intermediate post footing increased to prevent uplift

**NOTES**

1. At drainage lines and Davies light corrosion - resistant metal flap to be installed with less than 50 gap.
2. Special requirements may apply to the erection procedures for fences installed near high voltage transmission lines. The relevant electricity authority should be contacted prior to the installation of the fence.
3. Metal flap to be connected to fence on downstream side.

**FAUNA EXCLUSION FENCE**

- Metal flap to be designed to suit hydraulic flows and drain shape in stormwater flow paths.
- Metal flap to be increased to prevent uplift.

**SPECIAL REQUIREMENTS**

- ISU 13
- Special requirements may apply to the erection procedures for fences installed near high voltage transmission lines. The relevant electricity authority should be contacted prior to the installation of the fence.

**ROAD DESIGN ENGINEERING**

- R0800-31
- Fauna Exclusion Fence

**STANDARD DRAWING**

- R0800-31
- Fauna Exclusion Fence

**SEND FEEDBACK ON THIS STANDARD DRAWING TO**

- technologystandards@rms.nsw.gov.au
STAINLESS STEEL SWIVEL

1.8 THICK BLACK ANODISED ALUMINIUM PLATE

FALL GAUGE:
- ø 4.3
- ø 18.6
- ø 38.0

CHAIN: GALV MS
- 19 X 180 LONG GALVANIZED EYE BOLT

25 X 25 X 3.2 GAUGE STEEL TUBING
- HELD SPLIT CHAIN LINK TO CROSSBAR FOR ATTACHMENT OF SWIVEL

REINFORCING DETAIL FOR ALL PLATE LINKS

SEND FEEDBACK ON THIS STANDARD DRAWING TO:
technologystandards@rms.nsw.gov.au

MANAGER ROAD POLICY, SPECIFICATIONS & TECHNOLOGY

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1. SPECIAL REQUIREMENTS MAY APPLY TO THE ERECTION PROCEDURES FOR FENCES INSTALLED NEAR HIGH VOLTAGE TRANSMISSION LINES. THE RELEVANT ELECTRICITY AUTHORITY SHOULD BE CONTACTED PRIOR TO THE INSTALLATION OF THE FENCE.

2. NAILS - 50 LONG 4 PER PALING.
WALL MOUNTED HANDRAIL ARRANGEMENT

NOTE
DETAIL
NOT TO SCALE

NOTES
1. COMPLETED HAND RAIL SECTIONS TO BE HOT DIP GALVANIZED.
2. DIMENSIONS OF HANDRAIL NOT SHOWN AND ERECTION OF HANDRAIL TO BE IN ACCORDANCE WITH AS 1428.1

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au
1. Concrete footings 20 MPa
2. Holding rail to be fabricated from 50 mm x 2.5 mm wall steel, galvanized pipe.
3. Powder coating colour and target board provision (where necessary) to be as per Austroads Guide to Road Design Part A6. Pedestrian and cyclist path.
4. All materials to be used in accordance with Specification R.251.
5. Support sleeve to be 65 mm steel pipe.

NOTES

Reflective Tape Detail
(Tape to be Class 2 when required)

All dimensions are in millimetres unless otherwise shown.

Send feedback on this standard drawing to technologystandards@rms.nsw.gov.au
1. A MOTORWAY TO MOTORWAY CONNECTION WILL GENERALLY REQUIRE AN ADDED LANE OR EXTENDED PARALLEL RUNNING LANE AT THE MOTORWAY ENTRANCE.

ALTERNATIVE STOP LINE LOCATIONS BASED ON TRAFFIC STORAGE AND CONSTRUCTABILITY CONSIDERATIONS. LAYOUT VARIES ACCORDING TO LANE ARRANGEMENT. REFERS TO OTHER DRAWINGS FOR DETAILS.
NOTES

1. LENGTHS ARE APPLICABLE FOR ALL MOTORWAY POSTED SPEEDS.

2. LENGTH WILL BE GOVERNED BY APPROACH GEOMETRY (60m - 90m).

3. FOUR SECONDS OF TRAVEL TIME AT THE MOTORWAY POSTED SPEED, PARALLEL RUNNING LANE LENGTH MAY BE INCREASED TO A MAXIMUM OF 200m TO ALLOW FOR VEHICLE ACCELERATION BASED ON GRADE CORRECTION.

4. TAPER LENGTH BASED ON A LATERAL MOVEMENT AT 1.5 m/s AT THE MOTORWAY POSTED SPEED.

5. MINIMUM DISTANCE FROM THE START OF THE RAMP TO THE SOFT NOSE SHALL NOT BE LESS THAN THE ACCELERATION DISTANCE FROM 0Km/h TO THE MOTORWAY POSTED SPEED.

FOR DETAIL REFER TO AUSTROADS GUIDE TO ROAD DESIGN PART 4C

SEE NOTE 1

SEE NOTE 2

SEE NOTE 3

SEE NOTE 4

SEE NOTE 5

SEE NOTE 6
NOTES

1. LENGTHS ARE APPLICABLE FOR ALL MOTORWAY POSTED SPEEDS.

2. LENGTH WILL BE GOVERNED BY APPROACH GEOMETRY (60m - 90m).

3. FOUR SECONDS OF TRAVEL TIME AT THE MOTORWAY POSTED SPEED. PARALLEL RUNNING LANE LENGTH MAY BE INCREASED TO A MAXIMUM OF 200m TO ALLOW FOR VEHICLE ACCELERATION BASED ON GRADE CORRECTION.

4. TAPER LENGTH BASED ON A LATERAL MOVEMENT AT 1.0 M/S AT THE MOTORWAY POSTED SPEED.

5. MINIMUM DISTANCE FROM THE START OF THE RAMP TO THE SOFT NOSE SHALL NOT BE LESS THAN THE ACCELERATION DISTANCE FROM 0km/h TO THE MOTORWAY POSTED SPEED.

FOR DETAIL REFER TO AUSTROADS GUIDE TO ROAD DESIGN PART 4C.
NOTES

1. LENGTHS ARE APPLICABLE FOR ALL MOTORWAY POSTED SPEEDS.

2. LENGTH WILL BE GOVERNED BY APPROACH GEOMETRY (50km - 80km).

3. FOUR SECONDS OF TRAVEL TIME AT THE MOTORWAY POSTED SPEED. PARALLEL RUNNING LANE LENGTH MAY BE INCREASED TO A MAXIMUM OF 300m TO ALLOW FOR VEHICLE ACCELERATION BASED ON GRADE CORRECTION.

4. TAPER LENGTH BASED ON A LATERAL MOVEMENT AT 1.8 M/S AT THE MOTORWAY POSTED SPEED.

5. MINIMUM DISTANCE FROM THE START OF THE RAMP TO THE SOFT NOSE SHALL NOT BE LESS THAN THE ACCELERATION DISTANCE FROM 0km/h to the MOTORWAY POSTED SPEED.

SEE NOTE 5

THREE LANES AT STOP LINE

FOR DETAIL REFER TO AUSTROADS GUIDE TO ROAD DESIGN PART 4C

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au

MANAGER ROAD POLICY, SPECIFICATIONS & TECHNOLOGY

DATE: 06.06.17

STANDARD DRAWING
ROAD DESIGN ENGINEERING
R1010 RAMP METERING
THREE LANES AT STOP LINE (localised) - TWO AT NOSE

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JUNE 2017

R1010-04
NOTES

1. LENGTHS ARE APPLICABLE FOR ALL MOTORWAY POSTED SPEEDS

2. LENGTH WILL BE GOVERNED BY APPROACH GEOMETRY (60m - 80m)

3. FOUR SECONDS OF TRAVEL TIME AT THE MOTORWAY POSTED SPEED. PARALLEL RUNNING LANE LENGTH MAY BE INCREASED TO A MAXIMUM OF 200m TO ALLOW FOR VEHICLE ACCELERATION BASED ON GRADE CORRECTION.

4. TAPER LENGTH BASED ON A LATERAL MOVEMENT AT 1.0 M/S AT THE MOTORWAY POSTED SPEED.

5. MAXIMUM DISTANCE FROM THE START OF THE RAMP TO THE SOFT NOSE SHALL NOT BE LESS THAN THE ACCELERATION DISTANCE FROM 0km/h TO THE MOTORWAY POSTED SPEED.

FOR DETAIL REFER TO AUSTROADS GUIDE TO ROAD DESIGN PART 4C

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au

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NOTES

1. LENGTHS ARE APPLICABLE FOR ALL MOTORWAY POSTED SPEEDS.

2. LENGTH WILL BE GOVERNED BY APPROACH GEOMETRY (60m - 90m).

3. FOUR SECONDS OF TRAVEL TIME AT THE MOTORWAY POSTED SPEED. PARALLEL RUNNING LANE LENGTH MAY BE INCREASED TO A MAXIMUM OF 200m TO ALLOW FOR VEHICLE ACCELERATION BASED ON GRADE CORRECTION.

4. TAPER LENGTH BASED ON A LATERAL MOVEMENT AT 1.0M/S AT THE MOTORWAY POSTED SPEED.

5. MINIMUM DISTANCE FROM THE START OF THE RAMP TO THE SOFT NOSE SHALL NOT BE LESS THAN THE ACCELERATION DISTANCE FROM 0km/h TO THE MOTORWAY POSTED SPEED.

AS R1010

FOR DETAIL REFER TO AUSTROADS GUIDE TO ROAD DESIGN PART 4C

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au
NOTES

1. LENGTHS ARE APPLICABLE FOR ALL MOTORWAY POSTED SPEEDS.

2. LENGTH WILL BE GOVERNED BY APPROACH GEOMETRY (60m - 90m).

3. FOUR SECONDS OF TRAVEL TIME AT THE MOTORWAY POSTED SPEED. PARALLEL RUNNING LANE LENGTH MAY BE INCREASED TO A MAXIMUM OF 200m TO ALLOW FOR VEHICLE ACCELERATION BASED ON GRADE CORRECTION.

4. TAPER LENGTH BASED ON A LATERAL MOVEMENT AT 1.0 MS AT THE MOTORWAY POSTED SPEED.

5. MINIMUM DISTANCE FROM THE START OF THE RAMP TO THE SOFT NOSE SHALL NOT BE LESS THAN THE ACCCELERATION DISTANCE FROM 0km/h TO THE MOTORWAY POSTED SPEED.

SEE NOTE 1

SEE NOTE 2

SEE NOTE 3

SEE NOTE 4

SEE NOTE 5

FOR DETAIL REFER TO AUSTROADS GUIDE TO ROAD DESIGN PART 4C

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN

SEND FEEDBACK ON THIS STANDARD DRAWING TO technologystandards@rms.nsw.gov.au

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NOTES

1. Lengths are applicable for all motorway posted speeds.

2. Length will be governed by approach geometry (60km - 90km).

3. Four seconds of travel time at the motorway posted speed. Parallel running lane length may be increased to a maximum of 200m to allow for vehicle acceleration based on grade correction.

4. Taper length based on a lateral movement at 15 m/s at the motorway posted speed.

5. Minimum distance from the start of the ramp to the soft nose shall not be less than the acceleration distance from 0km/h to the motorway posted speed.

FOR DETAIL REFER TO Austroads Guide to Road Design Part 4C

All dimensions are in millimetres unless otherwise shown.
NOTES

1. LENGTHS ARE APPLICABLE FOR ALL MOTORWAY POSTED SPEEDS.

2. LENGTHS WILL BE GOVERNED BY APPROACH GEOMETRY (20km - 30km).

3. FOUR SECONDS OF TRAVEL TIME AT THE MOTORWAY POSTED SPEED. PARALLEL RUNNING LANE LENGTH MAY BE INCREASED TO A MAXIMUM OF 200m TO ALLOW FOR VEHICLE ACCELERATION BASED ON GRADE CORRECTION.

4. TAPER LENGTH BASED ON A LATERAL MOVEMENT AT 1.5 m/s AT THE MOTORWAY POSTED SPEED.

5. MINIMUM DISTANCE FROM THE START OF THE RAMP TO THE SOFT NOSE SHALL NOT BE LESS THAN THE ACCELERATION DISTANCE FROM 0km/h TO THE MOTORWAY POSTED SPEED.

FOR DETAIL REFER TO AUSTROADS GUIDE TO ROAD DESIGN PART 4C.