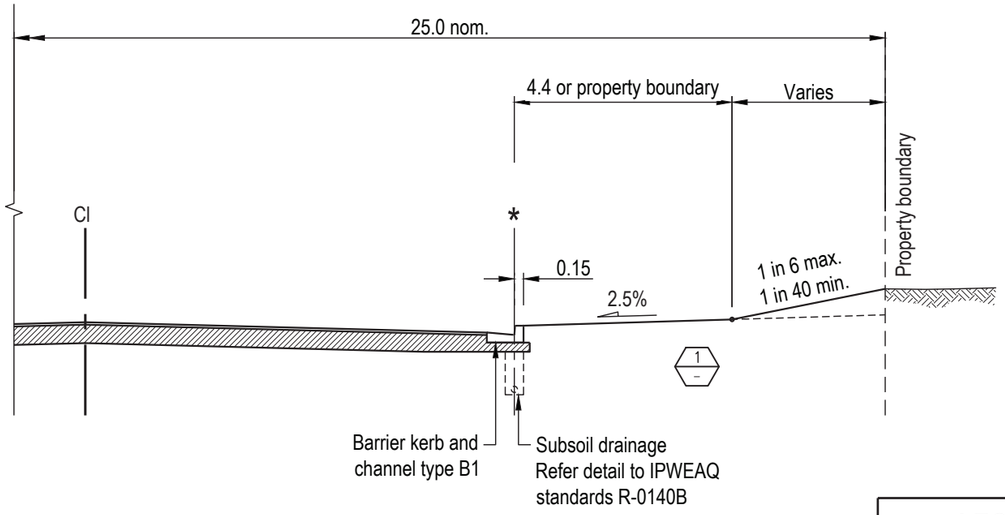
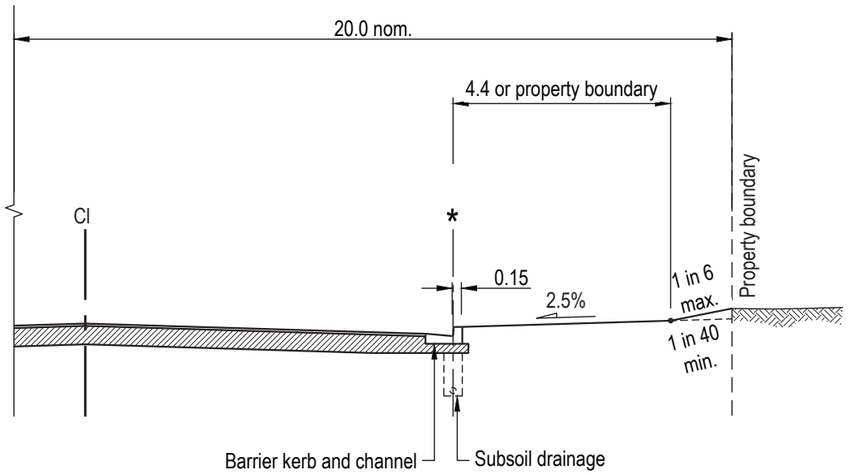


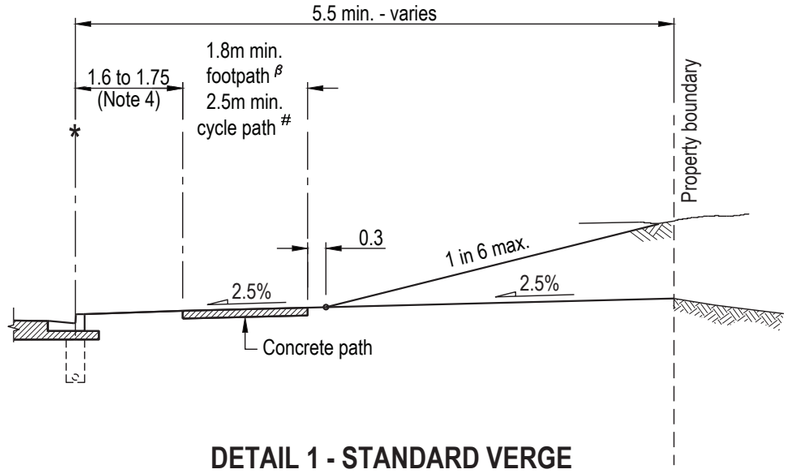
INDUSTRIAL COLLECTOR



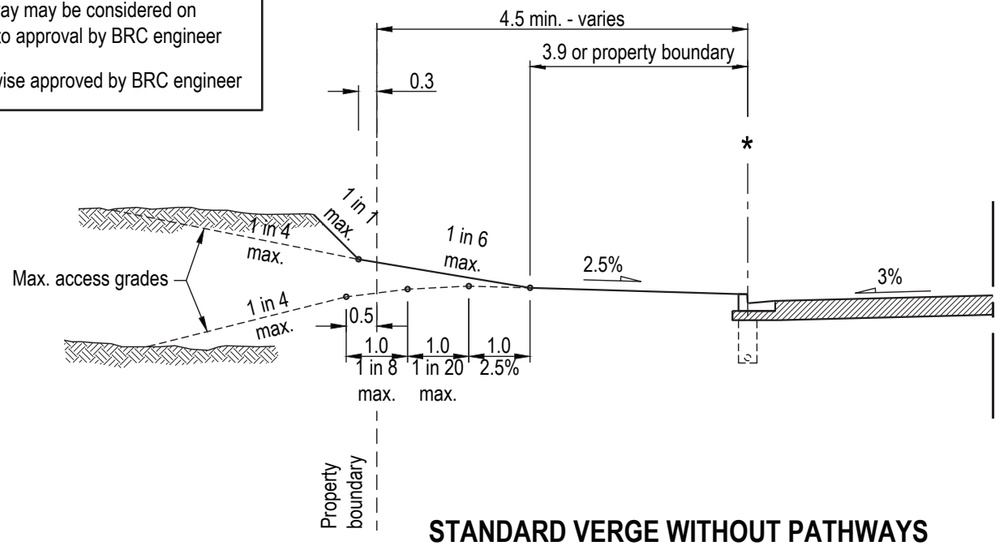
INDUSTRIAL ACCESS STREET

LEGEND

*	Nominal kerb line (Refer BRC standard drawing R1020)
β	A 1.5m pathway may be considered on merit subject to approval by BRC engineer
#	Unless otherwise approved by BRC engineer



DETAIL 1 - STANDARD VERGE



STANDARD VERGE WITHOUT PATHWAYS

NOTES:

1. Pavement design in accordance with "Austroads APRG-RPT-21 A Guide to the Design of Pavements for Light Traffic" or "Austroads Pavement Design - A Guide to the Structural Design of Road Pavements" or AP:G17-04.
2. Turf to be laid behind kerb - 0.4 wide min. and/or as required by erosion and sediment control plan.
3. Vehicle access in fill areas > 1m - Council will give special consideration to access treatment - submit proposal for approval.
4. Width may be reduced as directed by Council engineer.
5. All dimensions are in metres unless noted otherwise.

NOT TO SCALE

	Revisions	Verified	Date
B	Updated Title Block, Text Styles and Pathway Width	AJ	05/22
A	Original Issue		

Engineering Certification
Design: Verified:
Drawn: TS Checked: AJ
Digitally signed by Adam Johnston
Date: 2022.05.15 12:32:45 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Suzanne Brown
Date: 2022.06.01 15:50:51 +10'00'

BUNDABERG REGIONAL COUNCIL

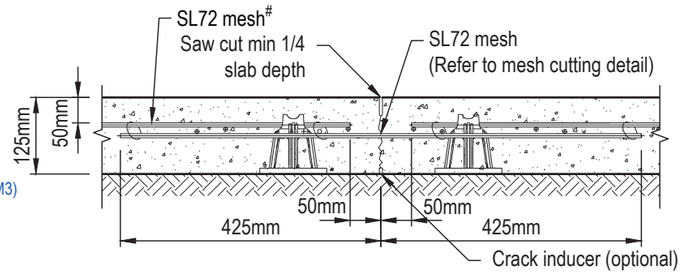
TYPE CROSS SECTIONS INDUSTRIAL COLLECTOR AND ACCESS STREET

Standard Drawing No.: R1004
Sheet Size: A3
Rev.: B

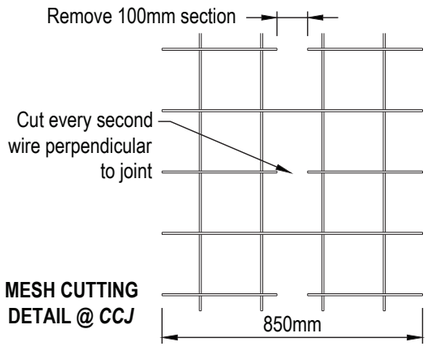
BRC(06/19)

LEGEND

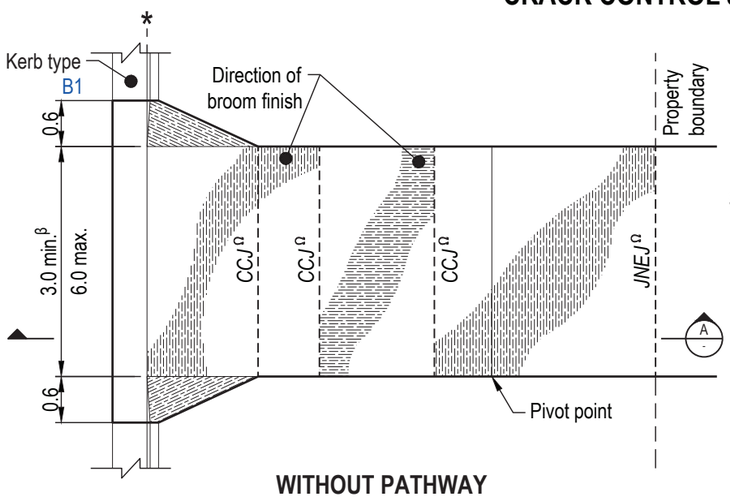
* Nominal kerb line
(Download kerb types plan for B1, M1 & M3)



CRACK CONTROL JOINT (*CCJ*) DETAIL

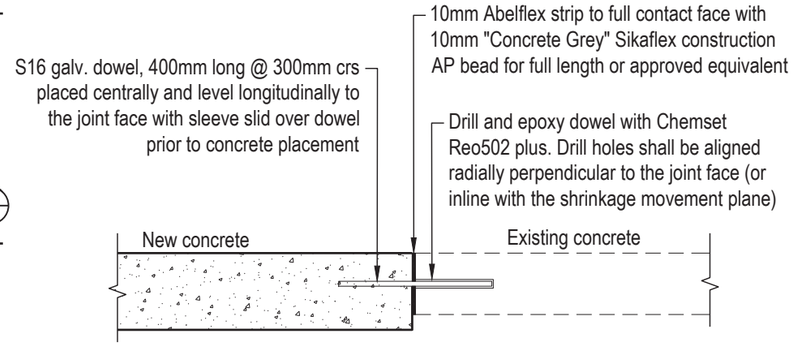


MESH CUTTING DETAIL @ *CCJ*

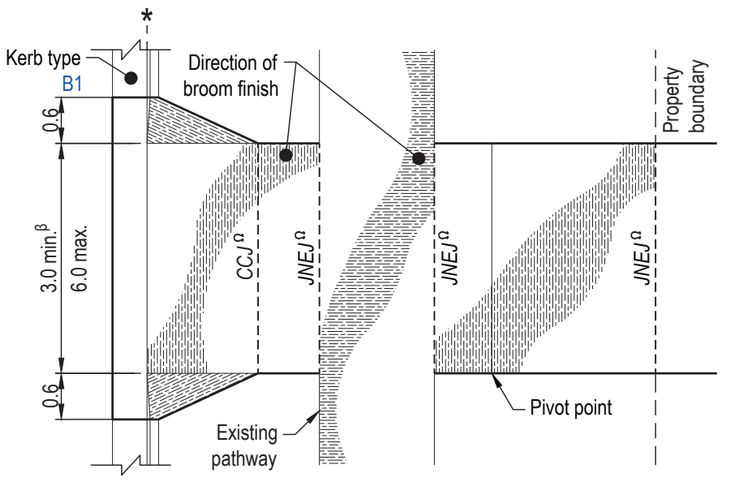


WITHOUT PATHWAY

β RPEQ to be consulted for joint details with driveways > 3.0m
Ω Or other approved joint as directed by BRC engineer



JOIN NEW TO EXISTING CONCRETE (*JNEJ*) DETAIL

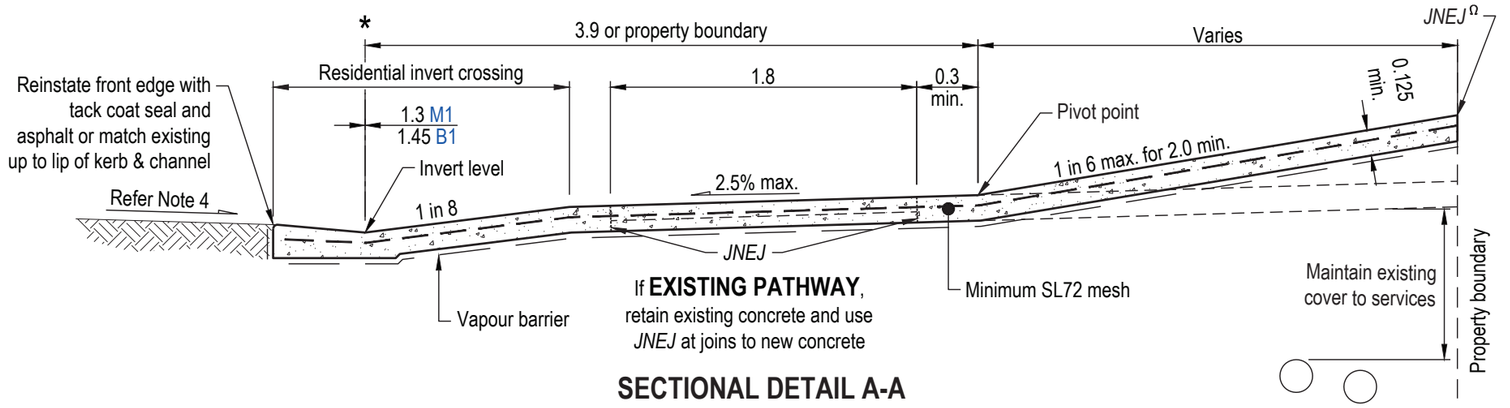


EXISTING PATHWAY

SLAB ABUTTING CHANNEL KERB (B1 SHOWN)

NOT TO SCALE

Alternative to SL72 mesh reinforcement (Note 9) as follows:
Concrete N32 in accordance with AS 1379 and AS 3600 with NOVOMESH 950 at a rate of 4.54kg/m^3 (or similar with approval from BRC engineer).



SECTIONAL DETAIL A-A

NOTES:

1. Bundaberg Regional Council (BRC) approval is required prior to commencement of any works. (www.bundaberg.qld.gov.au/transport-roads/roads/6)
2. Where the kerb and channel is in good condition and there is no visible damage over the width of the driveway, the driveway may be constructed from the nominal kerb line to the property boundary. If this option is chosen, the conditions outlined in Note 3 apply.
3. Construction and maintenance of the driveway from the lip of kerb & channel edge to the property boundary to a standard safe for the travelling public, is the sole responsibility of the property owner.
4. Driveway slopes have been designed to AS 2890 and AS 1428. The driveway allows an average vehicle (B85) to cross without scraping from a maximum crossfall of 5.0%. The driveway may not be suitable for sports/modified cars and cars with caravans/ trailers.
5. Driveways to be located clear of existing BRC services. Where this cannot be achieved, services must be relocated to the satisfaction of BRC engineer at the property owner's expense. Existing services include, but are not limited to: gully pits and any connecting pipework, water meters, sewer maintenance holes, fire hydrants, street trees and sluice valves.
6. The area excavated for the driveway must be neatly trimmed. The provision of bedding must be designed by an RPEQ where the bearing capacity of the existing ground condition is less than 50kPa (firm clay).
7. The maximum vertical deviation on the concrete driveway is 5.0mm measured with a 3.0m straight edge placed anywhere on the finished surface.
8. Earthworks surrounding the driveway must transition over grades not exceeding 1 in 20 unless approved by BRC engineer.
9. Concrete N32 min. in accordance with AS 1379 and AS 3600. Reinforcement mesh to AS 1304, 50mm top and edge cover. Lap mesh 250mm.
10. Driveway to be in plain grey concrete with a medium broom finish to comply with table D2.14 Slip Resistance Classification (as listed in the Building Code of Australia).
11. Driveways with Non-Standard finish must have slip resistance as per Note 10. A Non-Standard finish includes but is not limited to: exposed aggregate, coloured, stenciled & stamped concrete.
12. Driveway restoration works undertaken by BRC shall be in plain grey broom finished concrete or as required by a township colour plan regardless of the existing finishes. Restoration works could be as a result of the provision of new pathways, maintenance on subsurface underground infrastructure, etc.
13. M3 kerb is to remain and driveway is to commence from the back of kerb unless approved by BRC.
14. For further details of residential invert crossing refer BRC std. drg. R1014.
15. All dimensions are in metres unless noted otherwise.

	Revisions	Verified	Date
C	MAJOR UPDATE	AJ	05/22
B	M3 KERB ADDED	RMC	12/15
A	Original Issue		

Engineering Certification
Design: AJ Verified: AJ
Drawn: TS Checked: AJ
Digitally signed by Adam Johnston
Date: 2022.05.15 12:33:33 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Suzanne Brown
Date: 2022.06.01 15:52:45 +10'00'

BUNDABERG REGIONAL COUNCIL

DRIVEWAYS
RESIDENTIAL DRIVEWAY WITH KERB AND CHANNEL

Standard Drawing No.: **R1010**
Sheet Size: **A3**
Rev.: **C**

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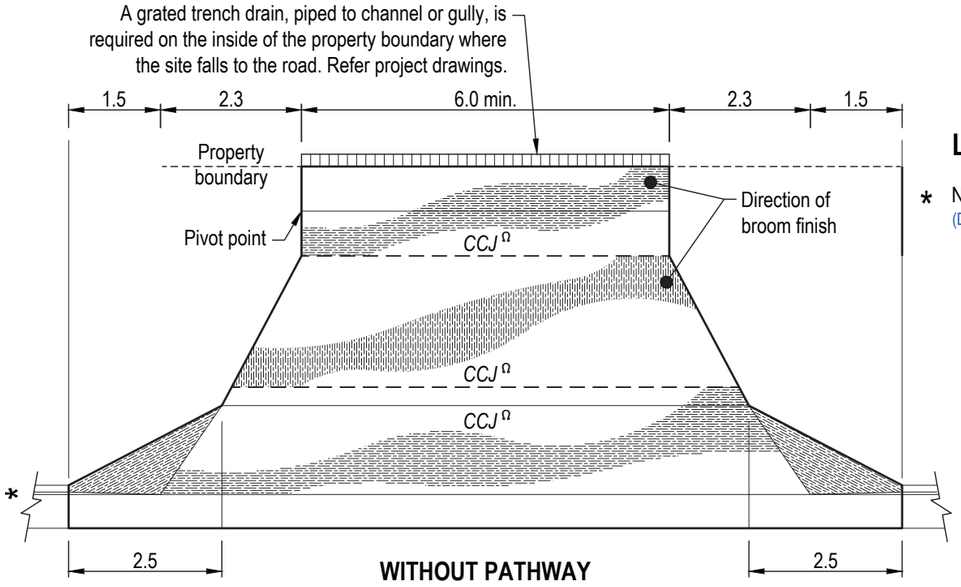
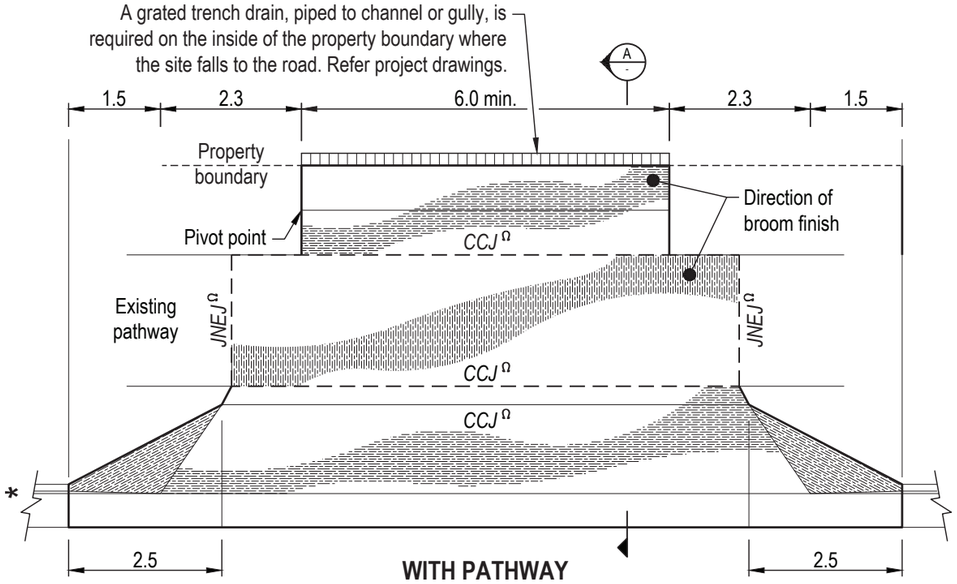
BRC(06/19)



WITHOUT PATHWAY

Ω Or other approved joint as directed by BRC engineer

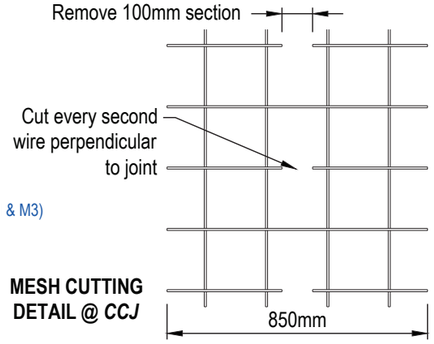


WITH PATHWAY

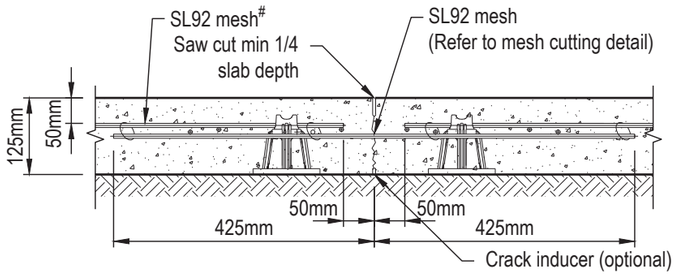
PLAN - VERGE

LEGEND

* Nominal kerb line
(Download kerb types plan for B1, M1 & M3)

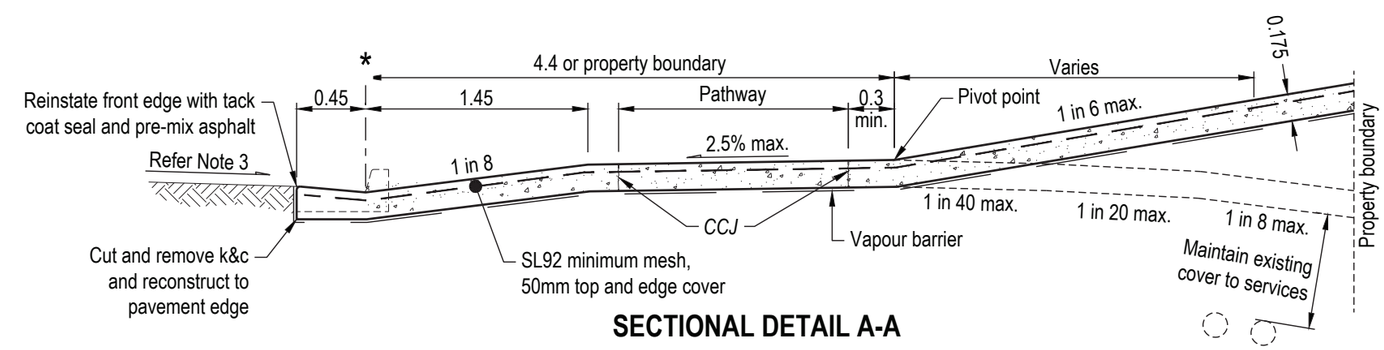


MESH CUTTING DETAIL @ *CCJ*



CRACK CONTROL JOINT (*CCJ*) DETAIL

JOIN NEW TO EXISTING CONCRETE (*JNEJ*) DETAIL



SECTIONAL DETAIL A-A

NOT TO SCALE

NOTES:

1. Bundaberg Regional Council (BRC) approval is required prior to commencement of any works. (www.bundaberg.qld.gov.au/transport-roads/roads/6)
2. Construction and maintenance of the driveway to a standard safe for the travelling public, is the sole responsibility of the property owner.
3. Driveway slopes have been designed to AS 2890 and AS 1428. The driveway allows an average vehicle (B85) to cross without scraping from a maximum crossfall of 5.0%. The driveway may not be suitable for sports/modified cars and cars with caravans/ trailers.
4. Driveways to be located clear of existing BRC services. Where this cannot be achieved, services must be relocated to the satisfaction of BRC engineer at the property owner's expense. Existing services include, but are limited to: gully pits and any connecting pipework, water meters, sewer maintenance holes, fire hydrants, street trees and sluice valves.
5. The area excavated for the driveway must be neatly trimmed. The design thickness and provision of bedding must be designed by an RPEQ where the bearing capacity of the existing ground condition is less than 50kPa (firm clay).
6. The maximum vertical deviation on the concrete driveway is 5.0mm measured with a 3.0m straight edge placed anywhere on the finished surface.
7. Earthworks surrounding the driveway must transition over grades not exceeding 1 in 20 unless approved by BRC engineer.
8. Concrete N32 min. in accordance with AS 1379 and AS 3600. Reinforcement mesh to AS 1304, 50mm top and edge cover. Lap mesh 250mm.
9. Driveway to be in plain grey concrete with a medium broom finish to comply with table D2.14 Slip Resistance Classification (as listed in the Building Code of Australia).
10. Driveways with Non-Standard finish must have slip resistance as per Note 9. A Non-Standard finish includes but is not limited to: exposed aggregate, coloured, stenciled & stamped concrete.
11. Driveway restoration works undertaken by BRC shall be in plain grey broom finished concrete or as required by a township colour plan regardless of the existing finishes. Restoration works could be as a result of the provision of new pathways, maintenance on subsurface underground infrastructure, etc.
12. RPEQ to be consulted for joint details.
13. All dimensions are in metres unless noted otherwise.

Revisions		Verified	Date
B	MAJOR UPDATE	AJ	05/22
A	Original Issue		

Engineering Certification			
Design:	AJ	Verified:	AJ
Drawn:	TS	Checked:	AJ

Digitally signed by Adam Johnston
Date: 2022.05.15 12:34:07 +10'00'

Approved
Branch Manager
Engineering Services

Digitally signed by Suzanne Brown
Date: 2022.06.01 15:54:54 +10'00'

BUNDABERG REGIONAL COUNCIL

DRIVEWAYS
INDUSTRIAL AND COMMERCIAL DRIVEWAY

Standard Drawing No.:	Sheet Size:	Rev.:
R1011	A3	B

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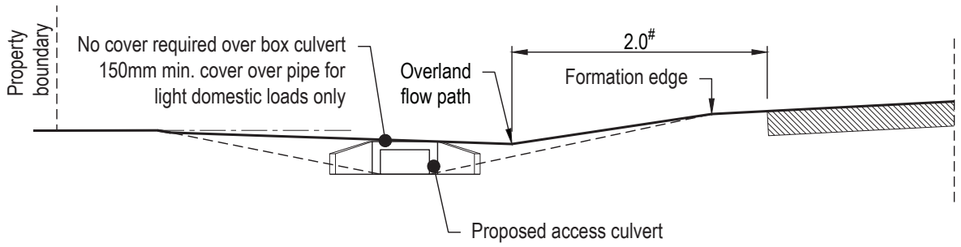


TYPICAL SECTION

Approval of BRC engineer required if less than 2.0m

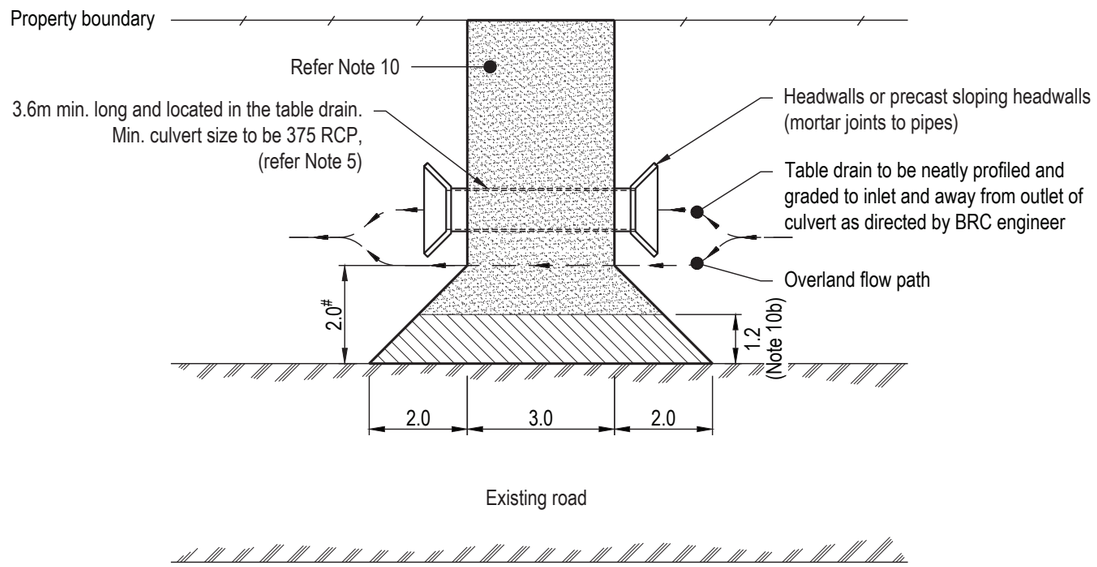
NOTES:

1. Bundaberg Regional Council (BRC) approval is required prior to commencement of any works. (www.bundaberg.qld.gov.au/transport-roads/roads/6)
2. Construction and maintenance of the driveway to a standard safe for the travelling public, is the sole responsibility of the property owner.
3. For traffic control and safety, the minimum requirements from the Manual of Uniform Traffic Control Devices (MUTCD) must be in place before work commences.
4. Driveway access is to be constructed so as to allow an overland flow path over the access road. This overland flow path is to be generally between the access culvert and the edge of road or as directed by BRC engineer. Generally the overland flow path is to be 300mm below road crown.
5. Box culvert or pipe size and location as designed by RPEQ or as directed by BRC engineer. Shallow roadside drains may require the installation of an access as per BRC std. drg. R1013.
6. Box culvert access to have wingwalls and apron.
7. Pipe culverts to have precast headwalls with wings (or equal CRS HUMES headwalls) for single/multiple pipes or cast insitu endwalls as per TMR drawings 1304,1305 & 1306.
8. BRC may direct the use of sloping headwalls if required in lieu of the headwall treatment mentioned in Note 9.
9. Minimum longitudinal grade of culvert is 0.3%.
10. Driveway surface options:
    a. Gravel driveways:
        - The minimum depth of gravel is to be 150mm of Type 2.3 on CBR 3 min., or such greater depth as directed by the civil contractor. Zero cover is allowed over RCBC.
        - Where the Council access road is sealed, driveway shall be a two coat seal with 14mm & 7mm aggregate to BRC standards plus 300mm min. overlap on existing seal (7mm stone only extended over existing seal). If asphalt is preferred, it will also be to BRC standards (25mm min.).

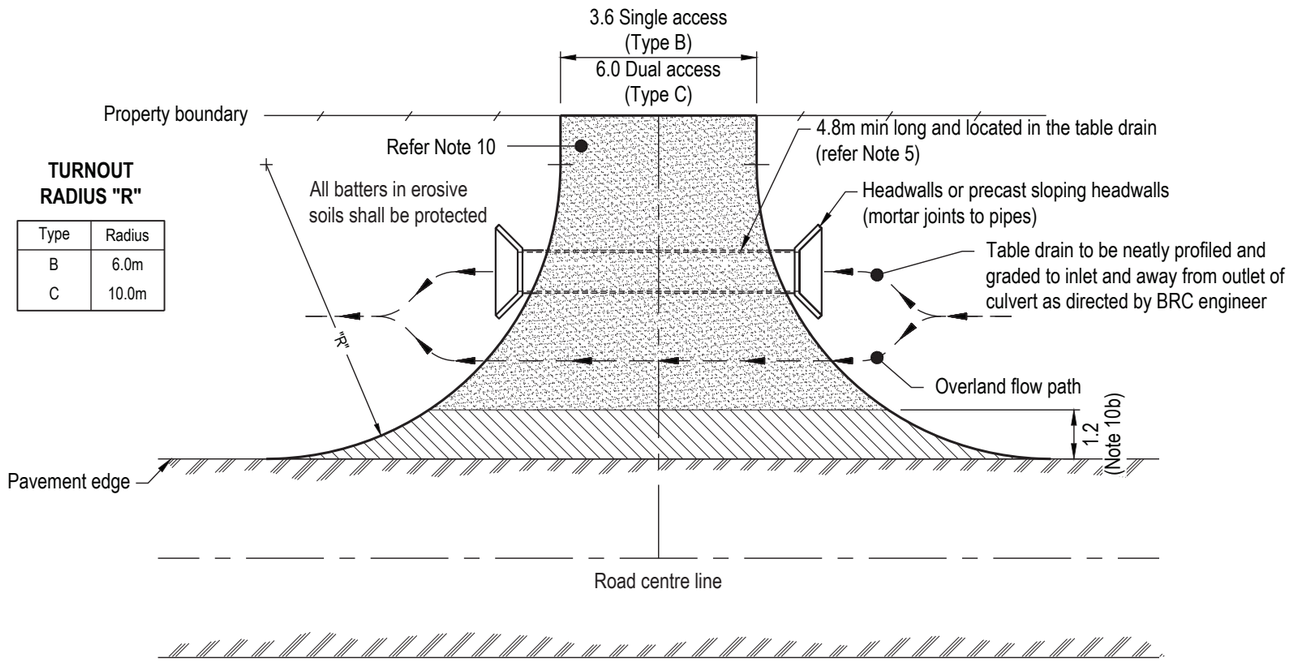
    OR

    b. Concrete driveways (sealed Council access road only):
        - Concrete N32 min. in accordance with AS 1379 and AS 3600. - 125mm thick with SL72 mesh (50mm top cover) .
        - The area excavated for the driveway must be neatly trimmed. The design thickness and provision of bedding must be designed by an RPEQ where the bearing capacity of the existing ground condition is less than 50kPa (firm clay).
        - First 1.2m of driveway access from sealed road is required to be a two coat seal with 14mm & 7mm aggregate to BRC standards plus 300mm min. overlap on existing seal (7mm stone only extended over existing seal)
11. All dimensions are in metres unless noted otherwise.

NOT TO SCALE



TYPE A - SINGLE ACCESS WITH CULVERT (SPEED 50kph MAX)



TURNOUT RADIUS "R"

Type	Radius
B	6.0m
C	10.0m

Type B AND C - ACCESS WITH CULVERT

	Revisions	Verified	Date
E	MAJOR UPDATE	AJ	05/22
D	PLANS AND NOTES AMENDMENT	RMC	03/17
C	SECTIONAL DETAIL AND NOTES AMENDMENT	RMC	24/12/15
B	NOTE 4 AMENDMENT		12/10
A	Original Issue		

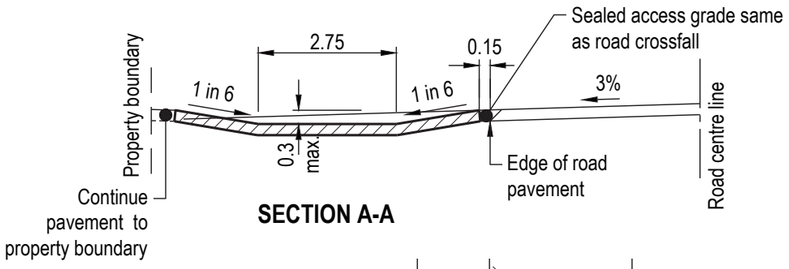
Engineering Certification
Design: AJ Verified: AJ
Drawn: TS/JCR Checked: AJ
Digitally signed by Adam Johnston
Date: 2022.05.15 12:34:43 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Suzanne Brown
Date: 2022.06.01 15:56:56 +10'00'

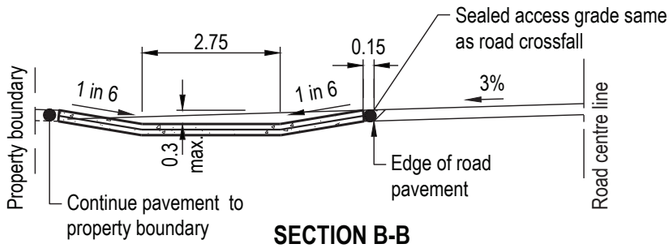
BUNDABERG REGIONAL COUNCIL

DRIVEWAYS
RESIDENTIAL ACCESS REQUIRING CULVERTS
NO KERB AND CHANNEL

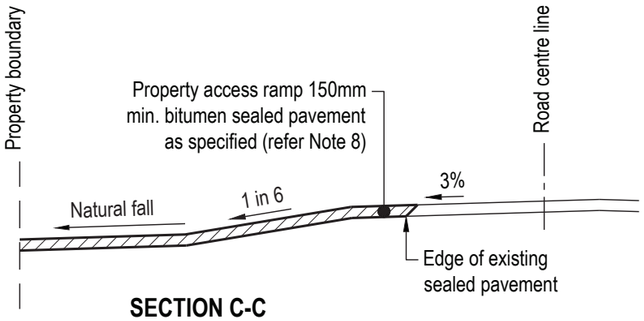
Standard Drawing No.: R1012
Sheet Size: A3
Rev.: E



SECTION A-A

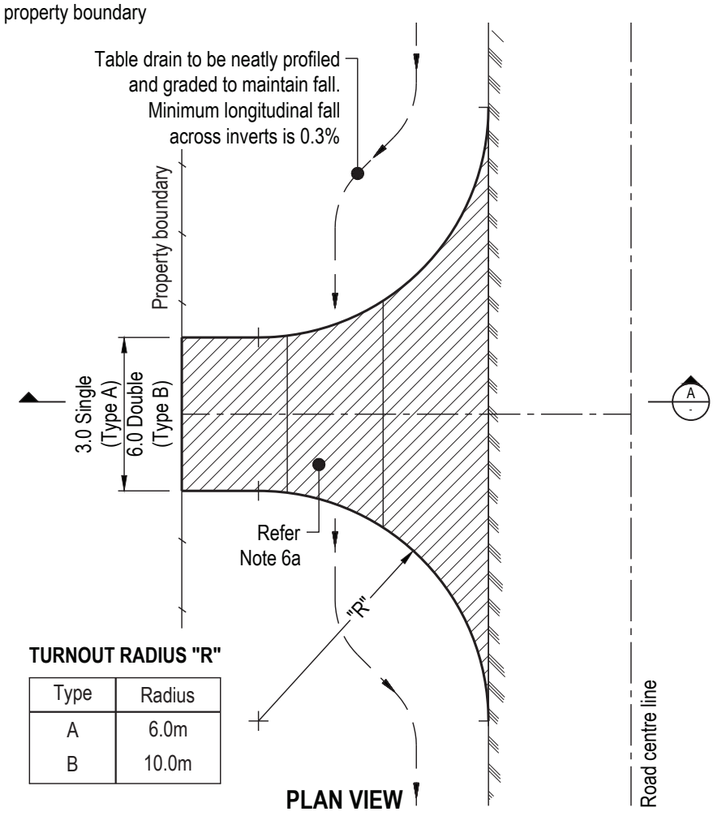


SECTION B-B



SECTION C-C

Managing the rainwater flows from this access is the responsibility of the property owner



TURNOUT RADIUS "R"

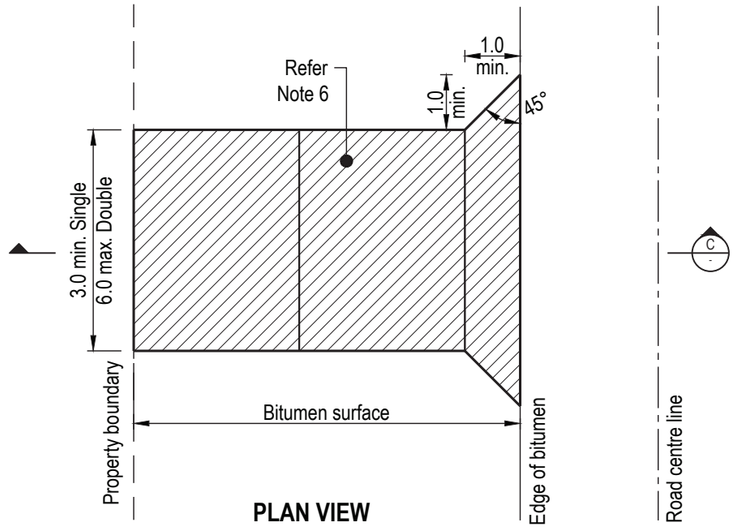
Type	Radius
A	6.0m
B	10.0m

PLAN VIEW

GRAVEL INVERT CROSSING

PLAN VIEW

CONCRETE INVERT CROSSING



PLAN VIEW

ACCESS FALLING FROM ROAD EDGE

NOTES:

1. Bundaberg Regional Council (BRC) approval is required prior to commencement of any works. (www.bundaberg.qld.gov.au/transport-roads/roads/6)
2. Construction and maintenance of the driveway to the edge of traffic lane, to a standard safe for the travelling public, is the sole responsibility of the property owner.
3. Driveway slopes have been designed to AS 2890. The driveway allows an average vehicle to cross (B85) without scraping. The driveway may not be suitable for sports/ modified cars and cars with caravans/ trailers.
4. For traffic control and safety, the minimum requirements from the Manual of Uniform Traffic Control Devices (MUTCD) must be in place before work commences.
5. Minimum longitudinal grade is 0.3%.
6. Driveway surface options:
   a. Gravel driveways:
      - The minimum depth of gravel is to be 150mm of Type 2.3 on CBR 3 min., or such greater depth as directed by the civil contractor.
      - Where the Council access road is sealed, driveway shall be a two coat seal with 14mm & 7mm aggregate to BRC standards plus 300mm min. overlap on existing seal (7mm stone only extended over existing seal). If asphalt is preferred, it will also be to BRC standards (25mm min.).

   OR

   b. Concrete driveways (sealed Council access road only):
      - Concrete N32 min. in accordance with AS 1379 and AS 3600. - 125mm thick with SL72 mesh (50mm top cover) .
      - The area excavated for the driveway must be neatly trimmed. The design thickness and provision of bedding must be designed by an RPEQ where the bearing capacity of the existing ground condition is less than 50kPa (firm clay).
      - First 150mm of driveway access from sealed road is required to be a tack coat with premix / cold mix AC infill.
7. All dimensions are in metres unless noted otherwise.

NOT TO SCALE

	Revisions	Verified	Date
C	MAJOR UPDATE	AJ	05/22
B	GENERAL NOTE CHANGES	RMC	02/13
A	Original Issue		

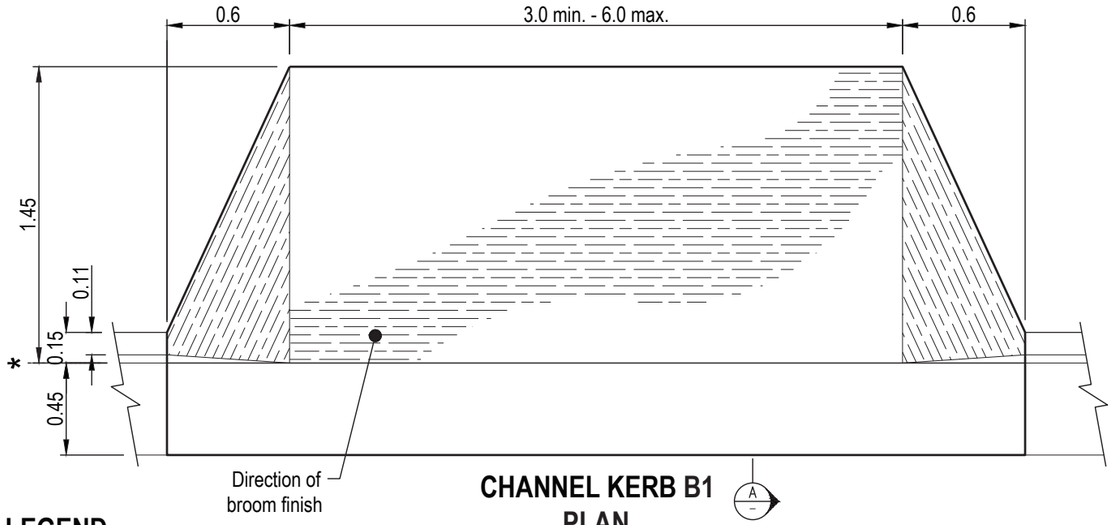
Engineering Certification
Design: AJ Verified: AJ
Drawn: TS/JCR Checked: AJ
Digitally signed by Adam Johnston
Date: 2022.06.27 15:49:16 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Suzanne Brown
Date: 2022.06.27 16:47:34 +10'00'

BUNDABERG REGIONAL COUNCIL

DRIVEWAYS
RESIDENTIAL INVERT ACCESSES
NO KERB AND CHANNEL

Standard Drawing No.: R1013
Sheet Size: A3
Rev.: C

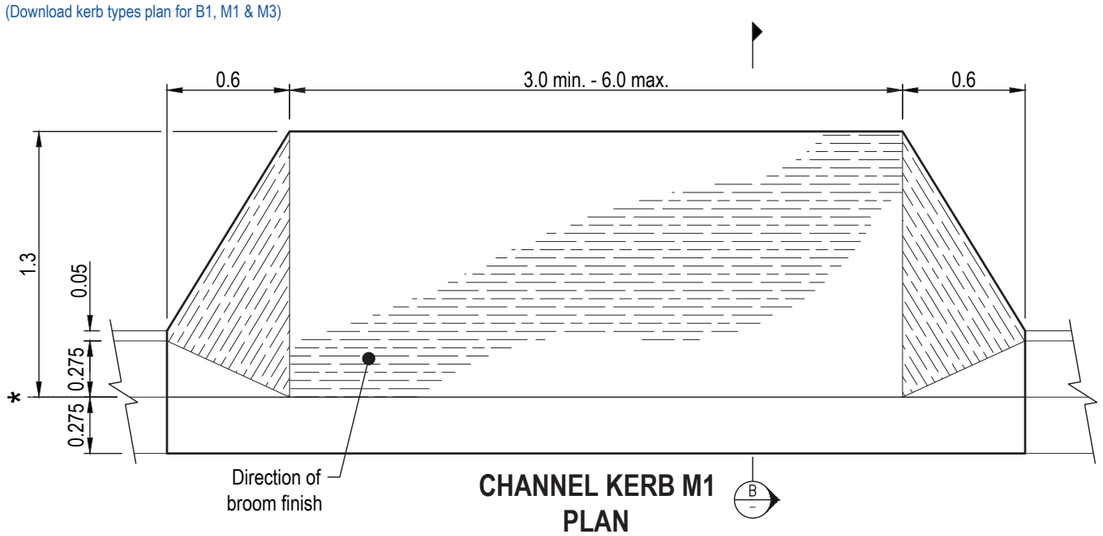


CHANNEL KERB B1
PLAN

A

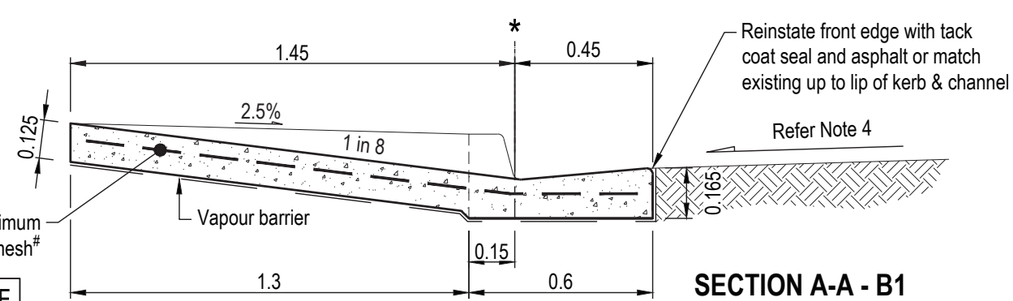
LEGEND

* Nominal kerb line
(Download kerb types plan for B1, M1 & M3)



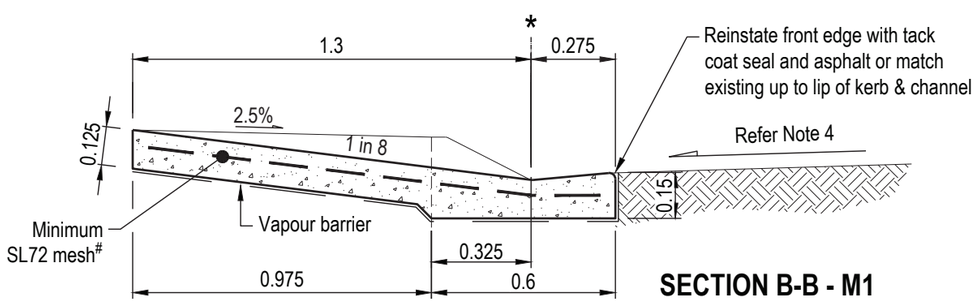
CHANNEL KERB M1
PLAN

B



SECTION A-A - B1

NOT TO SCALE



SECTION B-B - M1

NOTES:

1. Bundaberg Regional Council (BRC) approval is required prior to commencement of any works. (www.bundaberg.qld.gov.au/transport-roads/roads/6)
2. Where the kerb and channel is in good condition and there is no visible damage over the width of the driveway, the driveway may be constructed from the nominal kerb line to the property boundary. If this option is chosen, the conditions outlined in Note 3 apply.
3. Construction and maintenance of the driveway from the pavement edge to the property boundary to a standard safe for the travelling public, is the sole responsibility of the property owner.
4. Driveway slopes have been designed to AS 2890 and AS 1428. The driveway allows an average vehicle (B85) to cross without scraping from a maximum crossfall of 5.0%. The driveway may not be suitable for sports/modified cars and cars with caravans/ trailers.
5. Driveways to be located clear of existing BRC services. Where this cannot be achieved, services must be relocated to the satisfaction of BRC engineer at the property owner's expense. Existing services include, but are not limited to: gully pits and any connecting pipework, water meters, sewer maintenance holes, fire hydrants, street trees and sluice valves.
6. The area excavated for the driveway must be neatly trimmed. The provision of bedding must be designed by an RPEQ where the bearing capacity of the existing ground condition is less than 50kPa (firm clay).
7. The maximum deviation on the concrete driveway from straight is 5.0mm measured with a 3.0m straight edge placed anywhere on the finished surface.
8. Earthworks surrounding the driveway must transition over grades not exceeding 1 in 20 unless approved by BRC engineer.
9. Concrete N32 min. in accordance with AS 1379 and AS 3600. Reinforcement mesh to AS 1304, 50mm top and edge cover. Lap mesh 250mm.
10. Driveway to be in plain grey concrete with a medium broom finish to comply with table D2.14 Slip Resistance Classification (as listed in the Building Code of Australia).
11. Driveways with Non-Standard finish must have slip resistance as per Note 10. A Non-Standard finish includes but is not limited to: exposed aggregate, coloured, stenciled & stamped concrete..
12. Driveway restoration works undertaken by BRC shall be in plain grey broom finished concrete or as required by a township colour plan regardless of the existing finishes. Restoration works could be as a result of the provision of new pathways, maintenance on subsurface underground infrastructure, etc.
13. For further details of residential invert crossing refer BRC std. drg. R1010.
14. All dimensions are in metres unless noted otherwise.

Alternative to SL72 mesh reinforcement (Note 9) as follows: Concrete N32 in accordance with AS 1379 and AS 3600 with NOVOMESH 950 at a rate of 4.54kg/m^3 (or similar with approval from BRC Engineer).

	Revisions	Verified	Date
C	MAJOR UPDATE	AJ	05/22
B	M3 KERB ADDED	RMC	24/12/15
A	Original Issue		

Engineering Certification
Design: AJ Verified: AJ
Drawn: TS Checked: AJ
Digitally signed by Adam Johnston
Date: 2022.05.15 12:35:17 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Suzanne Brown
Date: 2022.06.01 15:59:35 +10'00'

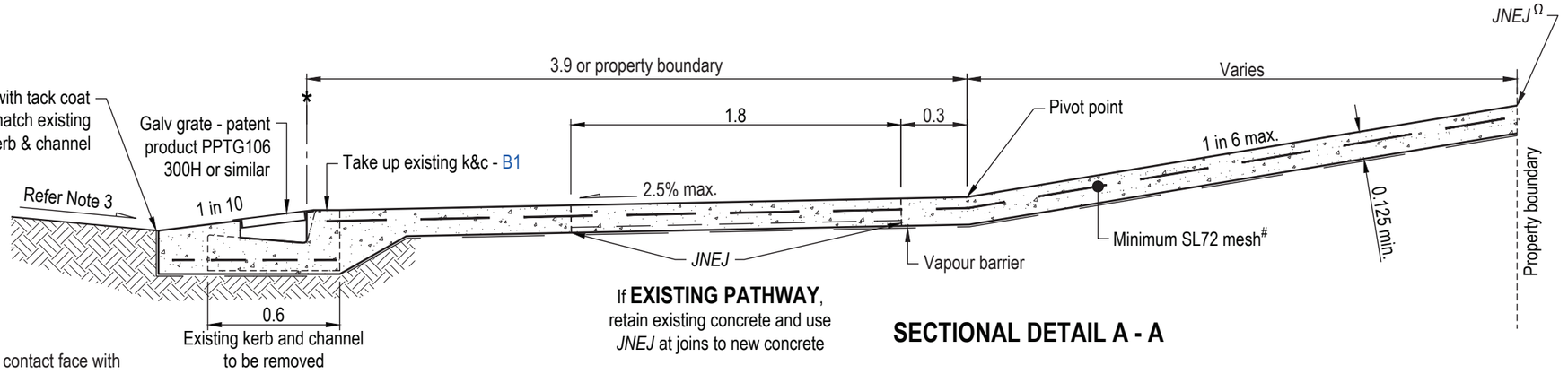
BUNDABERG REGIONAL COUNCIL

DRIVEWAYS
RESIDENTIAL INVERT CROSSINGS

Standard Drawing No.: **R1014**
Sheet Size: **A3**
Rev.: **C**

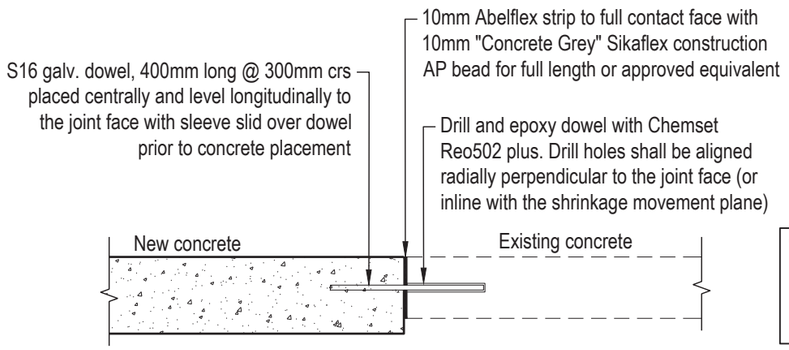
LEGEND

* Nominal kerb line
(Download kerb types plan for B1, M1 & M3)



If **EXISTING PATHWAY**, retain existing concrete and use *JNEJ* at joins to new concrete

SECTIONAL DETAIL A - A



JOIN NEW TO EXISTING CONCRETE (*JNEJ*) DETAIL

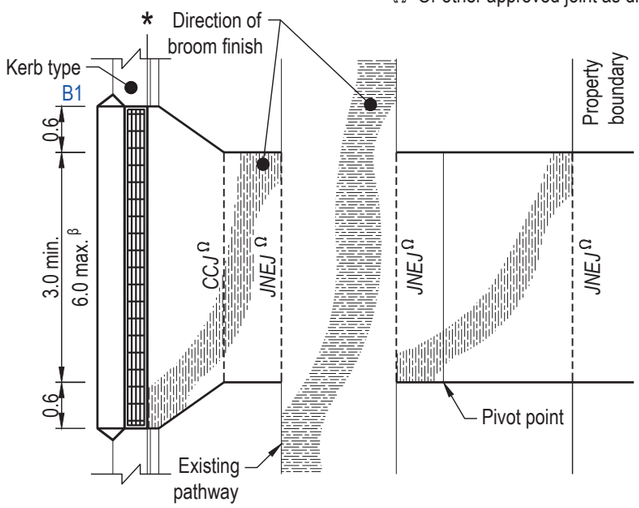
This crossing solution is for limited use only. Approval from BRC is required before installation commences.

NOTES:

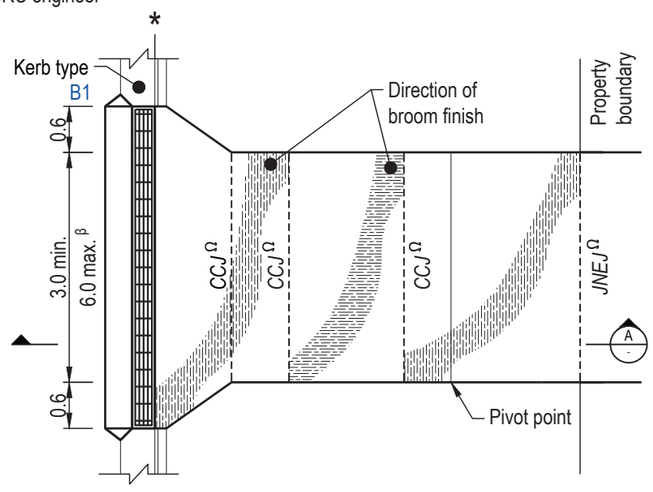
1. Bundaberg Regional Council (BRC) approval is required prior to commencement of any works. (www.bundaberg.qld.gov.au/transport-roads/roads/6)
2. Construction and maintenance of the driveway to a standard safe for the travelling public, is the sole responsibility of the property owner.
3. Driveway slopes have been designed to AS 2890 and AS 1428. The driveway allows an average vehicle (B85) to cross without scraping from a maximum crossfall of 7%. The driveway may not be suitable for sports/modified cars and cars with caravans/ trailers.
4. Driveways to be located clear of existing BRC services. Where this cannot be achieved, services must be relocated to the satisfaction of BRC engineer at the property owner's expense. Existing services include, but are not limited to: gully pits and any connecting pipework, water meters, sewer maintenance holes, fire hydrants, street trees and sluice valves.
5. The area excavated for the driveway must be neatly trimmed. The provision of bedding must be designed by an RPEQ where the bearing capacity of the existing ground condition is less than 50kPa (firm clay).
6. The maximum vertical deviation on the concrete driveway is 5.0mm measured with a 3.0m straight edge placed anywhere on the finished surface.
7. Earthworks surrounding the driveway must transition over grades not exceeding 1 in 20 unless approved by BRC engineer.
8. Concrete N32 min. in accordance with AS 1379 and AS 3600. Reinforcement mesh to AS 1304, 50mm top and edge cover. Lap mesh 250mm.
9. Driveway to be in plain grey concrete with a medium broom finish to comply with table D2.14 Slip Resistance Classification (as listed in the Building Code of Australia).
10. Driveways with Non-Standard finish must have slip resistance as per Note 9. A Non-Standard finish includes but is not limited to: exposed aggregate, coloured, stenciled & stamped concrete.
11. Driveway restoration works undertaken by BRC shall be in plain grey broom finished concrete or as required by a township colour plan regardless of the existing finishes. Restoration works could be as a result of the provision of new pathways, maintenance on subsurface underground infrastructure, etc.
12. All dimensions are in metres unless noted otherwise.

Alternative to SL72 mesh reinforcement (Note 8) as follows: Concrete N32 in accordance with AS 1379 and AS 3600 with NOVOMESH 950 at a rate of 4.54kg/m^3 (or similar with approval from BRC engineer).

β RPEQ to be consulted for joint details with driveways > 3.0m
Ω Or other approved joint as directed by BRC engineer



EXISTING PATHWAY



WITHOUT PATHWAY

NOT TO SCALE

PLAN VIEW

	Revisions	Verified	Date
C	MAJOR UPDATE	AJ	05/22
B	CRACK CONTROL JOINTS ADDED	RMC	24/12/15
A	Original Issue		

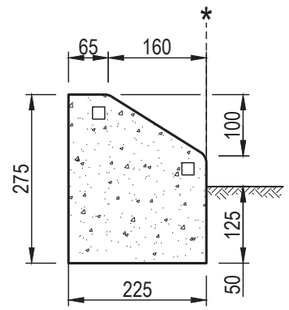
Engineering Certification
Design: AJ Verified: AJ
Drawn: Tifa/JCR Checked: AJ
Digitally signed by Adam Johnston Date: 2022.05.15 12:35:50 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Suzanne Brown Date: 2022.06.01 16:01:32 +10'00'

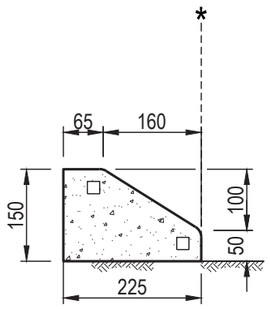
BUNDABERG REGIONAL COUNCIL

DRIVEWAYS
RESIDENTIAL DRIVEWAY
STEEP DRIVEWAYS

Standard Drawing No.: **R1015**
Sheet Size: **A3**
Rev.: **C**



KERB
SEMI MOUNTABLE KERB
TYPE SM3



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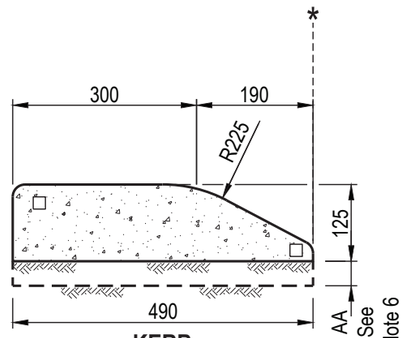
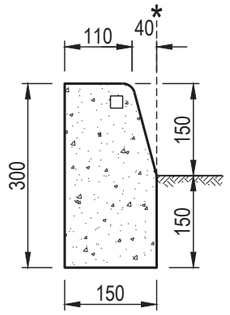
SEMI MOUNTABLE KERB
TYPE SM4



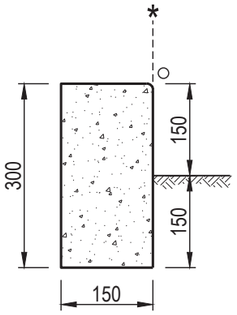
KERB
SEMI MOUNTABLE KERB
TYPE MR10

LEGEND

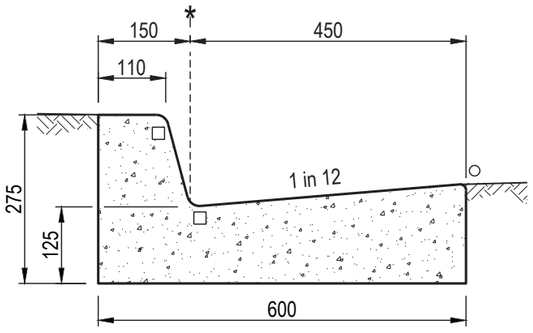
- ✱ Nominal kerb line for setting out
- ○ R10 radius
- ◕ R15 radius
- □ R20 radius



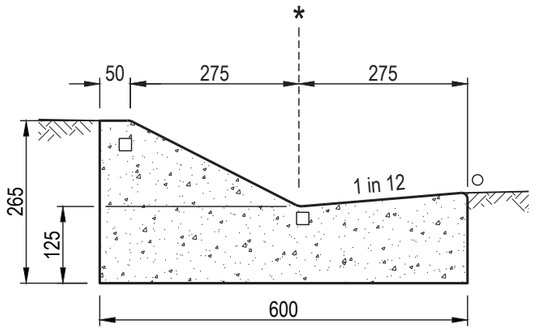
KERB
BARRIER KERB
TYPE B2



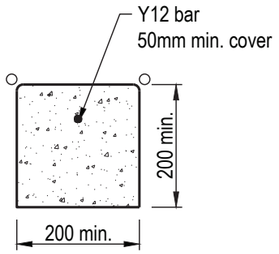
KERB
BARRIER KERB
TYPE B3



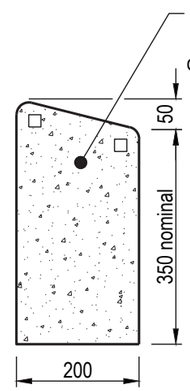
KERB AND CHANNEL
BARRIER KERB AND CHANNEL
TYPE B1



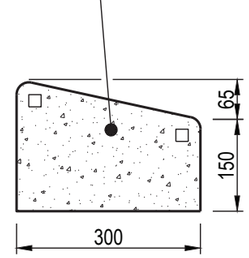
KERB AND CHANNEL
BARRIER KERB AND CHANNEL
TYPE M1



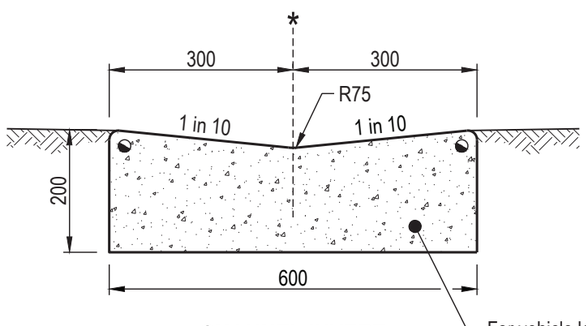
KERB
EDGE RESTRAINT
TYPE ER2



KERB
EDGE RESTRAINT
TYPE ER3

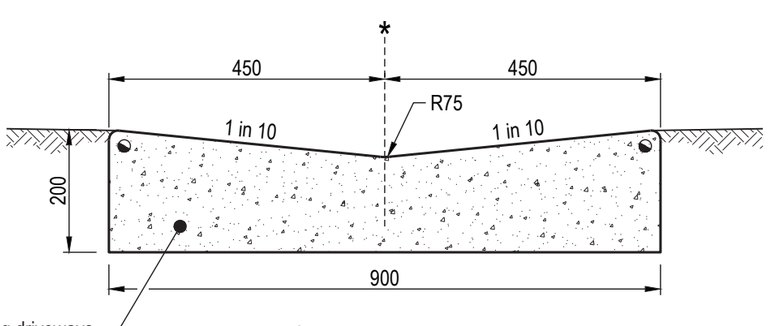


KERB
EDGE RESTRAINT
TYPE M6



CHANNEL INVERT
CHANNEL INVERT (INV1-600)
TYPE INV1-600

For vehicle loading including driveways, provide SL72 mesh or NOVOMESH 950 at a rate of 4.54kg/m^3 or as directed



CHANNEL INVERT
CHANNEL INVERT (INV1-900)
TYPE INV1-900

NOTES:

1. Refer. R1010, R1011, R1013 and R1014 for access crossing details.
2. Refer to specifications for kerb subgrade preparation requirements.
3. Concrete N25 min. for slipform.
4. Concrete N32 min. for reinforced inverts.
5. For construction & expansion joints, refer DTMR MRTS03.
6. Asphalt allowance "AA" provides for initial asphalt layer and/or future overlay as indicated in the documents.
7. All dimensions are in millimetres unless noted otherwise.

NOT TO SCALE

	Revisions	Verified	Date
C	Major Update	AJ	12/21
B	M3 KERB ADDED	RMC	24/12/15
A	Original Issue		

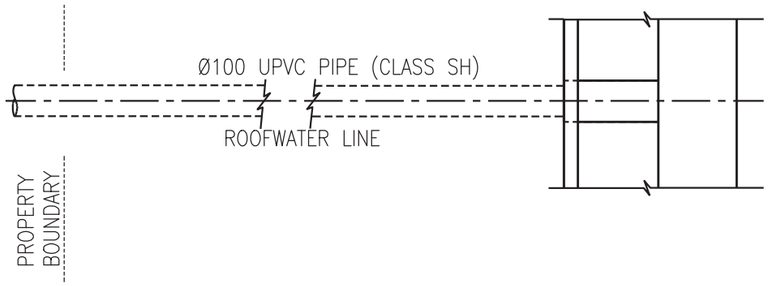
Engineering Certification
Design: AJ Verified: AJ
Drawn: TS/JCR Checked: AJ
Digitally signed by Adam Johnston
Date: 2022.05.15 12:36:28 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Suzanne Brown
Date: 2022.06.01 16:03:59 +10'00'

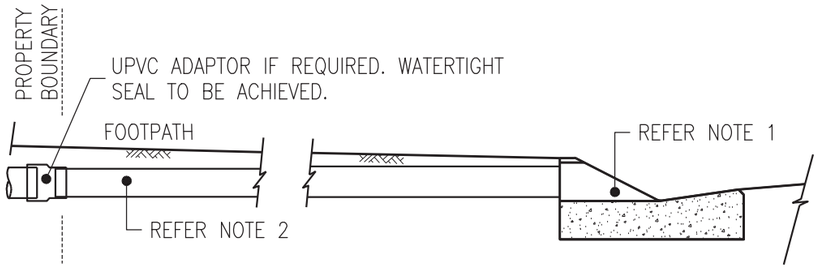
BUNDABERG REGIONAL COUNCIL

KERB AND CHANNEL
KERBS, CHANNELS, & INVERTS
PROFILES & DIMENSIONS

Standard Drawing No.: **R1020**
Sheet Size: **A3**
Rev.: **C**



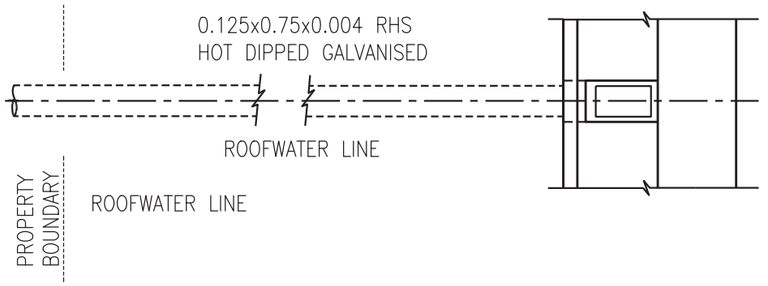
PLAN



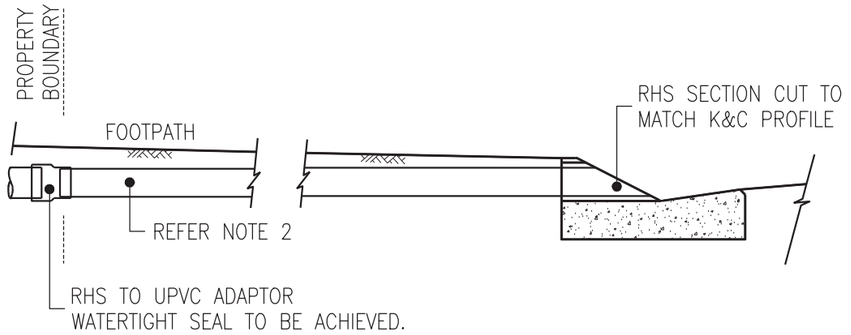
SECTIONAL ELEVATION

ALTERNATIVE 1
KERB AND CHANNEL
WITH KERB ADAPTOR

DETACHED DWELLING



PLAN



SECTIONAL ELEVATION

ALTERNATIVE 2
KERB AND CHANNEL
WITH RHS VERGE ADAPTOR

ALL OTHER AREAS

NOTES:

1. WHITE INDUSTRIES CAST KERB ADAPTORS TO SUIT K&C PROFILE (OR EQUIVALENT WITH FLANGED EDGES TO SET INTO KERB) INSTALLED AS DIRECTED BY COUNCIL AND IN ACCORDANCE WITH MANUFACTURERS REQUIREMENTS.
2. PIPE ACROSS FOOTPATH TO BE LAID WITH A MINIMUM GRADE OF 1 IN 100.
3. REFER PROJECT DRAWINGS/SPECIFICATIONS FOR ALTERNATIVE TO BE ADOPTED.
4. AT NEW DEVELOPMENTS, SEAL INLET TO ADAPTOR.
5. ALL DIMENSIONS IN METRES.
6. WHERE FOOTPATHS ARE TO BE CONCRETE AND COVER IS LESS THAN 50mm THEN GALV 0.125x0.75 ENCASED IN CONCRETE OR GALV ø100 STEEL PIPE IS TO BE USED.
7. ENCASE PIPE UNDER PATHS (NOMINALLY 100mm).
8. RHS GAL TO BE USED FOR INDUSTRIAL, HIGH DENSITY RESIDENTIAL AND COMMERCIAL.
9. UPVC TO BE USED FOR LOW DENSITY RESIDENTIAL ONLY.

Scales	Revisions		Verified	Date
NOT TO SCALE				
	A	Original Issue		

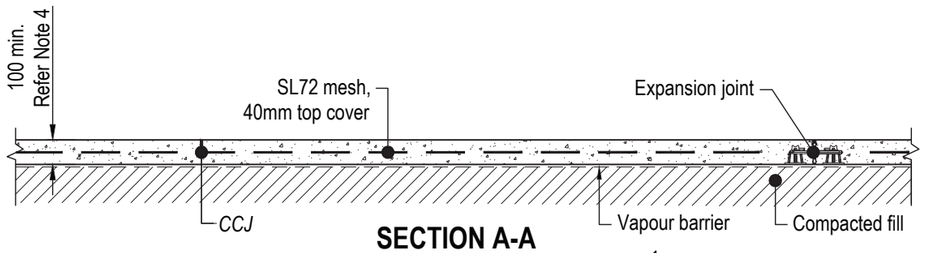
Quality Certification	
Design:	Verified:
Drawing: Tifa	Checked:
Approved by Engineer	
Date:	RPEQ:

BUNDABERG REGIONAL COUNCIL

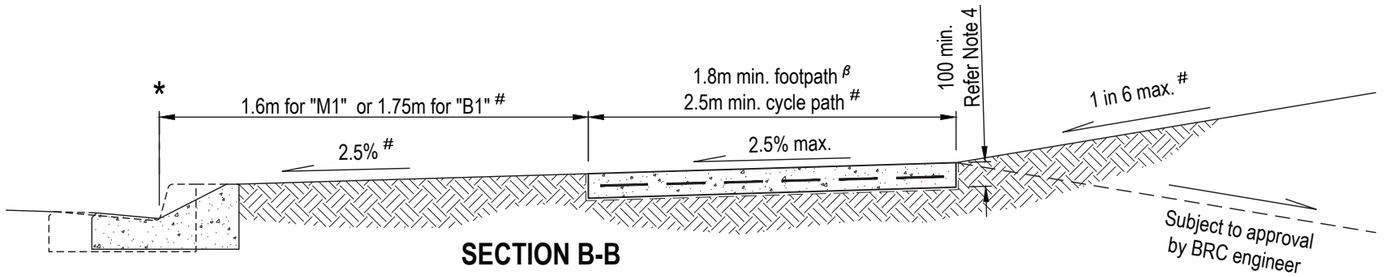
KERB AND CHANNEL
Kerb and Channel Drainage Connections

Standard Drawing No	Sheet Size	Rev
R1021	A3	

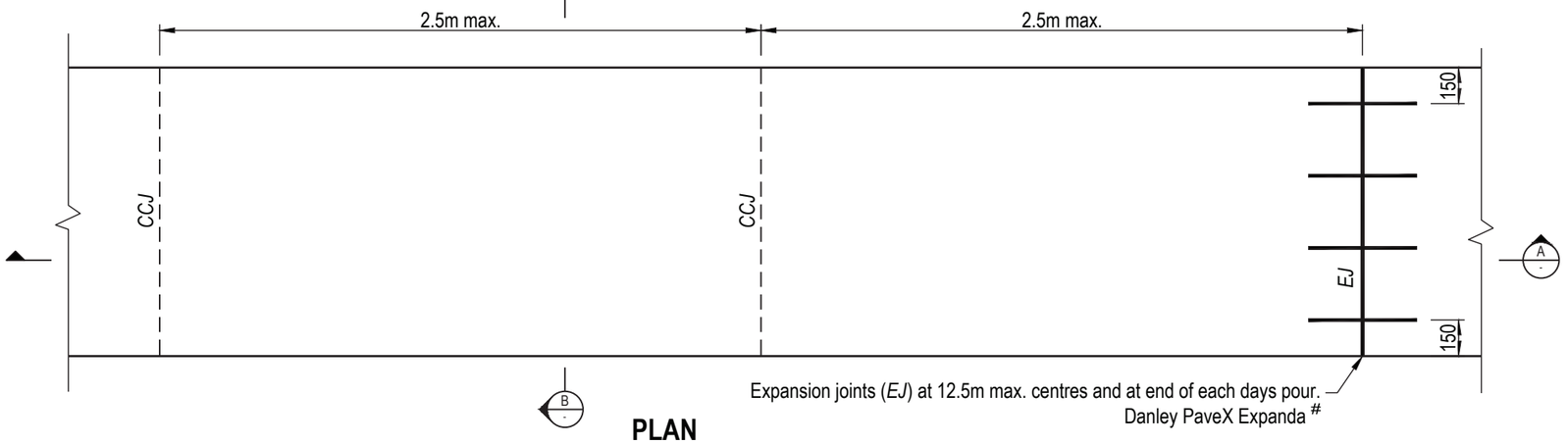
BRC(06/19)



SECTION A-A



SECTION B-B



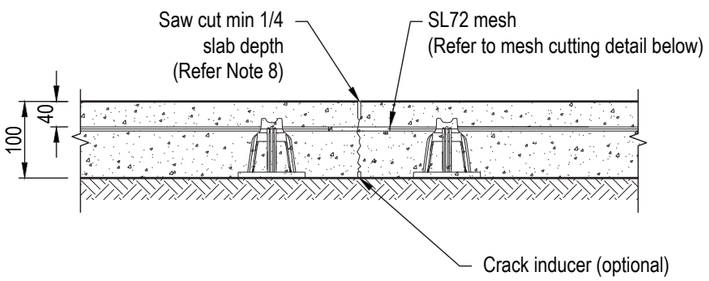
PLAN

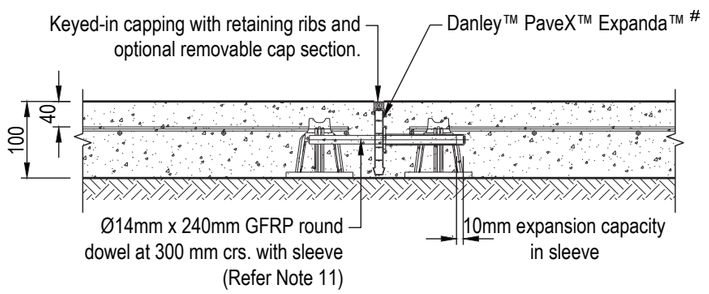
NOTES:

1. Concrete N32 min. in accordance with AS 1379 and AS 3600.
2. Crack control joints, 2.5m max. spacing.
3. All concrete surface to have a medium broom finish to comply with table D2.14 Slip Resistance Classification (as listed in the Building Code of Australia).
4. Concrete footpaths cross fall adjoining existing driveways are to be transitioned over longitudinal grades not to exceed 1 in 20 and to comply with requirements of AS 1428-1. Thickness to be increased to 125mm with top cover maintained at vehicular crossovers.
5. After construction topsoil to be placed adjacent to footpath to finish flush with concrete path.
6. The area excavated for the footpath must be neatly trimmed. The provision of bedding must be designed by an RPEQ where the bearing capacity of the existing ground condition is less than 50kPa (firm clay).
7. Coloured concrete (Heritage Red) to be used in Childers area only, as directed by BRC engineer.
8. Saw cuts to be undertaken within 15 to 24hrs of concrete pour.
9. Cross fall may vary in accordance with AS 1428, otherwise subject to BRC engineer approval.
10. Provide additional joint treatment at utilities and structures causing restraint i.e. telecommunications pits as directed by engineer.
11. For joints requiring dowels, ensure dowels align perpendicularly to the joint surface and reinforcing mesh is not resting/ supported on the dowels.
12. All dimensions are in millimetres unless noted otherwise.

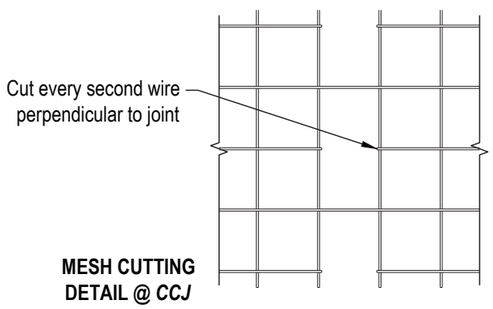
LEGEND

EJ	Expansion Joint
CCJ	Crack Control Joint
*	Nominal kerb line (refer BRC standard drawing R1020)
β	A 1.5m pathway may be considered on merit subject to approval by BRC engineer
#	Unless otherwise approved by BRC engineer

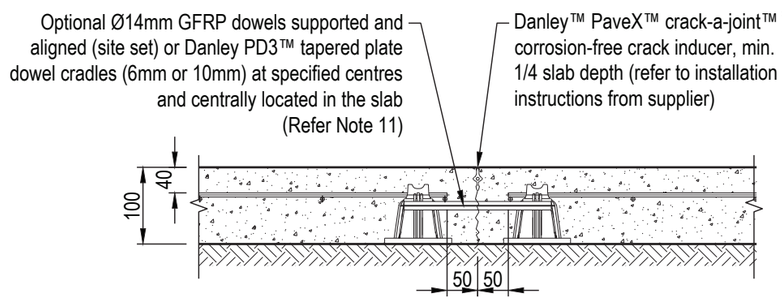




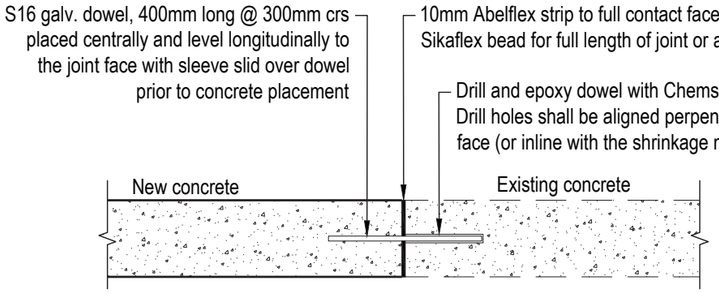
EXPANSION JOINT (*EJ*) DETAIL



MESH CUTTING DETAIL @ *CCJ*



CRACK CONTROL JOINT (*CCJ*) DETAIL (ALTERNATIVE)



JOIN NEW TO EXISTING CONCRETE DETAIL

NOT TO SCALE

CRACK CONTROL JOINT (*CCJ*) DETAIL (PREFERRED)

	Revisions	Verified	Date
E	Major Update	AJ	05/22
D	MESH, FILL SPECIFICATION AND XFALL NOTE UPDATED	RMC	24/10/18
C	SLOPES CHANGED	CNP	09/16
B	CRACK CONTROL JOINTS ADDED	RMC	26/08/15
A	Original Issue		

Engineering Certification
Design: Verified:
Drawn: TS Checked: AJ
Digitally signed by Adam Johnston
Date: 2022.05.15 12:37:08 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Suzanne Brown
Date: 2022.06.01 16:08:34 +10'00'

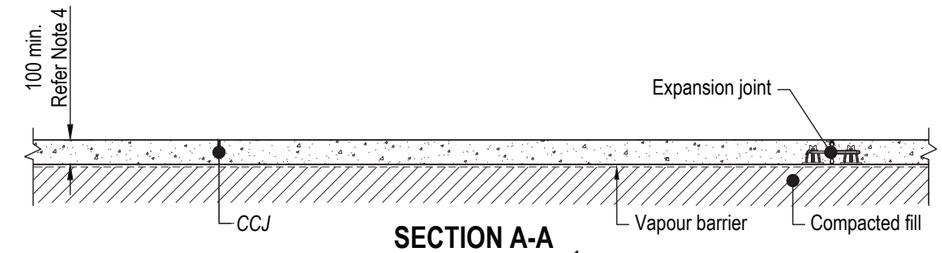
BUNDABERG REGIONAL COUNCIL

FOOTPATHS AND CYCLE PATHS
CONCRETE STRIP FOOTPATH - MESH REINFORCEMENT

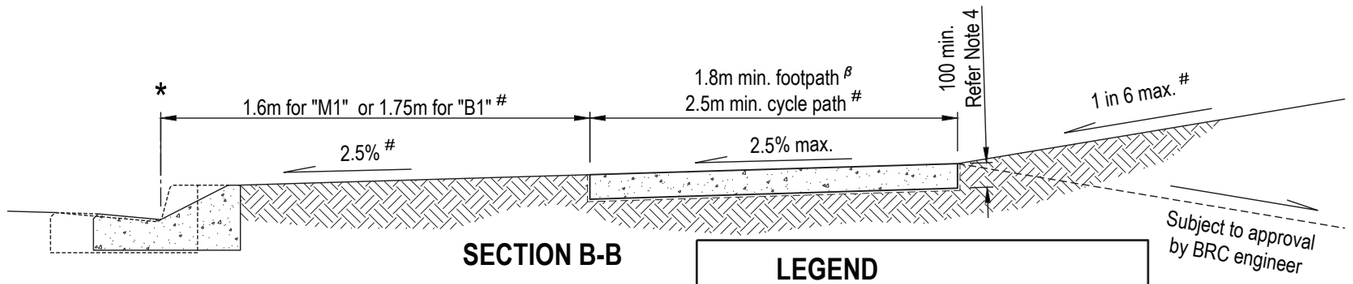
Standard Drawing No.: **R1030**
Sheet Size: **A3**
Rev.: **E**

R:\support services\Design\standards & manuals\standard drawings\brc standard drawings\Roads\R1030 - Rev E | 13/05/2022 10:38:13 AM

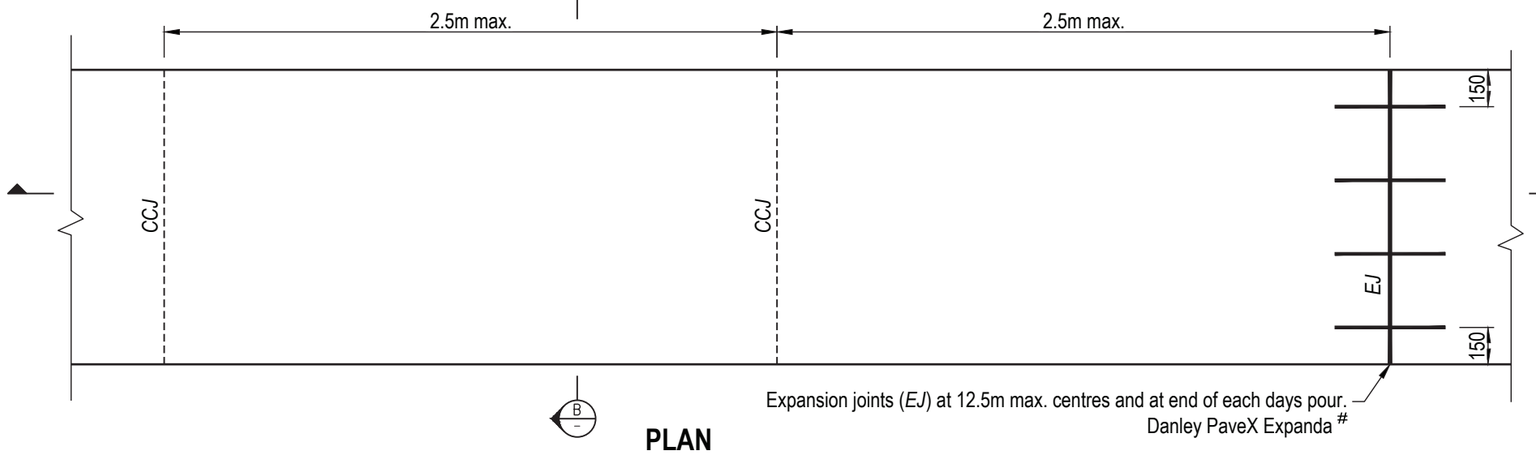
BRC(06/19)



SECTION A-A



SECTION B-B



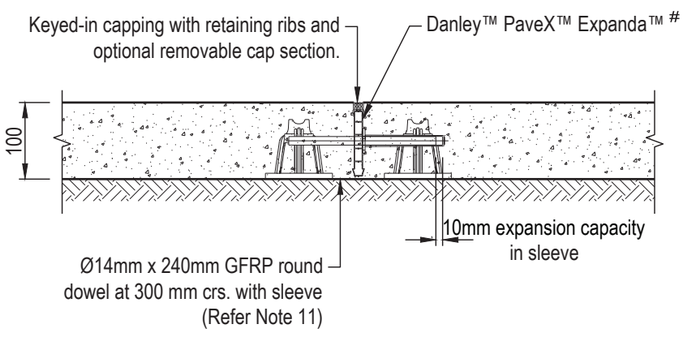
PLAN

LEGEND

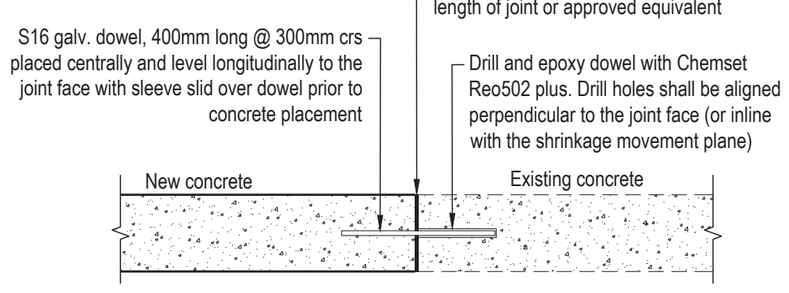
EJ	Expansion Joint
CCJ	Crack Control Joint
*	Nominal kerb line (refer BRC standard drawing R1020)
β	A 1.5m pathway may be considered on merit subject to approval by BRC engineer
#	Unless otherwise approved by BRC engineer

NOTES:

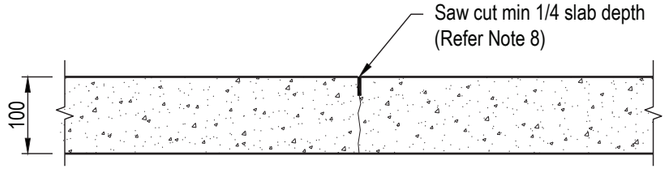
1. Concrete N32 in accordance with AS1379 and AS3600. NOVOMESH 950 reinforcement at a rate of 4.54kg/m^3 (2 bags) or similar with approval from BRC engineer.
2. Crack control joints, 2.5m max. spacing.
3. All concrete surface to have a medium broom finish to comply with table D2.14 Slip Resistance Classification (as listed in the Building Code of Australia).
4. Concrete footpaths cross fall adjoining existing driveways are to be transitioned over longitudinal grades not to exceed 1 in 20 and to comply with requirements of AS 1428-1. Thickness to be increased to 125mm at vehicular crossovers.
5. After construction topsoil to be placed adjacent to footpath to finish flush with concrete path.
6. The area excavated for the footpath must be neatly trimmed. The provision of bedding must be designed by an RPEQ where the bearing capacity of the existing ground condition is less than 50kPa (firm clay).
7. Coloured concrete (Heritage Red) to be used in Childers area only, as directed by BRC engineer.
8. Saw cuts to be undertaken within 15 to 24hrs of concrete pour.
9. Cross fall may vary in accordance with AS1428, otherwise subject to BRC engineer approval.
10. Provide additional joint treatment at utilities and structures causing restraint i.e. telecommunications pits as directed by engineer.
11. For joints requiring dowels, ensure dowels align perpendicularly to the joint surface.
12. All dimensions are in millimetres unless noted otherwise.



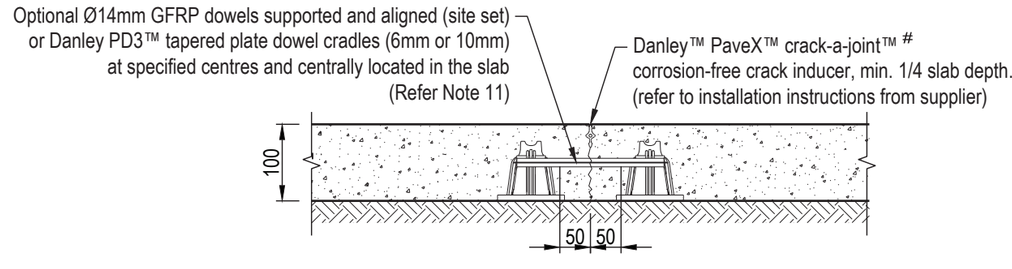
EXPANSION JOINT (*EJ*) DETAIL



JOIN NEW TO EXISTING CONCRETE DETAIL



CRACK CONTROL JOINT (*CCJ*) DETAIL



CRACK CONTROL JOINT (*CCJ*) DETAIL (ALTERNATIVE)

NOT TO SCALE

	Revisions	Verified	Date
B	Major Update	AJ	05/22
A	Original Issue		

Engineering Certification
Design: Verified:
Drawn: JCR Checked: AJ
Digitally signed by Adam Johnston
Date: 2022.05.15 12:37:46 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Suzanne Brown
Date: 2022.06.01 16:12:41 +10'00'

BUNDABERG REGIONAL COUNCIL

FOOTPATHS AND CYCLE PATHS
CONCRETE STRIP FOOTPATH - FIBRE REINFORCED

Standard Drawing No.: R1033

Sheet Size: A3

Rev.: B

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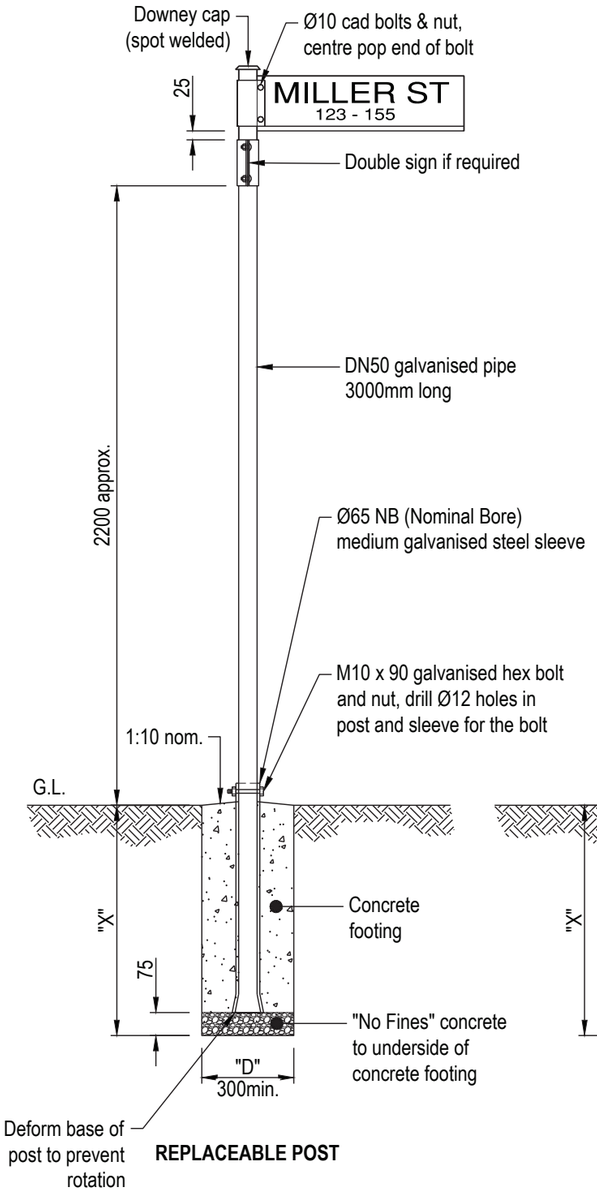
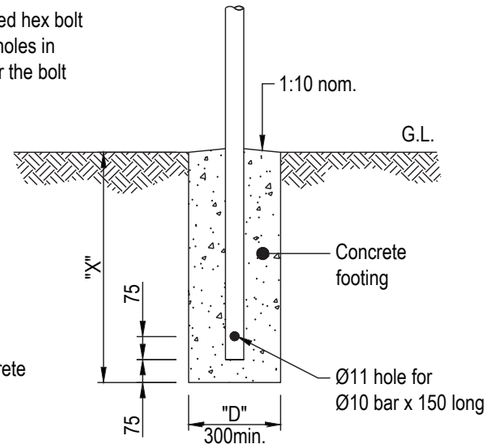
BRC(06/19)



REPLACEABLE POST



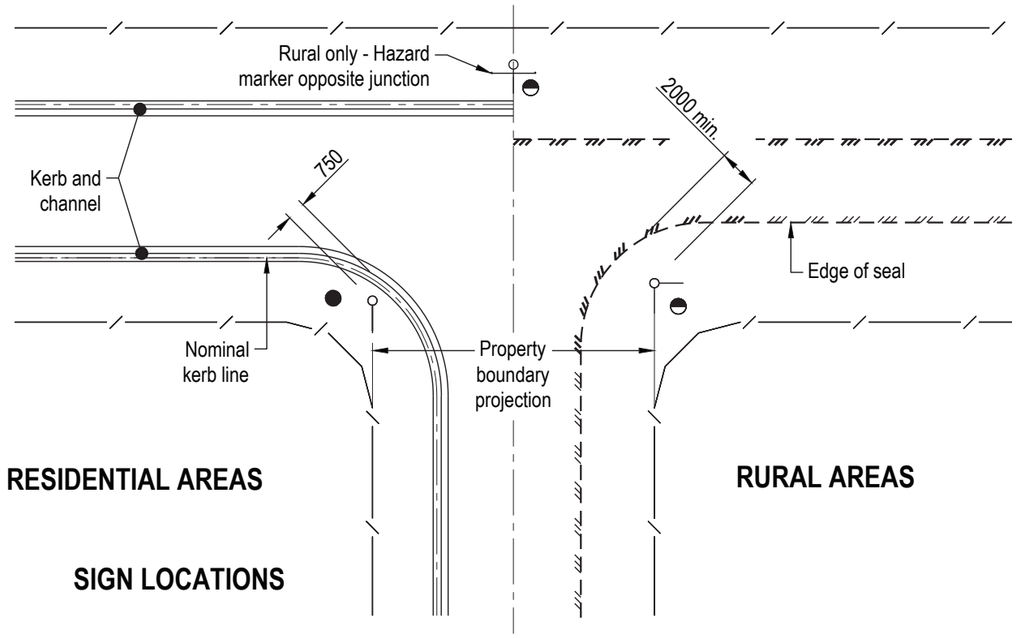
FIXED POST

LEGEND

- Sign to be located 750mm behind nominal kerb line.
- Sign post is to be located 2000 min. to 4000 max. from edge of seal.
- Sign post.

TABLE OF ABBREVIATIONS*	
Avenue	Av
Boulevard	Bvd
Circuit	Cct
Close	Cl
Court	Ct
Crescent	Cr
Drive	Dr
Esplanade	Esp
Lane	L
Parade	Pde
Road	Rd
Street	St
Terrace	Tce

* Refer AS 4819 for all Abbreviations

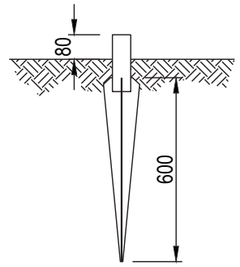


RESIDENTIAL AREAS

RURAL AREAS

SIGN LOCATIONS

POST SPECIFICATION				CONCRETE FOOTINGS					
	POST DIMENSIONS (mm)	WALL THICKNESS (mm)	GRADE	COHESIVE CLAY SOILS		COHESIONLESS SAND SOILS			
						LOOSE TO MEDIUM		DENSE	
				"D"(mm)	"X"(mm)	"D"(mm)	"X"(mm)	"D"(mm)	"X"(mm)
CHS	50NB	2.9	C350	300	600	400	750	300	750



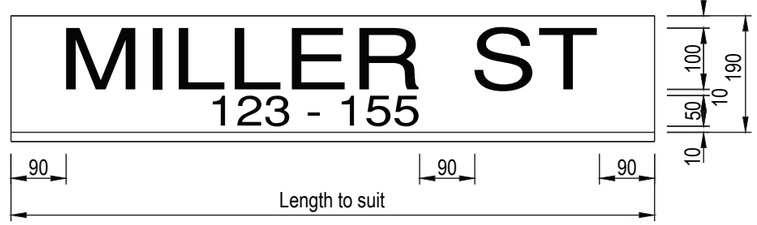
SPIKE

(Where approved by
Council engineer)

NOTES:

1. Street names must be approved by Council.
2. Name plates: anti-vandal section, 200mm wide and 3mm thick extruded aluminium or polypropylene section.
3. Bracket: standard 200mm wide and 3mm thick extruded aluminium (including 2 x Ø6 cad bolts and nuts). Cad bolts and nuts to AS1897.
4. Letters and numbers: all lettering to be Black Legend, reflective Class 2. Background to be white reflective Class 1. Letters to be 100mm high, Series B, medium spacing. Numbers to be 50mm high, Series C, narrow spacing. All text to AS1744.
5. Posts supplied and installed by developer.
6. Signs to be positioned on the side of street/road that provides best visibility.
7. Concrete N20 in accordance with AS1379 and AS3600.
8. All dimensions are in millimetres unless noted otherwise.

CONCRETE FOOTING



SIGN DETAILS

NOT TO SCALE

	Revisions	Verified	Date
B	Updated Title Block, Text Styles and Abbreviations	AJ	05/22
A	Original Issue		

Engineering Certification
Design: Verified:
Drawn: TS Checked: AJ
Digitally signed by Adam Johnston
Date: 2022.05.15 12:38:30 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Suzanne Brown
Date: 2022.06.01 16:14:50 +10'00'

BUNDABERG REGIONAL COUNCIL

SIGNAGE
STREET NAME SIGN AND POST

Standard Drawing No.: R1040

Sheet Size: A3

Rev.: B

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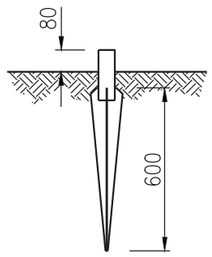
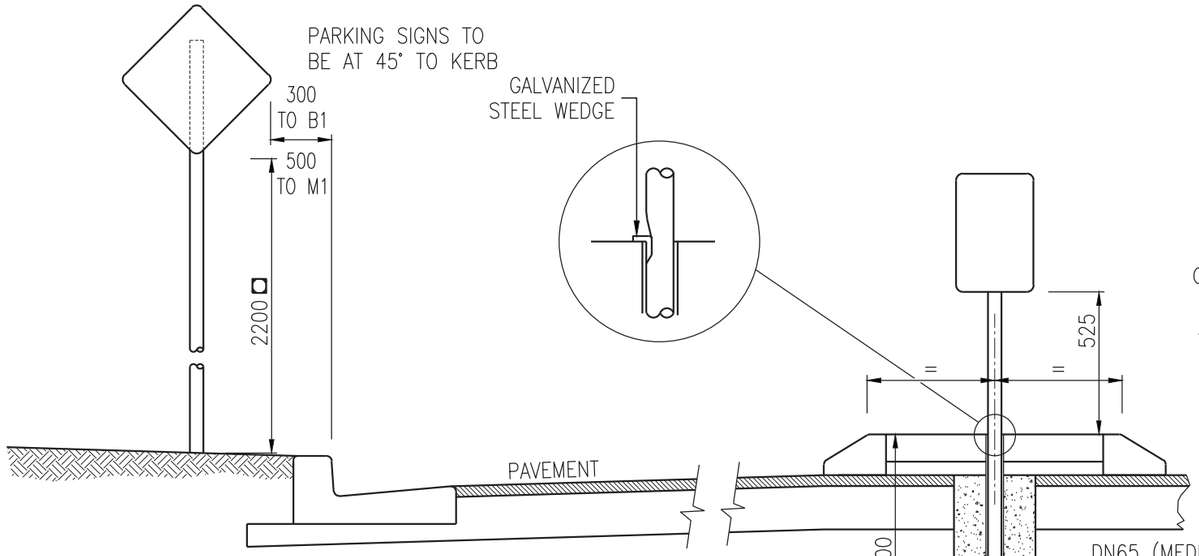
BRC(03/09)

LEGEND

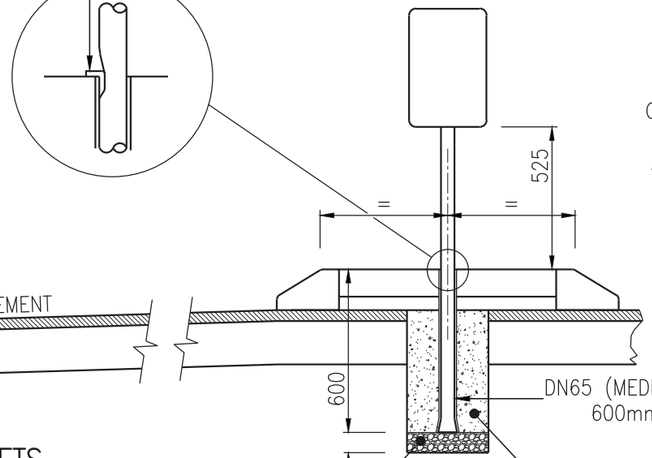
- # ON FOOTPATHS
- * ON MEDIANS
- ◓ AS DIRECTED BY COUNCIL ENGINEER
- □ MOUNTING HEIGHTS SHALL COMPLY WITH THE MUTCD 1.12.3



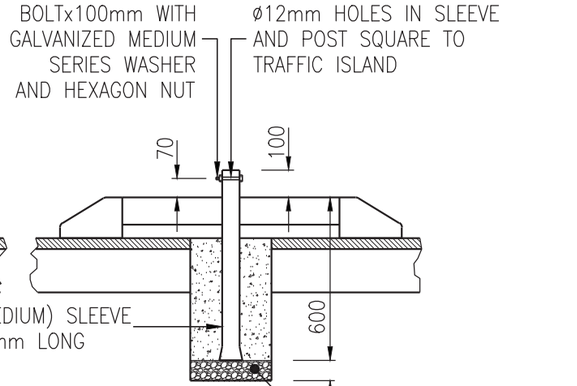
RURAL ROADS SPIKE ALTERNATIVE ◓



SIGN LOCATION ON RESIDENTIAL STREETS

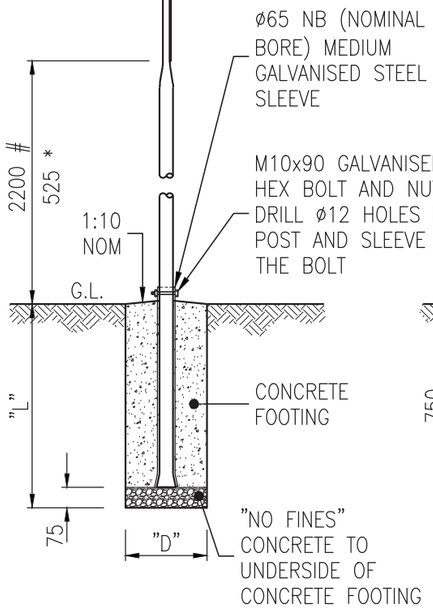


TYPE 1 SIGN FIXING

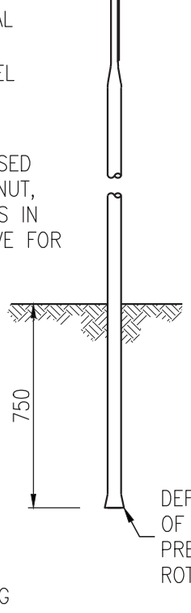


TYPE 2 SIGN FIXING

SIGN SIZE	FOOTINGS							
	COHESIVE CLAY SOILS				COHESIONLESS SAND SOILS			
	FIRM TO STIFF		VERY STIFF		LOOSE TO MEDIUM		DENSE	
	"D"(mm)	"L"(mm)	"D"(mm)	"L"(mm)	"D"(mm)	"L"(mm)	"D"(mm)	"L"(mm)
A SERIES	300	450	300	450	300	750	300	750
B SERIES	300	700	300	500	300	1000	300	800
C SERIES	300	900	300	600	300	1100	300	900

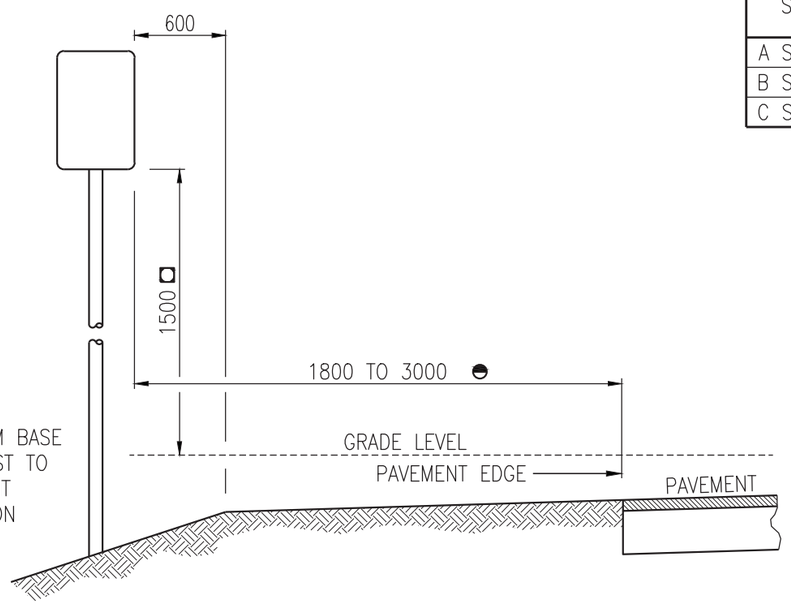


STREETS



RURAL ROADS

SIGN POST FOOTING



SIGN LOCATION ON RURAL ROADS

NOTES:

1. ALL SIGNS TO BE REFLECTORISED CLASS 1 TO AS1743 UNLESS NOTED OTHERWISE.
2. SIZE AND SIGN TYPE AS PER PROJECT DRAWINGS. SPECIAL STANDARDS ARE TO BE PROVIDED AT LARGE SIGNS WHEN INDICATED IN PROJECT DRAWINGS.
3. WHERE SIGNS ARE TO BE ERECTED IN STREETS WHERE FOOTPATHS ARE NOT CONSTRUCTED TO PERMANENT LEVELS LEVELS THE RURAL ROAD TYPE SHALL BE ADOPTED.
4. SIGNS SHALL BE OUT OF ALUMINIUM OR ALUMINIUM ALLOY NOT LESS THAN 2mm THICK TO AS2848.
5. THE DN65 SLEEVE AND SPIKE SHALL ONLY BE USED ON MEDIANS.
6. ALL PIPES TO BE GALVANIZED. STEEL PIPE TO AS1074. GALVANIZING TO AS1650.
7. CONCRETE N20 IN ACCORDANCE WITH AS1379 AND AS3600.
8. HEXAGONAL HEAD BOLTS TO AS1111, NUTS TO AS1112, WASHERS TO AS1237, GALVANIZING TO AS1214.
9. THE FINISHED PLATE SHALL COMPLY IN ALL RESPECTS TO THE REQUIREMENTS OF THE QUEENSLAND MAIN ROADS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES LATEST REVISION.

Scales	Revisions		Verified	Date
NOT TO SCALE				
	A	Original Issue		

Quality Certification	
Design:	Verified:
Drawing: Tifa	Checked:
Approved by Engineer	
Date:	RPEQ:

BUNDABERG REGIONAL COUNCIL

SIGNAGE
Sign - Footings and Locations

Standard Drawing No	Sheet Size	Rev
R1041	A3	

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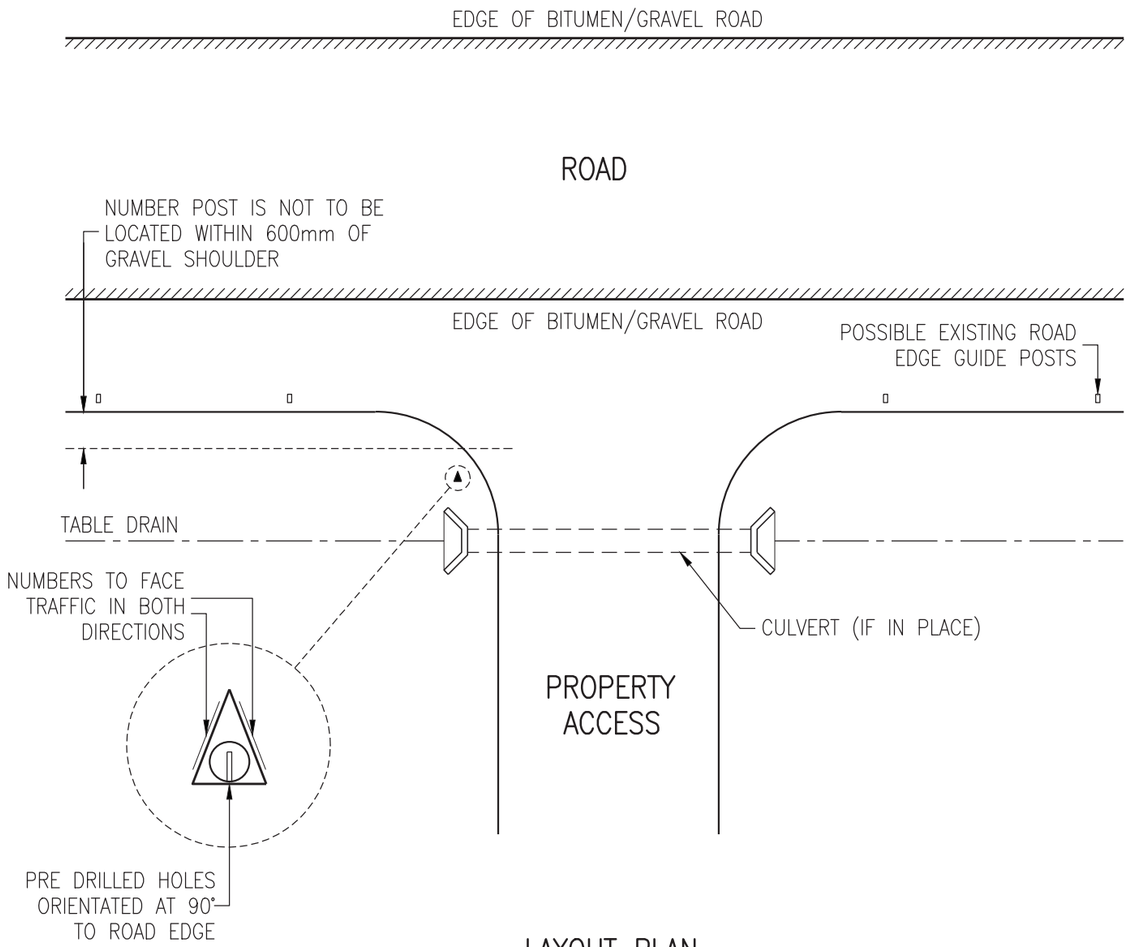

LAYOUT PLAN

LOCATION

1. THE NUMBER POST SHALL BE PLACED AT THE PROPERTY ACCESS POINT.
2. IF POSSIBLE, NUMBER POSTS SHOULD BE PLACED BETWEEN 1 AND 2 METRES OUTSIDE THE EDGE OF THE ROAD SHOULDER OR LINE OF GUIDE POSTS.
3. NUMBER POSTS SHOULD BE PLACED AT LEAST 1 METRE ABOVE GROUND FOR MAXIMUM VISIBILITY.
4. CONSIDERATION SHOULD BE GIVEN TO POSITIONING OF THE POST SO IT DOES NOT INTERFERE WITH SLASHER MOWING, MAINTENANCE OF DRAINS AND CULVERTS AND VEHICLES USING THE ACCESS.
5. ALIGN THE NUMBER SO IT IS CLEARLY VISIBLE FOR TRAFFIC TRAVELLING ALONG THE ROAD.
6. POSTS ARE COMMONLY PLACED ADJACENT TO THE PROPERTY'S LETTER BOX.

INSTALLATION

1. THE RURAL ADDRESS POST COMES AS A ROUND GALVANIZED POST, A PLASTIC NUMBER MODULE AND STICK ON NUMBERS.
2. TO INSTALL, DRIVE THE GALVANIZED POST INTO THE GROUND UNTIL IT IS FIRM. ENSURE THAT PRE DRILLED HOLE IN THE POST FACES THE PROPERTY AND IS SQUARE TO THE ROAD.

   *WARNING – CHECK WITH "DIAL BEFORE YOU DIG" (PHONE:1100/www.1100.com.au) BEFORE INSTALLING THE POST.
3. ONCE POST IS INSTALLED PLACE PLASTIC MODULE OVER THE POST AND FIX WITH THE SELF TAPPING SCREW PROVIDED.

BRC(03/09)

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Scales	Revisions		Verified	Date
NOT TO SCALE				
	A	Original Issue		

Quality Certification		
Design:		Verified:
Drawing:	Tifa	Checked:
Approved by Engineer		
Date:		RPEQ:

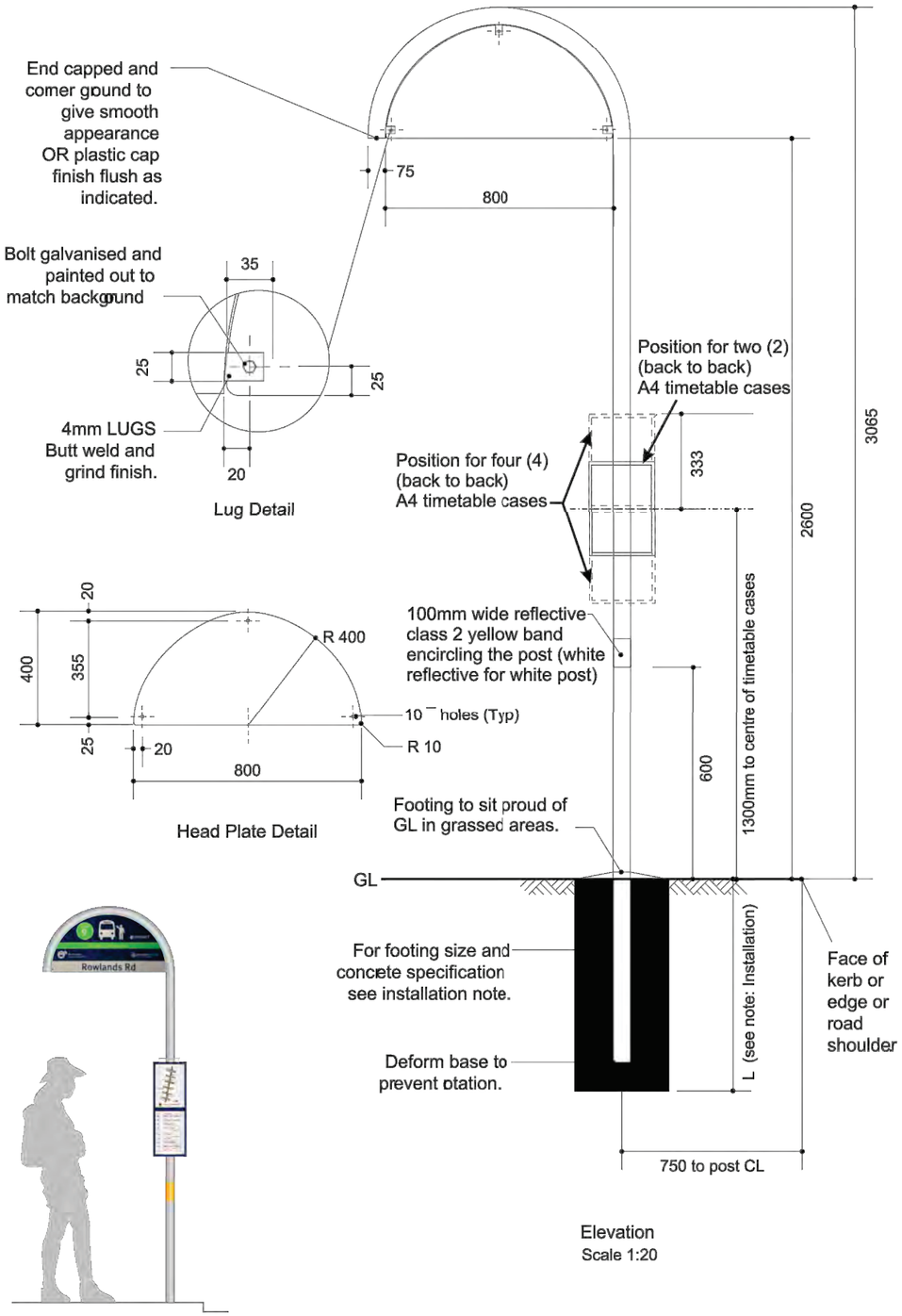
BUNDABERG REGIONAL COUNCIL

SIGNAGE
Location Plan of Rural Addressing Number Post

Standard Drawing No **R1042**

Sheet Size **A3**

Rev



Unless otherwise noted all dimensions in millimetres. Use figured dimensions in preference to scaling. Contractor to confirm all dimensions and details on site for all sign types prior to manufacture.

Note: Colours on this page may differ in appearance from those selected in artwork for final output.

Construction Specifications:

Post:
Materials: 65NB steel post, C350 grade, 3.2mm wall thickness, deformed base to prevent rotation. Spot weld 3 steel lugs to inside edge of curve to support head plate.
Finishes: Post hot dip galvanised and powder-coated in white (PMS White) or yellow (PMS 116). It should have a 100mm wide yellow engineers grade vinyl band to encircle the post 600mm from GL.

Posts may be painted when used in areas of high civic design standards or when used in situations with many other signs eg. at interchanges. Local councils may apply to paint post a suitable neutral colour to meet local design guidelines. Post colours must have a luminance contrast with the background of at least 30% to comply with the Disability Standards for Accessible Public Transport.

Sign Plate:
Materials: The head plate should be made from 1.6mm aluminium.
Finishes: The head plate should be double sided and made of reflective material to a Class 2 standard. All graphics to be screenprinted on reflective stock. An over coat of anti-graffiti (film or finish) is to be applied to seal sign.

Installation:
Footing size:
300mm Dia. with depth (L) according to strength of soil.

Firm Clay	Sand / Soft clay / Fill
700mm	900mm
Refer: Bus Stop Sign Post Details - Drawing 2005.192.1 (for other options)	
Selection of foundation type and strength category to be approved by engineer	

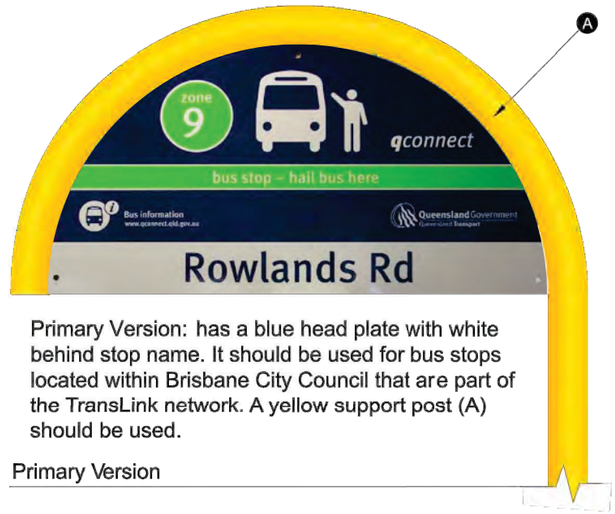
Concrete Specification: Concrete poured directly against auger hole unless approved otherwise. Mechanically vibrate full depth of concrete.

Concrete	Max. water/cement ratio	Min. cement content	Max. Aggregate	Slump
N25 to AS3600	0.55	250kg/m3	20mm	80mm

Paved surfaces are to be removed and replaced over footing and made good. In grassed locations footing is to sit proud of ground to prevent damage to post during mowing.

Location Plan:
The sign should be located at the down stream end of the bus stop and perpendicular to the traffic lane.
The post should be closest to the road and the sign away from the road.

On kerbed roads, signs should be located minimum 750mm back from the face of the kerb. Where mountable or semi mountable kerbs are used, the minimum clearance should be minimum 650mm from top of kerb. On unkerbed roads, signs should be minimum 750mm clear of the outer edge of the shoulder.



Primary Version: has a blue head plate with white behind stop name. It should be used for bus stops located within Brisbane City Council that are part of the TransLink network. A yellow support post (A) should be used.

Primary Version

Inverted Version: has a white head plate with white behind stop name. It should only be used to identify city express or inter-city stops located within Brisbane City Council that are part of the TransLink network.
A white support post (B) should be used.
A 3mm wide Green Line (C) should be inserted above the Stop Name in the inverted version of the sign.

Inverted Version

Scales: NOT TO SCALE

Revisions		Verified	Date
A	Original Issue		

Quality Certification
Design: Verified:
Drawing: Tifa Checked:
Approved by Engineer
Date: RPEQ:

BUNDABERG REGIONAL COUNCIL

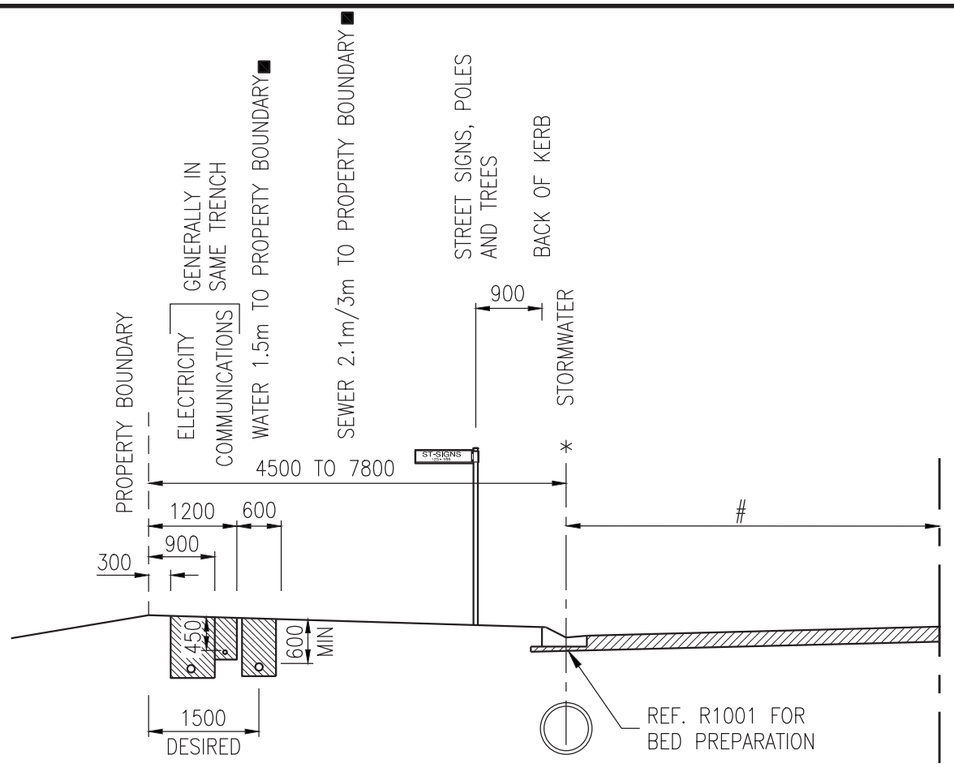
SIGNAGE
Bus Stop Sign Details

Standard Drawing No **R1043**

Sheet Size **A3**

Rev

BRC(03/09)



LEGEND

* NOMINAL KERB LINE.

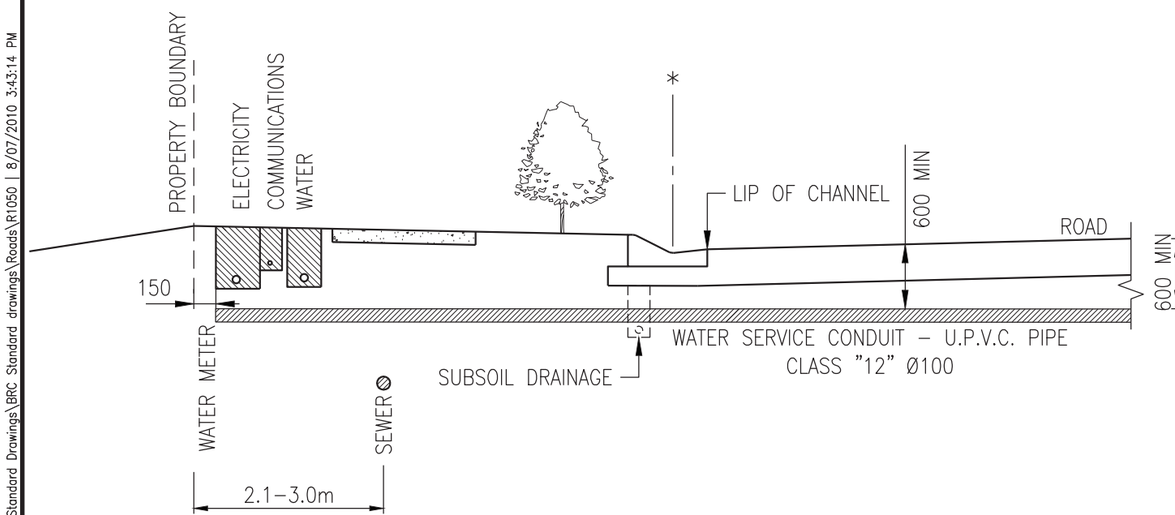
\# WIDTH AS APPROVED.

■ MAY VARY WITH APPROVAL FROM COUNCIL DEVELOPMENT ENGINEER.

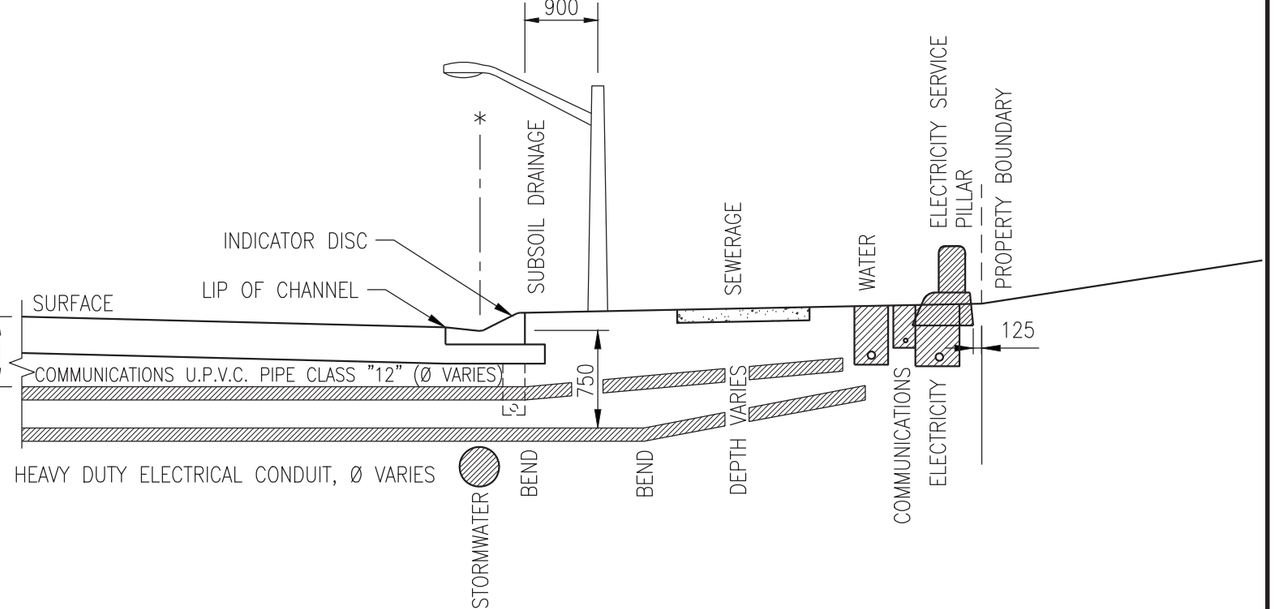
NOTES:

1. ELECTRICITY CONDUITS ADOPTED ARE TYPICALLY:
   Ø40 FOR STREET LIGHTING
   Ø80 FOR LV,
   Ø100, 11kv
   Ø100/125 FOR HV, 33kv
2. WATER CONDUIT TO BE ENCASED IN LEAN MIX CONCRETE IF LESS THAN 150mm COVER BELOW THE BOTTOM OF BOX.
3. BRASS INDICATOR DISCS TO BE PLACED IN KERB OVER ALL CONDUITS.
4. CONDUITS TO BE PLACED 150mm MIN BELOW PAVEMENT BOX.
5. DEPTHS SHOWN ARE MIN REQUIREMENTS BY COUNCIL.
6. CHECK WITH SERVICE PROVIDERS FOR RELEVANT STANDARD SPECS.
7. GAS CORRIDOR WILL BE BY SPECIAL APPROVAL BY COUNCIL.
8. OFFSET CONDUIT 500mm WHERE THERE IS A CLASH WITH LIGHT POLE FOUNDATIONS.

SERVICE CORRIDOR ON ROAD RESERVE



WATER OR GAS SERVICE CONDUIT SECTION



ELECTRICITY & COMMUNICATIONS SERVICE CONDUIT SECTION

Scales	Revisions	Verified	Date
NOT TO SCALE	A Original Issue		

Quality Certification
Design: Verified:
Drawing: Tifa Checked:
Approved by Engineer
Date: RPEQ:

BUNDABERG REGIONAL COUNCIL

PUBLIC UTILITIES
Typical Service Conduit Alignments

Standard Drawing No **R1050**

Sheet Size **A3**

Rev

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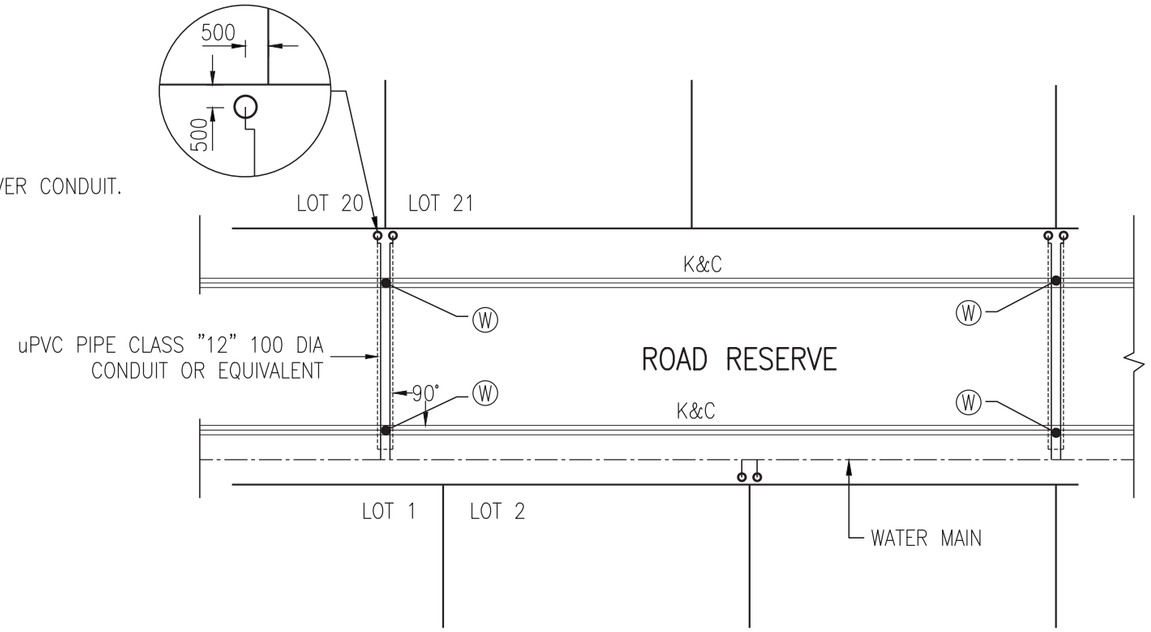
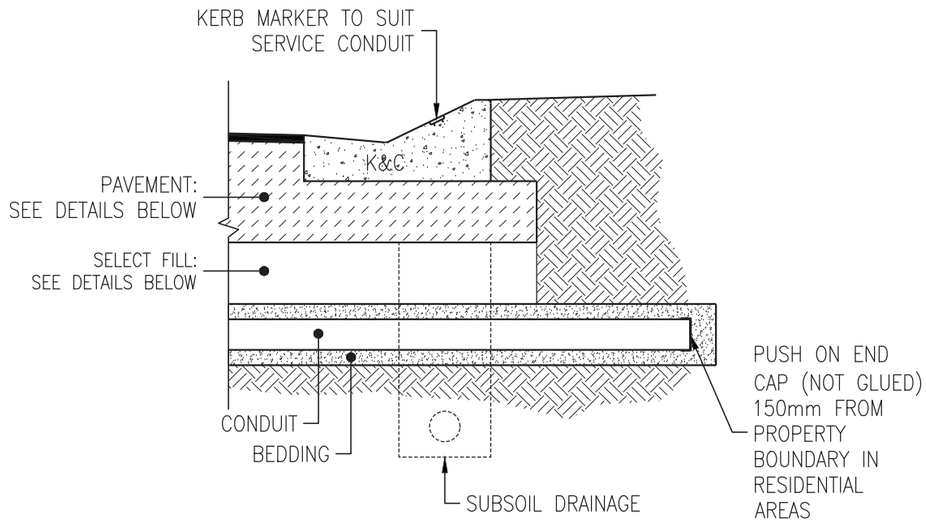
BRC(03/09)

LEGEND

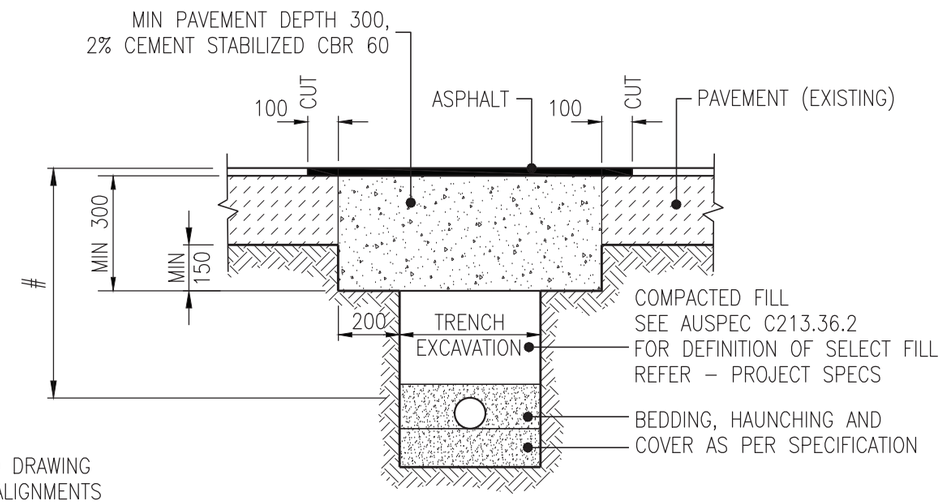
Ⓦ KERB MARKER OVER CONDUIT.



WATER SERVICE CONDUIT LOCATION PLAN



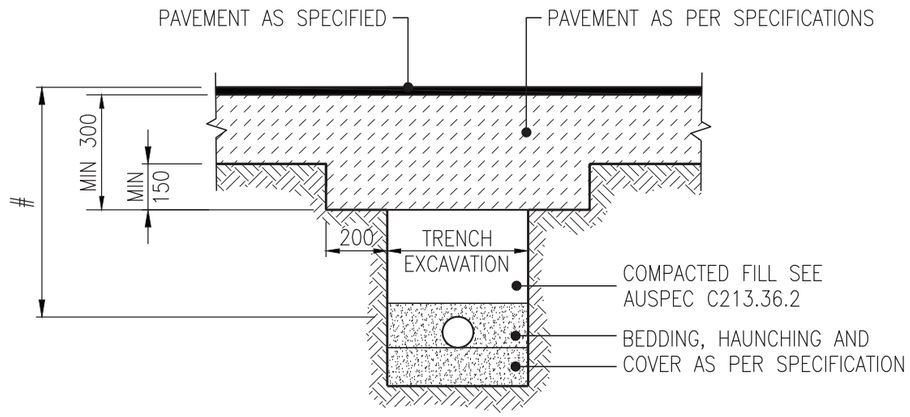
TYPICAL DETAIL AT KERB & CHANNEL



NOTES:

SEE BRC STANDARD DRAWING R1050 FOR SERVICE ALIGNMENTS AND INDICATIVE DEPTHS.

CONDUIT/SERVICE ROAD – CROSSING
TYPICAL DETAILS – EXISTING ROAD



CONDUIT/SERVICE ROAD – CROSSING
TYPICAL DETAILS – NEW ROAD

Scales	Revisions		Verified	Date
NOT TO SCALE				
	A	Original Issue		

Quality Certification	
Design:	Verified:
Drawing: Tifa	Checked:
Approved by Engineer	
Date:	RPEQ:

BUNDABERG REGIONAL COUNCIL

PUBLIC UTILITIES
Conduit/Service Road - Crossing Details

Standard Drawing No **R1051**

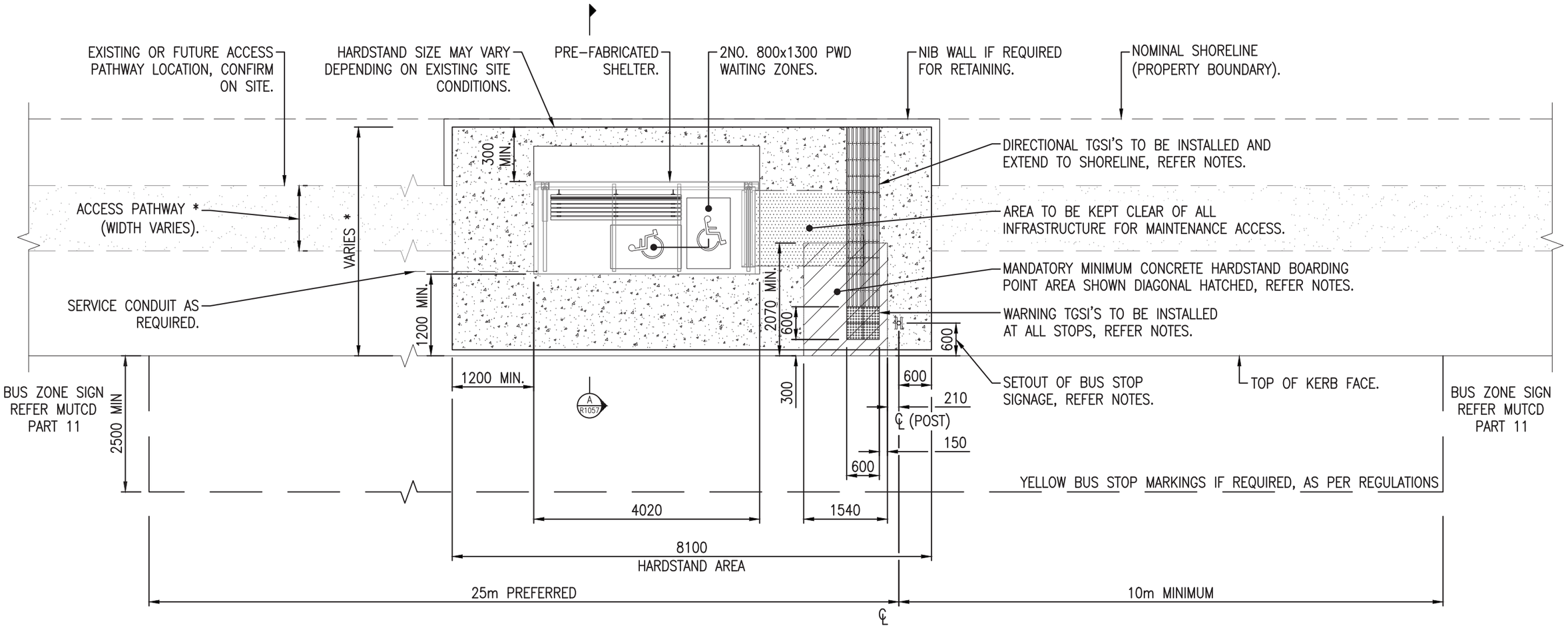
Sheet Size **A3**

Rev

BRC(06/19)

NOTE

* DIMENSION TO BE CONFIRMED ON SITE IN RELATION TO SITE CONDITIONS.



1 SITE LAYOUT PLAN

NOT TO SCALE

	Revisions	Verified	Date
#	#	#	#
#	#	#	#
#	#	#	#
A	Original Issue		

Engineering Certification
Design: RAW Verified: RAW
Drawn: LJM Checked: RAW
Ross Wegner

Approved
Branch Manager
Engineering Services
Digitally signed by Suzanne Brown
Date: 2022.06.01 16:19:10 +10'00'

BUNDABERG REGIONAL COUNCIL

Bus Shelter Hardstand
Sheet 1 of 2
#

Standard Drawing No.: **R1056**
Sheet Size: **A3**
Rev.: **A**

Z:\EMPIRE PROJECTS\CC-5457 CLOSED BRC (Prefabricated Bus Shelter, Various Locations, Bundaberg Region)\CIVIL\PLANS\CC-5457 BRC PLANS | 16/09/2020 10:53:19 AM

BRC(06/19)

NOTES

HARDSTAND

1. THE MANDATORY LONGITUDINAL AND CROSS FALL GRADIENT AT BOARDING POINT IS MAXIMUM 1:40 FALL ACROSS THE BOARDING POINT AREA (SHOWN HATCHED). ALL OTHER HARDSTAND AND ADJACENT AREAS TO THE BUS STOP SHALL MEET APPLICABLE STANDARDS IN RELATION TO THE ADJACENT SITE CONDITIONS, AND TO PREFERABLY ACHIEVE A LONGITUDINAL AND CROSS FALL GRADIENT OF MAXIMUM 1:40 FALL.
2. HARDSTANDS SHALL BE MINIMUM 125MM THICK BROOM FINISHED (FOR SLIP RESISTANCE) GRADE N25 CONCRETE SL82 MESH PLACED CENTRALLY.
3. A CLEAR HARDSTAND ACCESS SPACE OF 1200MM MINIMUM IS REQUIRED BETWEEN AND AROUND ALL BUS STOP INFRASTRUCTURE (1500MM DESIRABLE).
4. ALL CONCRETE WORK IS TO BE EXECUTED IN ACCORDANCE WITH THE CURRENT EDITION OF:
   - AS 3600 – CONCRETE STRUCTURES.
   - AS 1379 – SPECIFICATION AND SUPPLY OF CONCRETE.
5. CHARACTERISTIC COMPRESSIVE STRENGTH OF THE CONCRETE (F'C) MUST NOT BE LESS THAN N25 AT 28 DAYS U.N.O.
6. THE MAXIMUM SIZE OF AGGREGATE SHALL BE 20MM AND SLUMP SHALL BE 80MM ∓15.
7. ALL CONCRETE TO BE VIBRATED.
8. ALL SLABS TO BE LIGHT BROOM FINISHED.
9. SLAB TO FALL TO KERBSIDE EDGE OR AS INDICATED ON PLAN.
10. PLASTIC CHAIRS TO BE USED TO SUPPORT REINFORCEMENT AND GIVE THE CORRECT CONCRETE COVER.

ACCESS

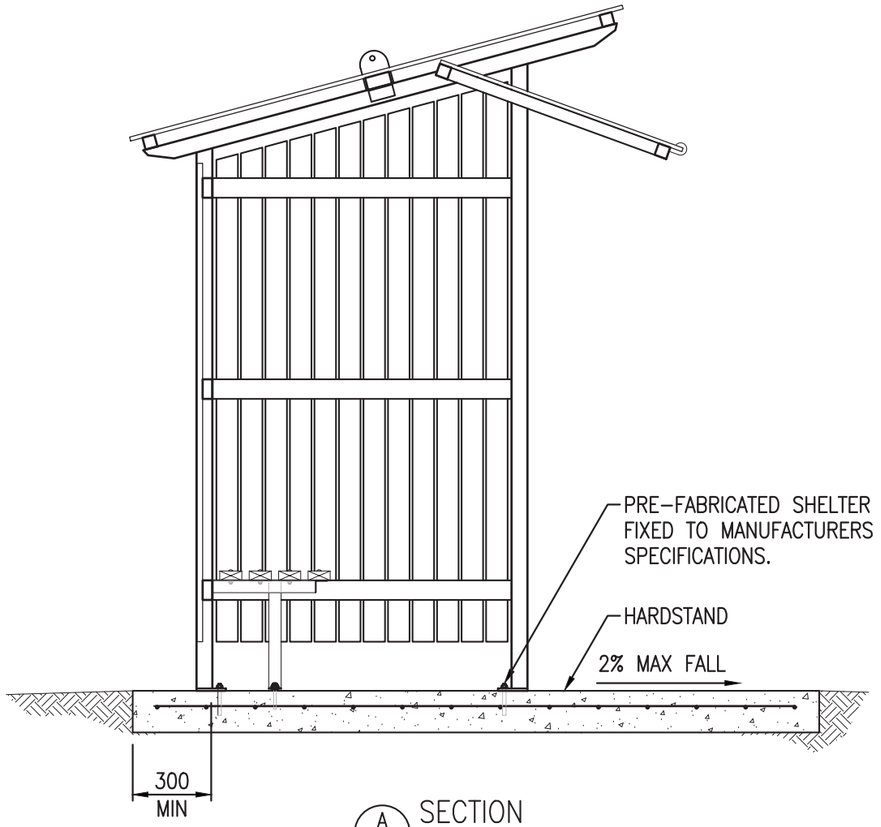
11. WHERE BUS STOPS ARE LOCATED ALONG BICYCLE ROUTES, SHARED ACCESS PATHS SHOULD BE APPLIED AS PER LOCAL GOVERNMENT REQUIREMENTS OR WITH REFERENCE TO RELEVANT GUIDELINE DIMENSIONS GIVEN IN THE APPLICABLE STANDARDS, TMR GUIDELINES, AND AUSTROADS.
12. CIRCULATION OF WHEELCHAIRS SHOULD BE CONSIDERED AT EACH BUS STOP BASED ON SITE SPECIFIC CONDITIONS AND TO ADDRESS COMPLIANCE WITH DISABLED STANDARDS FOR ACCESSIBLE PUBLIC TRANSPORT 2002 (DSAPT). LINE–MARKING OF THE 2NO. ALLOCATED SPACES (PWD WAITING ZONES) IS NOT REQUIRED.
13. TACTILE GROUND SURFACE INDICATORS (TGSI) SHOULD PREFERABLY BE INSTALLED AS SHOWN. WHERE THERE IS A PATHWAY ACCESSING A BUS STOP, DIRECTIONAL TGSI SHALL BE INSTALLED FOR THE FULL WIDTH OF THE PATH OF TRAVEL OVER A MINIMUM 600MM DEPTH AND PERPENDICULAR TO THE DIRECTION OF TRAVEL WHEN APPROACHING. DIRECTIONAL TGSI SHALL BE USED ACROSS THE OPEN SPACE FROM THE ACCESS PATHWAY DIRECTIONAL TGSI TO THE BOARDING POINT WARNING TGSI. TGSI TO EXTEND TO THE SHORELINE – I.E. BUILDING LINE, WALL, A FENCE, A KERB, OR A GRASS VERGE WHERE APPLICABLE.
14. THE COLOUR OF TGSI SHALL BE SELECTED BASED ON SITE SPECIFIC REQUIREMENTS. INTEGRATED TGSI SHALL HAVE A MINIMUM COLOUR CONTRAST OF 30% COMPARED TO THE AMOUNT OF LIGHT REFLECTED FROM THE SURFACE OF THE ADJACENT PATH OF TRAVEL. FOR EXAMPLE; FOR A LIGHT CONCRETE COLOURED PATH OF TRAVEL, DARK COLOURED (TO BE BLACK) TGSI. FOR A BLACK BITUMEN PATH OF TRAVEL LIGHT COLOURED (TO BE WHITE OR YELLOW) TGSI. THIS CONTRAST MUST BE MAINTAINED IN BOTH WET AND DRY CONDITIONS.

FURNITURE & SIGNAGE

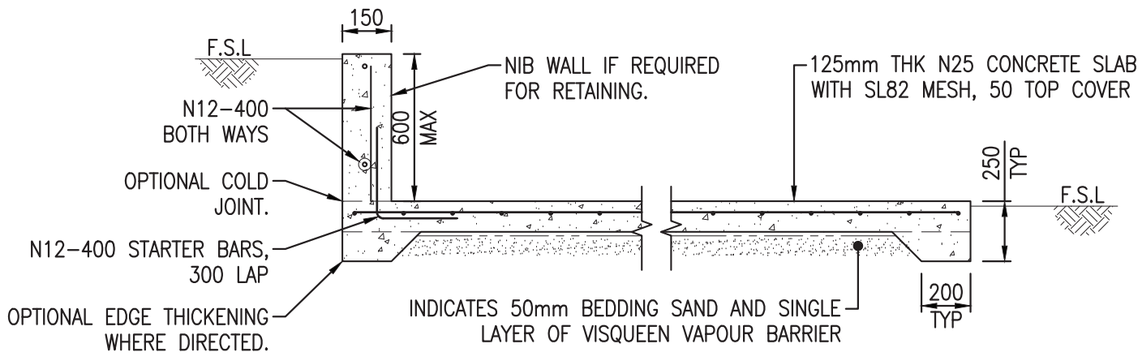
15. FOR DETAILS OF BUS STOP SIGNAGE (J–POLE/BLADE) AND FOOTING DETAILS REFER TO TRANSLINK SIGNAGE MANUAL.
16. SEATS SHOULD BE BOLTED TO HARDSTAND AREA, AND MADE FROM EASILY MAINTAINED MATERIALS. SEATS TO BE COMPLIANT WITH DSAPT. WHERE A SEAT ABUTS A CONTINUOUS ACCESSIBLE PATH OF TRAVEL, ENSURE MINIMUM 30% LUMINANCE CONTRAST AGAINST BACKGROUND (E.G. FLOORING).

ADDITIONAL REQUIREMENTS

17. ALL BUS STOPS TO BE DSAPT COMPLIANT. FOR FURTHER GUIDANCE REFER TO THE RELEVANT STANDARDS, TRANSLINK GUIDANCE AND RELEVANT LOCAL GOVERNMENT REQUIREMENTS.
18. ALL BUS STOP COMPONENTS SHOULD BE POSITIONED IN CONSIDERATION OF RELEVANT ONSITE CONDITIONS WITH REFERENCE TO THE GUIDANCE CONTAINED WITHIN THE PUBLIC TRANSPORT INFRASTRUCTURE MANUAL (PTIM), AND FOR ADDITIONAL REQUIREMENTS AND DESIGN ALTERNATIVES REFER TO THE COMPONENTS TABLE CONTAINED IN THE PTIM.
19. REFER TO PTIM GLOSSARY FOR DEFINITIONS OF TERMS AND PTIM ABBREVIATIONS FOR DEFINITIONS OF ACRONYMS.
20. ALL DRAWING DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.



A R1056 SECTION
Scale 1:25



BUS STOP HARDSTAND WITH NIB WALL
Scale 1:25

NOT TO SCALE

	Revisions	Verified	Date
#	#	#	#
#	#	#	#
#	#	#	#
A	Original Issue		

Engineering Certification
Design: RAW Verified: RAW
Drawn: LJM Checked: RAW
Ross Wegner

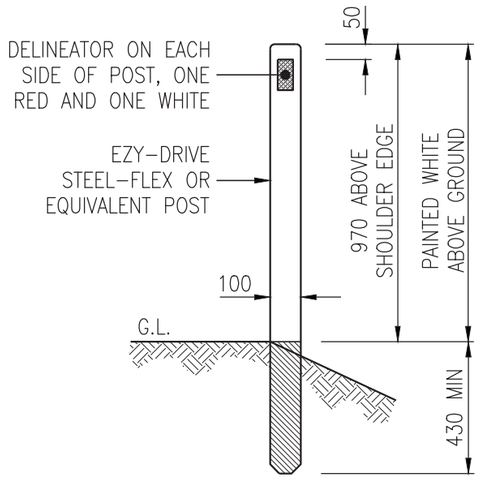
Approved
Branch Manager
Engineering Services
Digitally signed by Suzanne Brown
Date: 2022.06.01 16:27:17 +10'00'

BUNDABERG REGIONAL COUNCIL

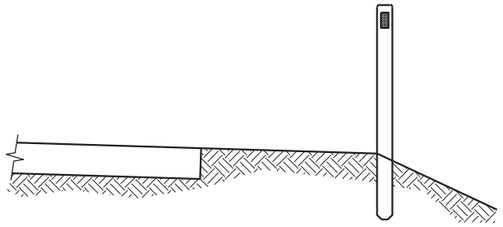
Bus Shelter Hardstand
Sheet 2 of 2
#

Standard Drawing
No.: **R1057**
Sheet Size: **A3**
Rev.: **A**

Z:\EMPIRE PROJECTS\CC-5457 CLOSED BRC (Prefabricated Bus Shelter, Various Locations, Bundaberg Region)\CIVIL\PLANS\CC-5457 BRC PLANS | 16/09/2020 10:53:20 AM



STEEL-FLEX GUIDE POST



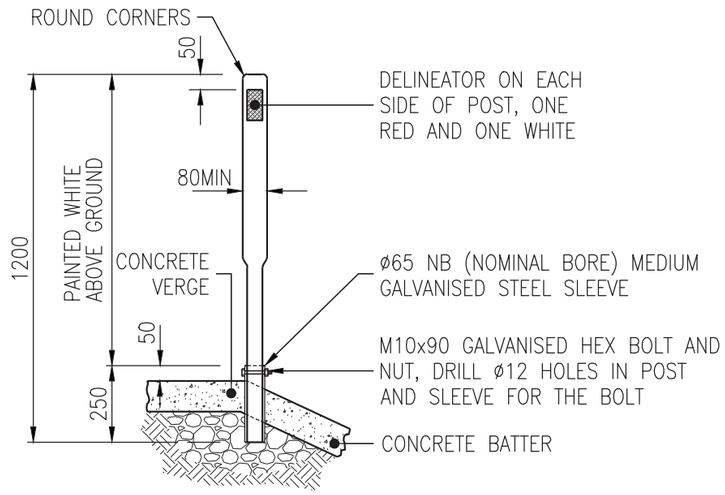
ROADWAY GENERALLY:

1. INSIDE FACE OF POST TO BE SET IN LINE WITH THE SHOULDER EDGE.
2. THE DISTANCE FROM THE PAVEMENT EDGE SHOULD BE UNIFORM.
3. POSTS SHOULD BE SET SO THAT THEIR TOPS ARE ON A SMOOTH GRADE.

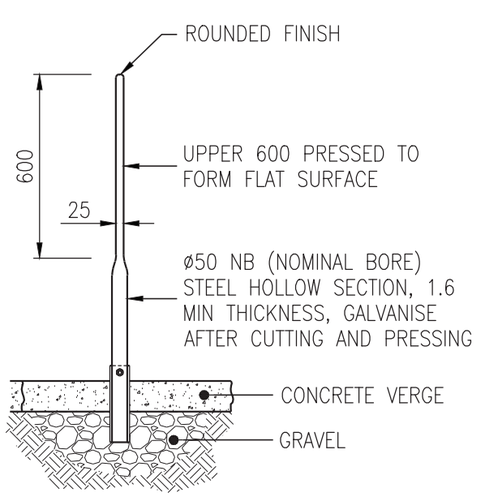
INSTALLATION DETAILS

NOTES:

1. GUIDE POSTS OTHER THAN THOSE SHOWN TO BE APPROVED BY COUNCIL ENGINEER BEFORE USE. GUIDE POSTS TO BE INSTALLED TO MANUFACTURERS SPECIFICATIONS.
2. DELINEATORS SHALL BE THE FOLLOWING REFLECTORISED PANELS WITH THE LONGER AXIS VERTICAL IN EACH CASE. RED DELINEATORS (100x50mm) SHALL BE ON THE LEFT HAND SIDE AND WHITE DELINEATORS (100x25mm) ON THE RIGHT HAND SIDE AS SEEN BY APPROACHING DRIVERS. COMPLYING WITH CLASS 1A MATERIAL AS/NZS1906.1.
3. POST SPACING: WHERE THE LOCATION OF ROAD EDGE GUIDE POSTS IS NOT SPECIFIED IN THE PROJECT DRAWINGS, THEN THE SPACING SHALL BE IN ACCORDANCE WITH MUTCD3.2.4.4.
4. ALL DIMENSIONS IN MILLIMETRES UNLESS OFTHER WISE SHOWN.



FRONT VIEW
CONCRETE VERGE/BATTER



SIDE VIEW
CONCRETE VERGE/BATTER

* REFER GENERAL MUTCD NOTES (F)

CURVE RADIUS (m)	SPACING (m)	
	OUTSIDE OF CURVE	INSIDE OF CURVE
< 100	6	12
100–199	10	20
200–299	15	30
300–399	20	40
400–599	30	60
600–799	40	60
800–1199	60	60
1200–2000	90 *	90 *
2000–UP TO STRAIGHTS	150 *	150 *

TABLE (1) GUIDE POST SPACING ON CURVES

POSTS ON INSIDE OF CURVE ARE TO BE LOCATED OPPOSITE A POST ON THE OUTSIDE OF THE CURVE WHERE POSSIBLE.

TUBULAR STEEL GUIDE POST

Scales	Revisions	Verified	Date
NOT TO SCALE	A Original Issue		

Quality Certification
Design: Verified:
Drawing: Tifa Checked:
Approved by Engineer
Date: RPEQ:

BUNDABERG REGIONAL COUNCIL

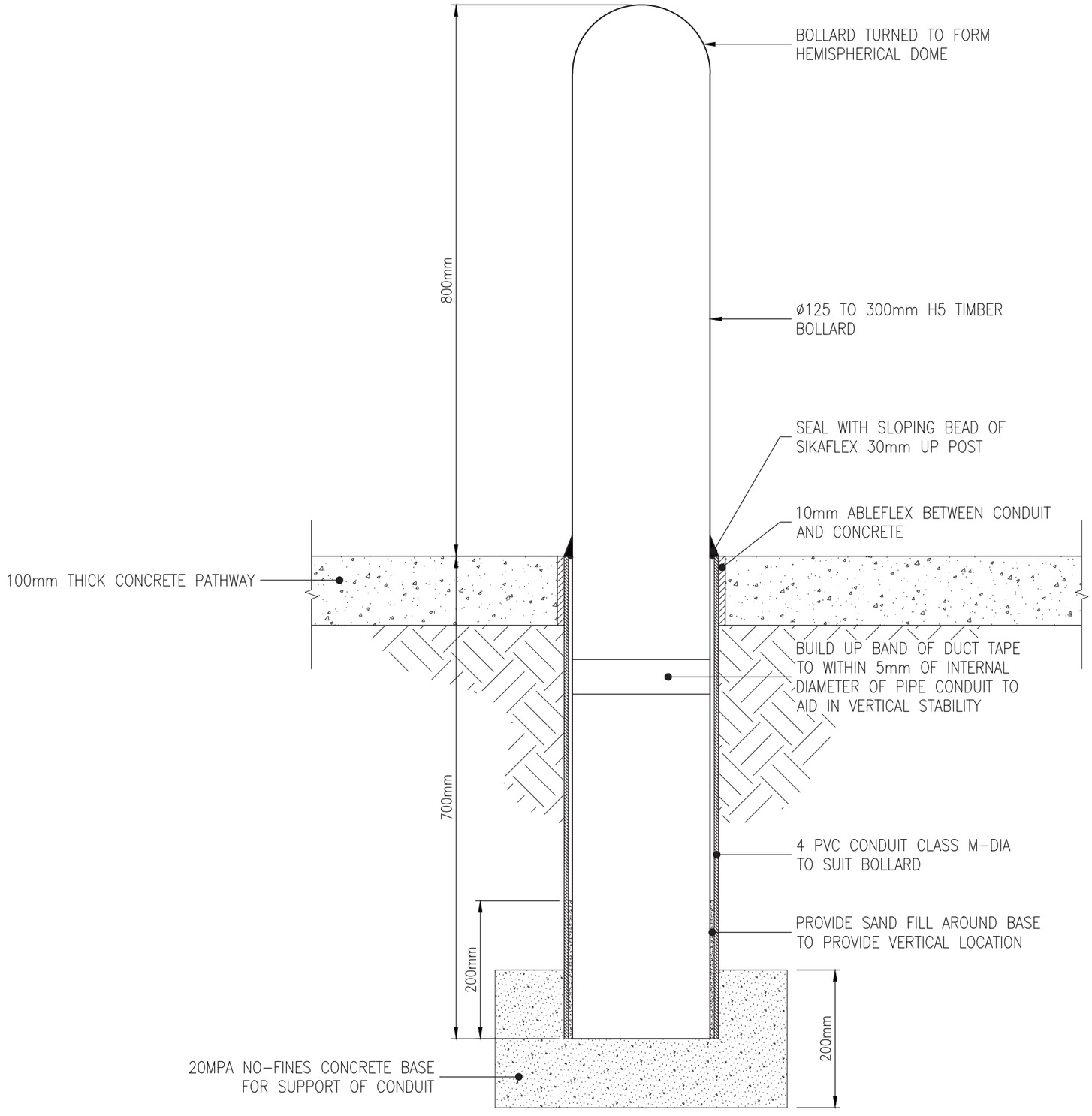
ROAD EDGE GUIDE POSTS AND BOLLARDS
Posts Types and Spacings

Standard Drawing No **R1060**

Sheet Size **A3**

Rev

BRC(03/09)



NOTES:

1. ENSURE THE FIT OF SUPPLIED BOLLARDS BY INSERTING BOLLARDS INTO SPARE CONDUIT BEFORE PLACING INTO GROUND. PLANE ANY SPOTS WHICH ARE PREVENTING THE BOLLARD FROM FITTING INTO THE CONDUIT.
2. CONCRETE N32 IN ACCORDANCE WITH AS1379 AND AS3600.
3. SEE R1030 FOR PATH CONSTRUCTION DETAILS.

Scales	Revisions		Verified	Date
NOT TO SCALE				
	A	Original Issue		

Quality Certification	
Design:	Verified:
Drawing: Tifa	Checked:
Approved by Engineer	
Date:	RPEQ:

BUNDABERG REGIONAL COUNCIL

ROAD EDGE GUIDE POSTS AND BOLLARDS
Standard Bollard Treatment With 4 PVC Casing

Standard Drawing No **R1061**

Sheet Size **A3**

Rev

BRC(06/19)

DESIGN CRITERIA	
LGIP Type	Trunk
Priority Users	Motorists
Nominal AADT	>18000 vpd (four lane) >10000 & <= 18000 (two lane)
Maximum Lots/ Dwellings	N/A
Design Speed	70 km/h
Direct Access	No
Kerb & Channel	B1
Lane Marking	Yes
Asphalt Surfacing min. Depth/ Type (Note 3)	50mm / AC14
Longitudinal Grade	Minimum 0.3% Maximum 5%
Vertical curve length per 1% change of grade (K value) refer "Guide to Road Design Part 3: Geometric Design" (Austroads 2010)	Minimum crest 30m Minimum sag 28m
Horizontal Curve Radius	Minimum 240m
Superelevation	5%
Traffic Loading	2 X 10^6 ESA

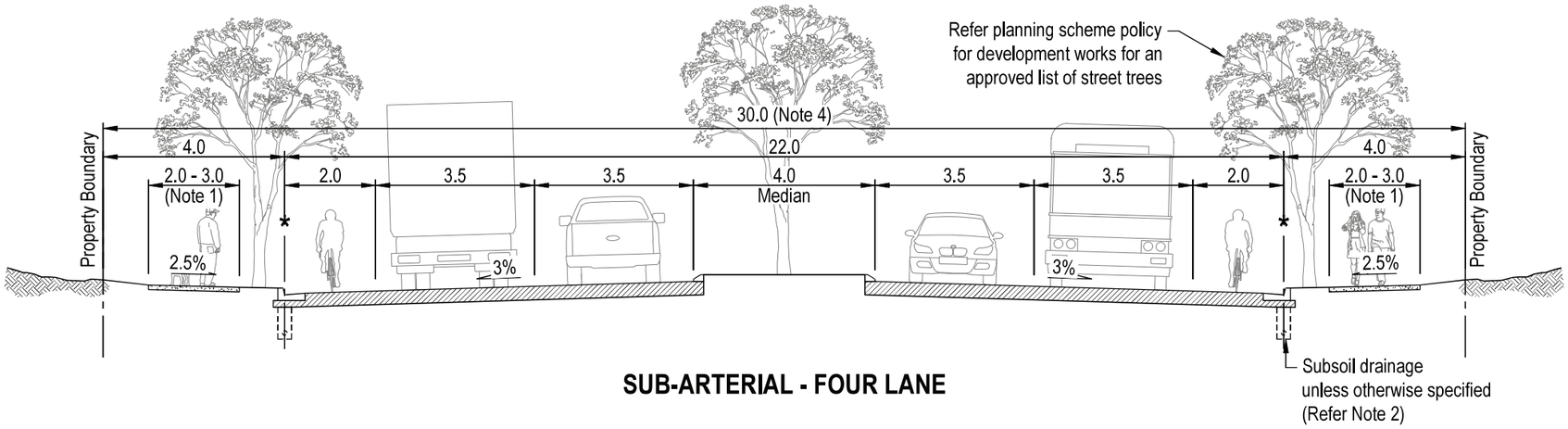
ROAD FUNCTION

To provide a high volume connection between suburbs and higher order arterial roads. Dedicated lanes reduce conflict between road users and allow for a safe and efficient environment. Amenity is improved through attractive landscaping and approved street trees. Ideally there is no direct property access.

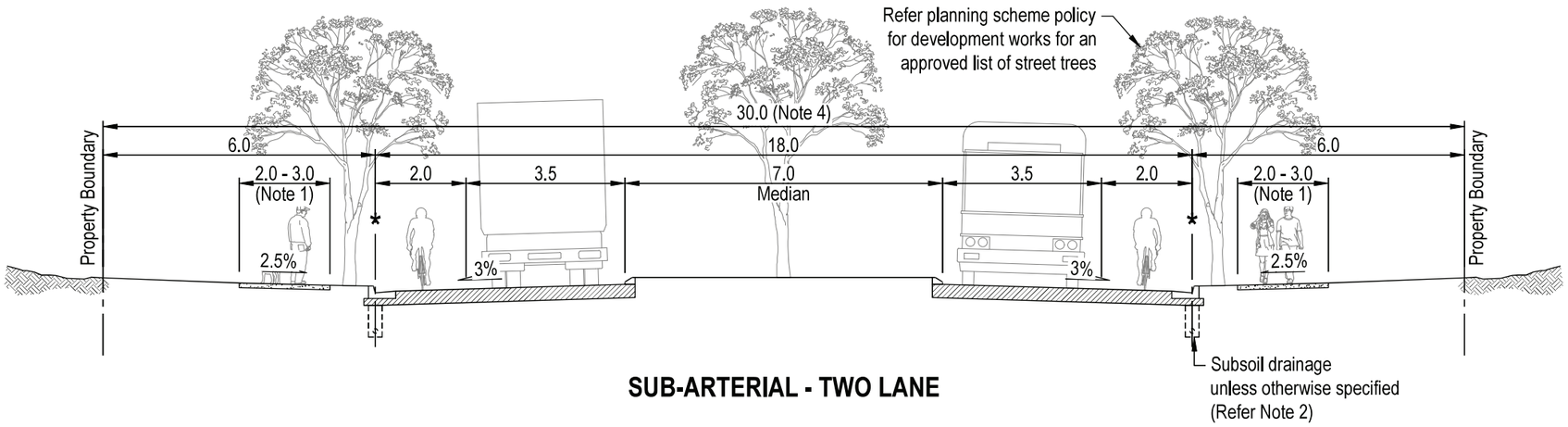
LEGEND

* Nominal kerb line.
(Refer BRC standard drawing R1020).

Pavement design in accordance with:
- AP-T36-06 Pavement Design for Light Traffic - A Supplement to Austroads Pavement Design Guide.
- AGPT02-12 Guide to Pavement Technology Part 2: Pavement Structural Design.



SUB-ARTERIAL - FOUR LANE



SUB-ARTERIAL - TWO LANE

NOTES:

1. Refer "Local Government Infrastructure Plan (LGIP)" to see if identified as a part of the off-road multi-modal pathway network. The path widths are as follows:
   - Principal pathway (3.0m).
   - Distributor pathway (2.5m).
   - Collector pathway (2.0m).
   - Off-road regional recreational cycleway (3.0m).

   If not identified in LGIP, a 2.0m path is to be provided on one side of the road.
2. For subsoil drainage details refer to IPWEAQ standards. Any "Water Sensitive Urban Design (WSUD)" solution is to be in accordance with guidelines from Healthy Waterways and Water by Design.
3. Refer to DTMR specification "MRTS30 - Asphalt Pavements".
4. Road reserve width will be wider at intersections and must be approved by Council's development engineers.
5. All dimensions are in metres unless noted otherwise.

NOT TO SCALE

	Revisions	Verified	Date
B	Updated Asphalt, Title Block and Text Styles	AJ	09-20
A	Original Issue		

Engineering Certification
Design: ARW Verified: AJ
Drawn: TS Checked: AJ
Digitally signed by Adam Johnston
Date: 2020.09.16 14:14:25 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Dwayne Honor
Date: 2020.09.17 10:00:08 +10'00'

BUNDABERG REGIONAL COUNCIL

ROAD TYPE CROSS SECTIONS
URBAN ROAD - SUB-ARTERIAL

Standard Drawing No.: R2001
Sheet Size: A3
Rev.: B

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BRC(06/19)

DESIGN CRITERIA	
LGIP Type	Trunk
Priority Users	Motorists & Cyclists
Nominal AADT	>3000 & <=10000 vpd
Maximum Lots/ Dwellings	1000
Design Speed	60 km/h
Direct Access	Yes
Kerb & Channel	B1
Lane Marking	Yes
Asphalt Surfacing min. Depth/ Type (Note 3)	50mm / AC14
Longitudinal Grade	Minimum 0.3% Maximum 5%
Vertical curve length per 1% change of grade (K value) refer "Guide to Road Design Part 3: Geometric Design" (Austroads 2010)	Minimum crest 12m Minimum sag 16m
Horizontal Curve Radius	Minimum 98m
Superelevation	5%
Traffic Loading	1 X 10^6 ESA

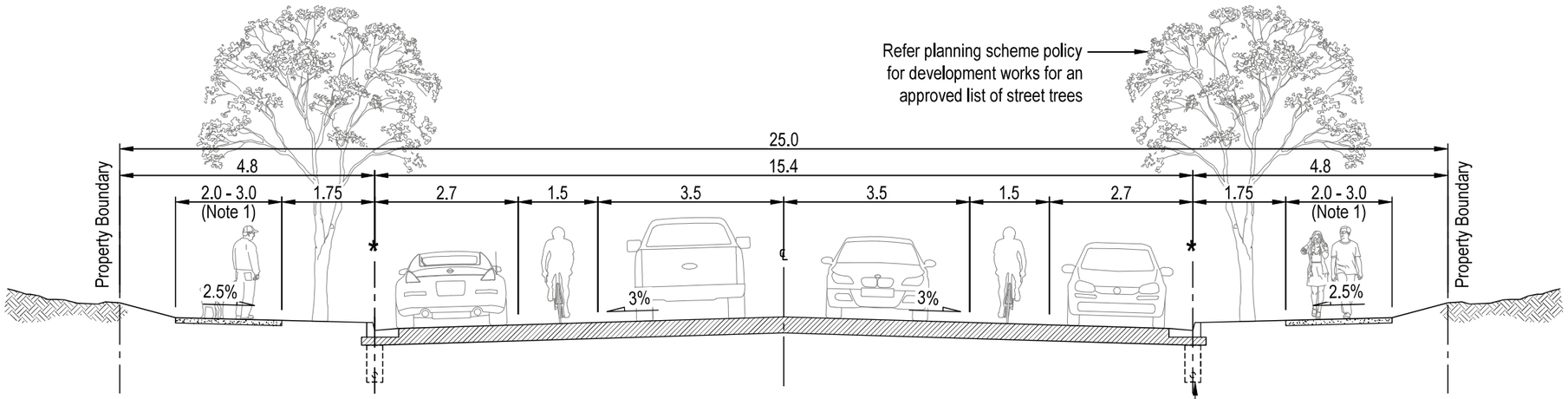
ROAD FUNCTION

To provide a connection between suburbs and higher order arterial roads. Dedicated lanes reduce conflict between road users and allow for a safe and efficient environment.
Residential amenity is improved through direct access to properties. Pathways are provided on both sides of the road to promote active transport options.
Where the road corridor is constrained to 20m (i.e., infill areas) lane widths can be reduced to minimum acceptable standards.

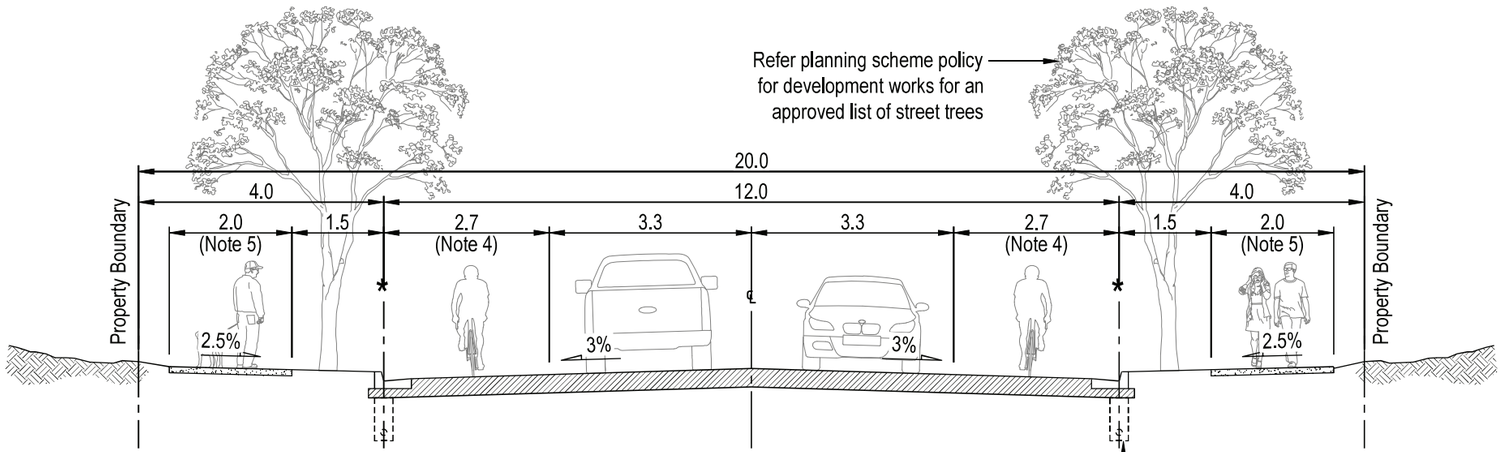
LEGEND

* Nominal kerb line.
(Refer BRC standard drawing R1020).

Pavement design in accordance with:
- AP-T36-06 Pavement Design for Light Traffic - A Supplement to Austroads Pavement Design Guide.
- AGPT02-12 Guide to Pavement Technology Part 2: Pavement Structural Design.



TRUNK COLLECTOR - GREENFIELD



TRUNK COLLECTOR - CONSTRAINED CORRIDOR

NOTES:

1. Refer "Local Government Infrastructure Plan (LGIP)" to see if identified as a part of the off-road multi-modal pathway network. The path widths are as follows:
   - Principal pathway (3.0m).
   - Distributor pathway (2.5m).
   - Collector pathway (2.0m).
   - Off-road regional recreational cycleway (3.0m).

   If not identified in LGIP, a 2.0m path is to be provided on one side of the road.
2. For subsoil drainage details refer to IPWEAQ standards. Any "Water Sensitive Urban Design (WSUD)" solution is to be in accordance with guidelines from Healthy Waterways and Water by Design.
3. Refer to DTMR specification "MRTS30 - Asphalt Pavements".
4. Parking is permitted in marked bicycle lane unless otherwise marked or sign posted.
5. For "constrained corridor", a pathway width of 2.0m is required despite what may be shown in LGIP. If not identified in LGIP, a 2.0m path is to be provided on one side of the road.
6. All dimensions are in metres unless noted otherwise.

NOT TO SCALE

	Revisions	Verified	Date
B	Updated Asphalt, Title Block and Text Styles	AJ	09-20
A	Original Issue		

Engineering Certification
Design: ARW Verified: AJ
Drawn: TS Checked: AJ
Digitally signed by Adam Johnston
Date: 2020.09.16 14:12:32 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Dwayne Honor
Date: 2020.09.17 10:01:19 +10'00'

BUNDABERG REGIONAL COUNCIL

ROAD TYPE CROSS SECTIONS
URBAN ROAD - TRUNK COLLECTOR

Standard Drawing No.: R2002
Sheet Size: A3
Rev.: B

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BRC(06/19)

DESIGN CRITERIA

LGIP Type	Non-Trunk
Priority Users	All users equal priority
Nominal AADT	>750 & <=3000 vpd
Maximum Lots/ Dwellings	300
Design Speed	50 km/h
Direct Access	Yes
Kerb & Channel	M3 (low density) INV1 & B2 (high density)
Lane Marking	Nil
Asphalt Surfacing min. Depth/ Type (Note 3)	30mm / BRC10
Longitudinal Grade	Minimum 0.3% Maximum 10%
Vertical curve length per 1% change of grade (K value) refer "Guide to Road Design Part 3: Geometric Design" (Austroads 2010)	Minimum crest 3.5m Minimum sag 7m
Horizontal Curve Radius	Minimum 42m
Superelevation	Nil
Traffic Loading	3.5 X 10^5 ESA

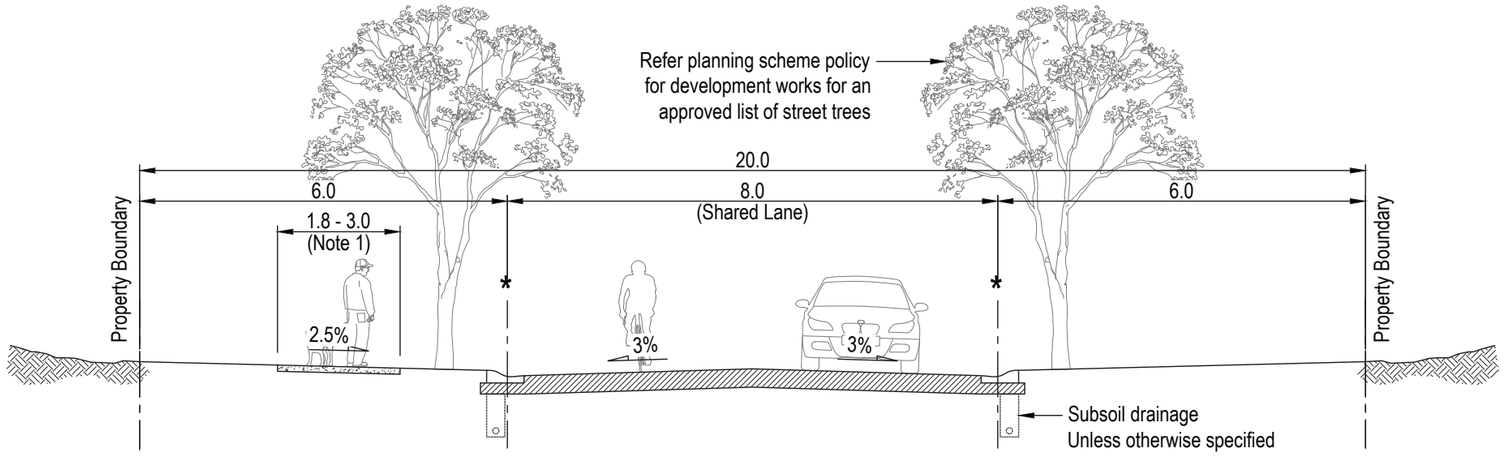
ROAD FUNCTION

To provide a connection between residential access streets and higher order traffic carrying roads. In lower density areas where on-street parking demand is expected to be low, lanes are unmarked and cyclists, and motorists share the available space with intermittent parked cars (i.e., occasionally vehicles travelling in opposite directions will have to give way to oncoming vehicles).
In higher density areas indented parking bays will be required to cater for a greater flow of traffic.

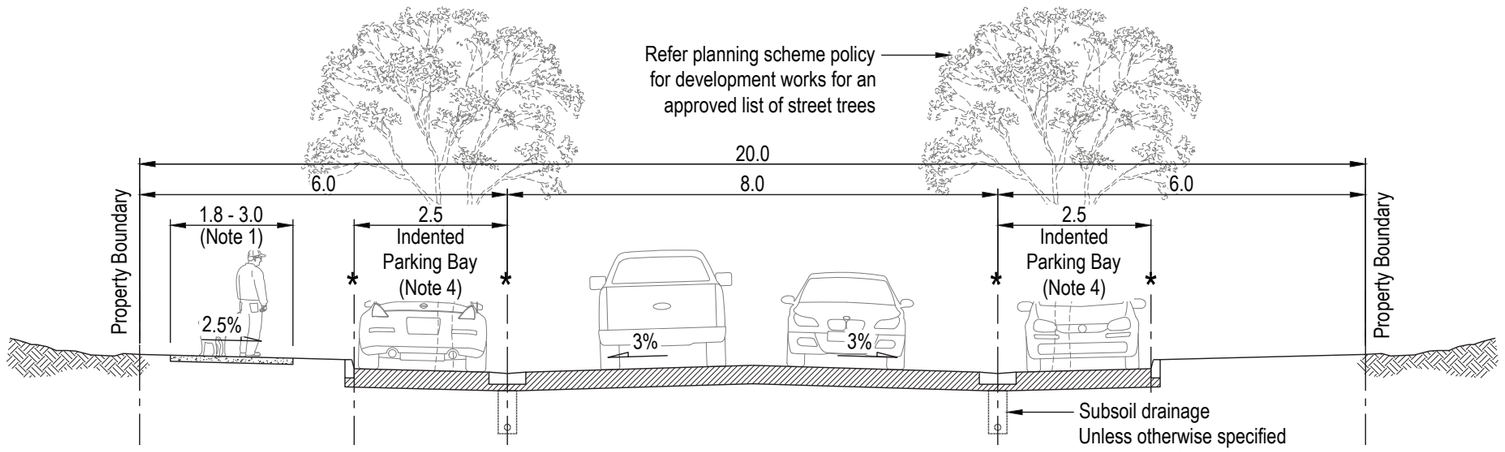
LEGEND

* Nominal kerb line.
(Refer BRC standard drawing R1020).

Pavement design in accordance with:
- AP-T36-06 Pavement Design for Light Traffic - A Supplement to Austroads Pavement Design Guide.
- AGPT02-12 Guide to Pavement Technology Part 2: Pavement Structural Design.



COLLECTOR STREET - LOW DENSITY



COLLECTOR STREET - MEDIUM DENSITY

NOTES:

1. Refer "Local Government Infrastructure Plan (LGIP)" to see if identified as a part of the off-road multi-modal pathway network. The path widths are as follows:
   - Principal pathway (3.0m).
   - Distributor pathway (2.5m).
   - Collector pathway (2.0m).
   - Off-road regional recreational cycleway (3.0m).

   If not identified in LGIP, a minimum 1.8m pathway is to be provided on one side of the road. A 1.5m pathway may be considered on merit subject to approval by BRC engineer.
2. For subsoil drainage details refer to IPWEAQ standards. Any "Water Sensitive Urban Design (WSUD)" solution is to be in accordance with guidelines from Healthy Waterways and Water by Design.
3. Refer to DTMR specification "MRTS30 - Asphalt Pavements" as modified by BRC mix design.
4. Indented parking bay to be designed in accordance with DTMR TN-138 and must be approved by Council's development engineers.
5. All dimensions are in metres unless noted otherwise.

NOT TO SCALE

	Revisions	Verified	Date
C	Updated Notes	AJ	05/22
B	Updated Asphalt, Title Block and Text Styles	AJ	09/20
A	Original Issue		

Engineering Certification
Design: ARW Verified: AJ
Drawn: TS Checked: AJ
Digitally signed by Adam Johnston
Date: 2022.05.15 12:39:26 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Suzanne Brown
Date: 2022.06.01 16:32:00 +10'00'

BUNDABERG REGIONAL COUNCIL

ROAD TYPE CROSS SECTIONS
URBAN ROAD - COLLECTOR STREET

Standard Drawing No.: R2003
Sheet Size: A3
Rev.: C

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BRC(06/19)

DESIGN CRITERIA	
LGIP Type	Non-Trunk
Priority Users	All users equal priority
Nominal AADT	>300 & <=750 vpd
Maximum Lots/ Dwellings	75
Design Speed	40 km/h
Direct Access	Yes
Kerb & Channel	M3 (low density) INV1 & B2 (high density)
Lane Marking	Nil
Asphalt Surfacing min. Depth/ Type (Note 3)	25mm / BRC7
Longitudinal Grade	Minimum 0.3% Maximum 10%
Vertical curve length per 1% change of grade (K value) refer "Guide to Road Design Part 3: Geometric Design" (Austroads 2010)	Minimum crest 3.5m Minimum sag 7m
Horizontal Curve Radius	Minimum 24m
Superelevation	NIL
Traffic Loading	5 X 10^4 ESA

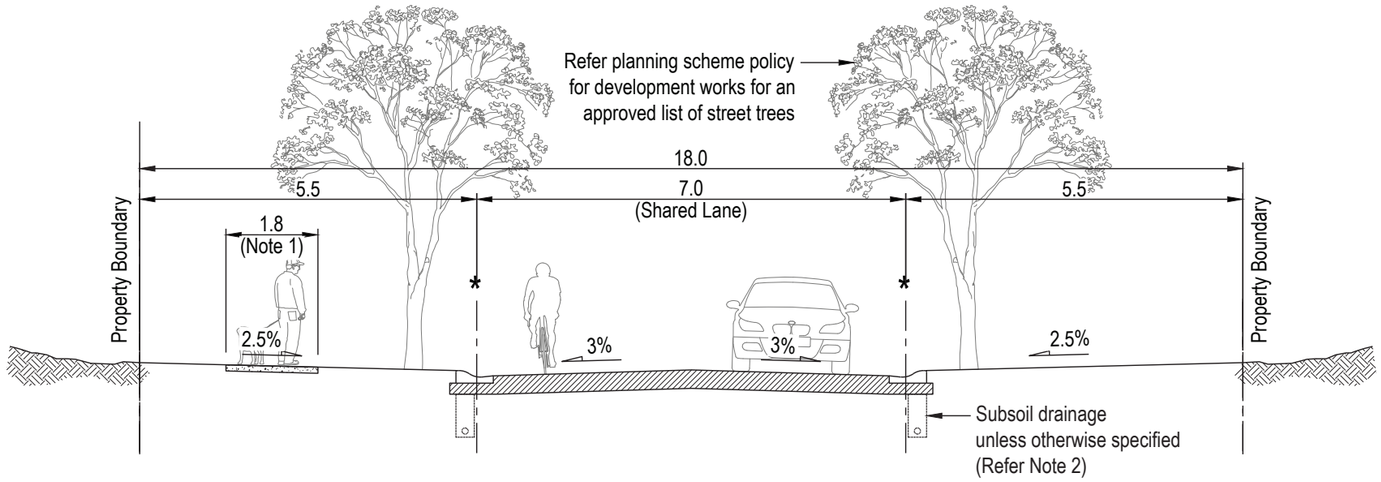
ROAD FUNCTION

To provide direct access to adjoining residential properties.
In lower density areas where on-street parking demand is expected to be low, lanes are unmarked, and cyclists and motorists share the available space with intermittent parked cars (i.e., occasionally vehicles travelling in opposite directions will have to give way to oncoming vehicles).
In higher density areas indented parking bays will be required to cater for a greater flow of traffic.

LEGEND

* Nominal kerb line.
(Refer BRC standard drawing R1020).

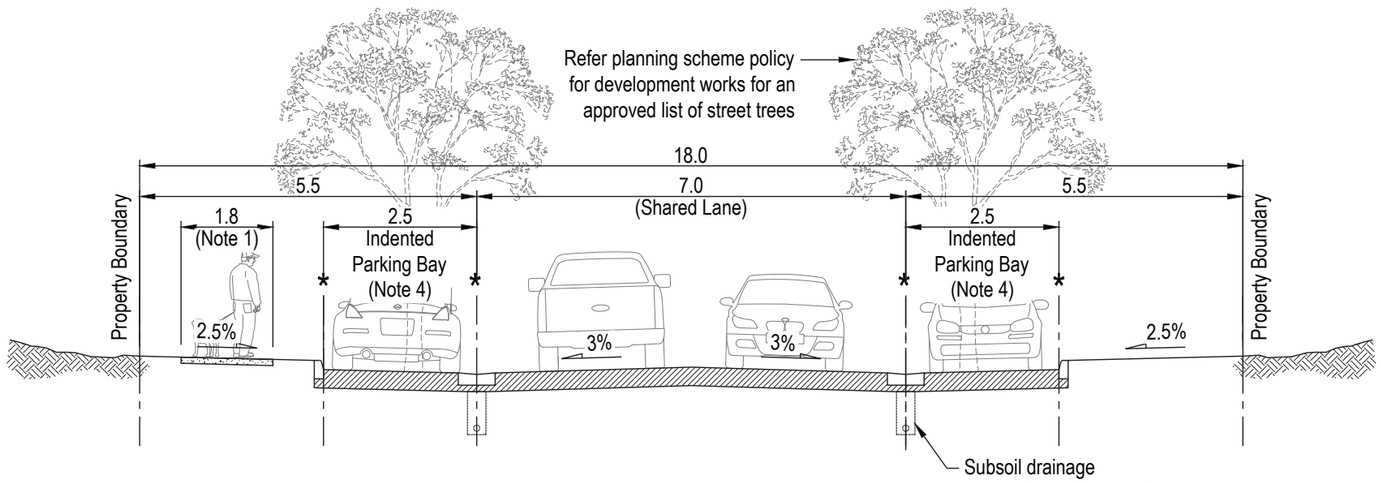
Pavement design in accordance with:
- AP-T36-06 Pavement Design for Light Traffic - A Supplement to Austroads Pavement Design Guide.
- AGPT02-12 Guide to Pavement Technology Part 2: Pavement Structural Design.



ACCESS STREET - LOW DENSITY

NOTES:

1. A minimum 1.8m pathway is required on one side of the street, it will generally be located on the northern or western side of the road. A 1.5m pathway may be considered on merit subject to approval by BRC engineer.
2. For subsoil drainage details refer to IPWEAQ standards. Any "Water Sensitive Urban Design (WSUD)" solution is to be in accordance with guidelines from Healthy Waterways and Water by Design.
3. Refer to DTMR specification "MRTS30 - Asphalt Pavements" as modified by BRC mix design.
4. Indented parking bay to be designed in accordance with DTMR TN-138 and must be approved by Council's development engineers.
5. All dimensions are in metres unless noted otherwise.



ACCESS STREET - MEDIUM DENSITY

NOT TO SCALE

	Revisions	Verified	Date
C	Updated Notes	AJ	05/22
B	Updated Asphalt, Title Block and Text Styles	AJ	09/20
A	Original Issue		

Engineering Certification
Design: ARW Verified: AJ
Drawn: TS Checked: AJ
Digitally signed by Adam Johnston
Date: 2022.05.15 12:40:14 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Suzanne Brown
Date: 2022.06.01 16:38:15 +10'00'

BUNDABERG REGIONAL COUNCIL

ROAD TYPE CROSS SECTIONS
URBAN ROAD - ACCESS STREET

Standard Drawing No.: R2004
Sheet Size: A3
Rev.: C

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BRC(06/19)

DESIGN CRITERIA

LGIP Type	Non-Trunk
Priority Users	Pedestrians & Cyclists
Nominal AADT	<=300 vpd
Maximum Lots/ Dwellings	30
Design Speed	40 km/h
Direct Access	Yes
Kerb & Channel	M3 (low density) INV1 & B2 (high density)
Lane Marking	Nil
Asphalt Surfacing min. Depth/ Type (Note 3)	25mm / BRC7
Longitudinal Grade	Minimum 0.3% Maximum 12%
Vertical curve length per 1% change of grade (K value) refer "Guide to Road Design Part 3: Geometric Design" (Austroads 2010)	Minimum CREST 3.5m Minimum SAG 7m
Horizontal Curve Radius	Minimum 24m
Superelevation	NIL
Traffic Loading	5 X 10^4 ESA

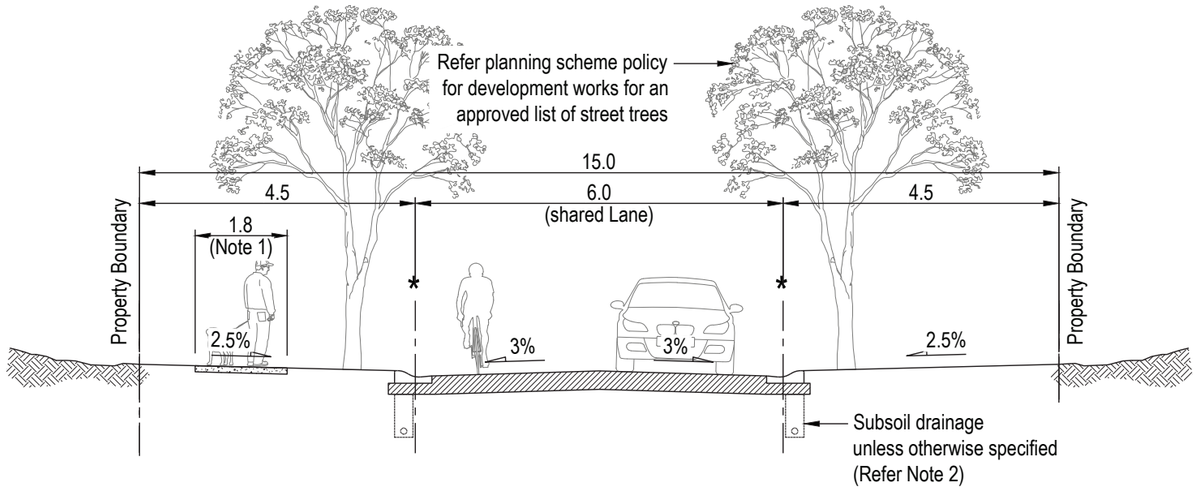
ROAD FUNCTION

To provide direct access to adjoining residential properties.
Cyclists and motorists share a 5m lane. The street is designed as a slow speed environment and occasionally vehicles travelling in opposite directions will have to give way to oncoming vehicles.
In low density areas, cars may park partly in the 5m (shared lane).
In higher density areas, intermittent indented parking bays will be required on one or alternating sides of the street to cater for a greater parking demand.

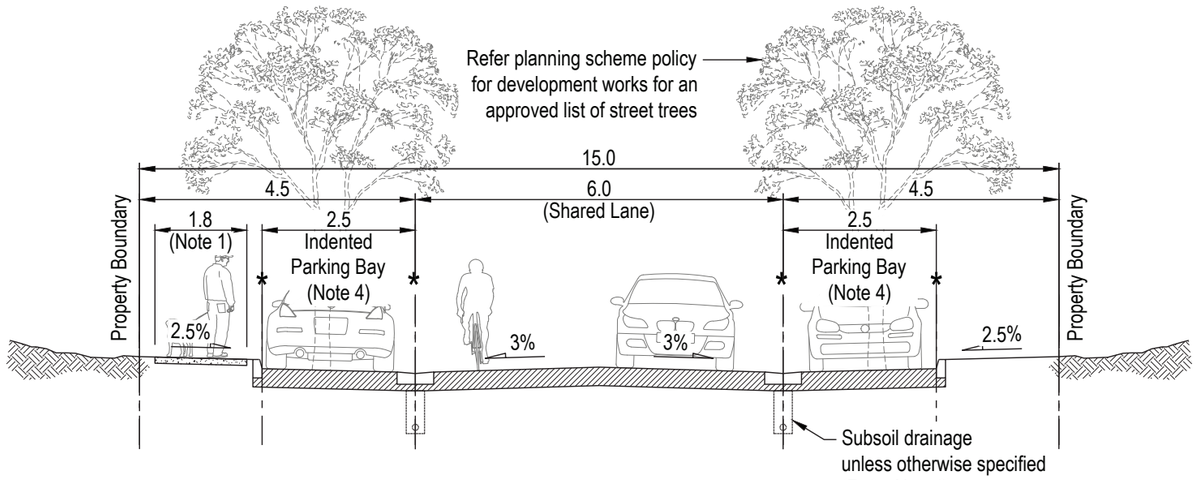
LEGEND

* Nominal kerb line.
(Refer BRC standard drawing R1020).

Pavement design in accordance with:
- AP-T36-06 Pavement Design for Light Traffic - A Supplement to Austroads Pavement Design Guide.
- AGPT02-12 Guide to Pavement Technology Part 2: Pavement Structural Design.



ACCESS PLACE - LOW DENSITY



ACCESS PLACE - MEDIUM DENSITY

NOTES:

1. A minimum 1.8m pathway is required on one side of the street, it will generally be located on the northern or western side of the road. A 1.5m pathway may be considered on merit subject to approval by BRC engineer.
2. For subsoil drainage details refer to IPWEAQ standards. Any "Water Sensitive Urban Design (WSUD)" solution is to be in accordance with guidelines from Healthy Waterways and Water by Design.
3. Refer to DTMR specification "MRTS30 - Asphalt Pavements" as modified by BRC mix design.
4. Indented parking bay to be designed in accordance with DTMR tn-138 and must be approved by Council's development engineers.
5. All dimensions are in metres unless noted otherwise.

NOT TO SCALE

	Revisions	Verified	Date
C	Updated Notes	AJ	05/22
B	Updated Asphalt, Title Block and Text Styles	AJ	09/20
A	Original Issue		

Engineering Certification
Design: ARW Verified: AJ
Drawn: TS Checked: AJ
Digitally signed by Adam Johnston
Date: 2022.05.15 12:41:06 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Suzanne Brown
Date: 2022.06.01 16:41:04 +10'00'

BUNDABERG REGIONAL COUNCIL

ROAD TYPE CROSS SECTIONS
URBAN ROAD - ACCESS PLACE

Standard Drawing
No.: R2005
Sheet Size: A3
Rev.: C

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BRC(06/19)

DESIGN CRITERIA

	CBD ACCESS	COMMERCIAL ACCESS
LGIP Type	Non-Trunk	Non-Trunk
Priority Users	Pedestrians & Motorists	Pedestrians & Motorists
Nominal AADT	Traffic study req.	Traffic study req.
Maximum Lots/ Dwellings	N/A	300
Design Speed	40 km/h	50 km/h
Direct Access	Not permitted	Not permitted
Kerb & Channel	B1	B1
Lane Marking	YES	YES
Asphalt Surfacing min. Depth/ Type (Note 3)	50mm / AC14	50mm / AC14
Longitudinal Grade	Minimum 0.3% Maximum 5%	Minimum 0.3% Maximum 10%
Vertical curve length per 1% change of grade (K value) refer "Guide to Road Design Part 3: Geometric Design" (Austroads 2010)	Minimum crest 3.5m Minimum sag 7m	Minimum crest 7m Minimum sag 11m
Horizontal Curve Radius	Minimum 42m	Minimum 66m
Superelevation	NIL	NIL
Traffic Loading	5 X 10^6 ESA	5 X 10^6 ESA

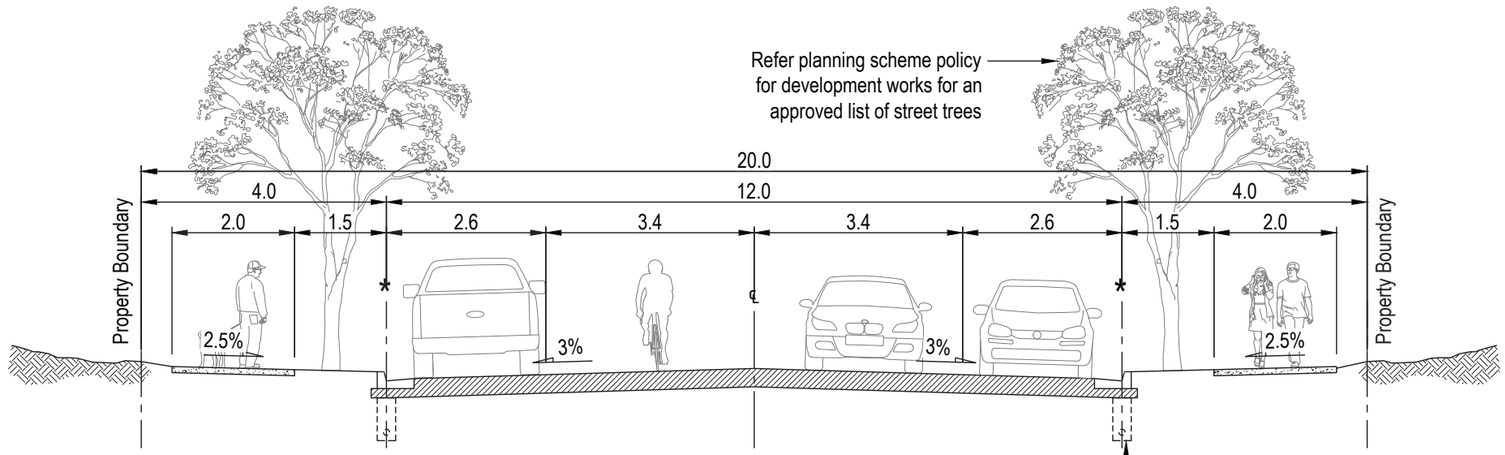
ROAD FUNCTION

To provide access to properties and businesses within the CBD and commercial centres. A slow speed mixed traffic lane serves both motorists and cyclists alike. The street is designed with ample pedestrian crossings to facilitate a vibrant commercial space. For CBD access streets no standard cross section is defined. A traffic assessment would be required to determine the most suitable design.

LEGEND

* Nominal kerb line.
(Refer BRC standard drawing R1020).

Pavement design in accordance with:
- AP-T36-06 Pavement Design for Light Traffic - A Supplement to Austroads Pavement Design Guide.
- AGPT02-12 Guide to Pavement Technology Part 2: Pavement Structural Design.



COMMERCIAL ACCESS

NOTES:

1. For subsoil drainage details refer to IPWEAQ standards. Any "Water Sensitive Urban Design (WSUD)" solution is to be in accordance with guidelines from Healthy Waterways and Water by Design.
2. All dimensions are in metres unless noted otherwise.
3. Refer to DTMR specification "MRTS30 - Asphalt Pavements".

"CROSS SECTION TO BE DETERMINED FROM TRAFFIC STUDY"

CBD ACCESS

NOT TO SCALE

	Revisions	Verified	Date
C	Minor Edit	AJ	05/22
B	Updated Asphalt, Title Block and Text Styles	AJ	09/20
A	Original Issue		

Engineering Certification
Design: ARW Verified: AJ
Drawn: TS Checked: AJ
Digitally signed by Adam Johnston
Date: 2022.05.15 12:41:55 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Suzanne Brown
Date: 2022.06.01 16:45:13 +10'00'

BUNDABERG REGIONAL COUNCIL

ROAD TYPE CROSS SECTIONS
URBAN ROAD - CBD / COMMERCIAL ACCESS

Standard Drawing No.: R2006
Sheet Size: A3
Rev.: C

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BRC(06/19)

DESIGN CRITERIA

LGIP Type	Trunk
Priority Users	HEAVY VEHICLES
Nominal AADT	>750 & <= 3000 vpd
Maximum Lots/ Dwellings	300
Design Speed	60 km/h
Direct Access	YES
Kerb & Channel	B1
Lane Marking	Yes
Asphalt Surfacing min. Depth/ Type (Note 3)	50mm / AC14
Longitudinal Grade	Minimum 0.3% Maximum 5%
Vertical curve length per 1% change of grade (K value) refer "Guide to Road Design Part 3: Geometric Design" (Austroads 2010)	Minimum crest 7m Minimum sag 11m
Horizontal Curve Radius	Minimum 56m
Superelevation	5%
Traffic Loading	5 X 10^6 ESA

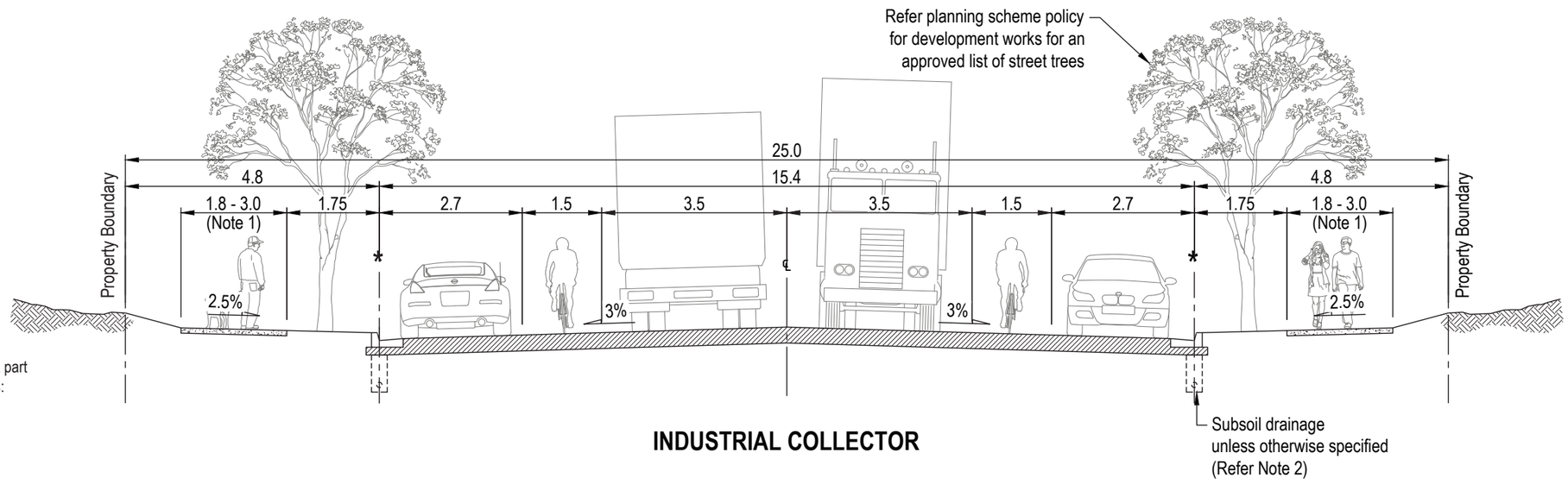
ROAD FUNCTION

To provide a connection between industrial access and higher order freight routes. This road is designed to carry heavy vehicles as well as provide a safe environment for pedestrians and cyclists.

LEGEND

* Nominal kerb line.
(Refer BRC standard drawing R1020).

Pavement design in accordance with:
- AP-T36-06 Pavement Design for Light Traffic - A Supplement to Austroads Pavement Design Guide.
- AGPT02-12 Guide to Pavement Technology Part 2: Pavement Structural Design.



INDUSTRIAL COLLECTOR

NOTES:

1. Refer "Local Government Infrastructure Plan (LGIP)" to see if identified as a part of the off-road multi-modal pathway network. The path widths are as follows:
   - Principal pathway (3.0m).
   - Distributor pathway (2.5m).
   - Collector pathway (2.0m).
   - Off-road regional recreational cycleway (3.0m).

   If not identified in LGIP, a minimum 1.8m pathway is to be provided on one side of the road. A 1.5m pathway may be considered on merit subject to approval by BRC engineer.
2. For subsoil drainage details refer to IPWEAQ standards. Any "Water Sensitive Urban Design (WSUD)" solution is to be in accordance with guidelines from Healthy Waterways and Water by Design.
3. Refer to DTMR specification "MRTS30 - Asphalt Pavements".
4. All dimensions are in metres unless noted otherwise.

NOT TO SCALE

	Revisions	Verified	Date
C	Updated Notes	AJ	05/22
B	Updated Asphalt, Title Block and Text Styles	AJ	09/20
A	Original Issue		

Engineering Certification
Design: ARW Verified: AJ
Drawn: TS Checked: AJ
Digitally signed by Adam Johnston
Date: 2022.05.15 12:42:40 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Suzanne Brown
Date: 2022.06.02 08:32:16 +10'00'

BUNDABERG REGIONAL COUNCIL

ROAD TYPE CROSS SECTIONS
URBAN ROAD - INDUSTRIAL COLLECTOR

Standard Drawing No.: R2007
Sheet Size: A3
Rev.: C

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BRC(06/19)

DESIGN CRITERIA	
LGIP Type	Non-Trunk
Priority Users	Heavy vehicles
Nominal AADT	<750 vpd
Maximum Lots/ Dwellings	75
Design Speed	40 km/h
Direct Access	YES
Kerb & Channel	B1
Lane Marking	Yes
Asphalt Surfacing min. Depth/ Type (Note 3)	50mm / AC14
Longitudinal Grade	Minimum 0.3% Maximum 5%
Vertical curve length per 1% change of grade (K value) refer "Guide to Road Design Part 3: Geometric Design" (Austroads 2010)	Minimum crest 3.5m Minimum sag 7m
Horizontal Curve Radius	Minimum 42m
Superelevation	NIL
Traffic Loading	5 X 10^6 ESA

NOTES:

1. A minimum 1.8m pathway is required on one side of the street, it will generally be located on the northern or western side of the road. A 1.5m pathway may be considered on merit subject to approval by BRC engineer.
2. For subsoil drainage details refer to IPWEAQ standards. Any "Water Sensitive Urban Design (WSUD)" solution is to be in accordance with guidelines from Healthy Waterways and Water by Design.
3. Refer to DTMR specification "MRTS30 - Asphalt Pavements".
4. If cycling demand is expected to be high, the parking lanes is to be utilised as marked bicycle lane.
5. All dimensions are in metres unless noted otherwise.

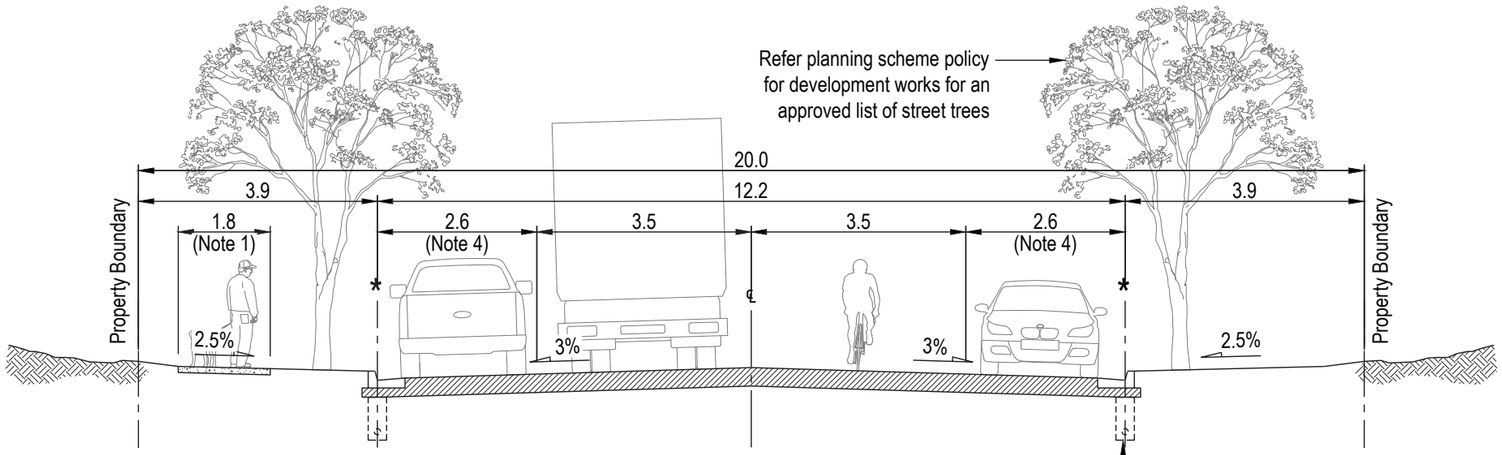
ROAD FUNCTION

To provide direct access for heavy vehicles to industrial properties.
A slow speed mixed traffic lane serves both heavy vehicles and cyclists alike. However, cycling demand is expected to be low and limited to commuter use.

LEGEND

* Nominal kerb line.
(Refer BRC standard drawing R1020).

Pavement design in accordance with:
- AP-T36-06 Pavement Design for Light Traffic - A Supplement to Austroads Pavement Design Guide.
- AGPT02-12 Guide to Pavement Technology Part 2: Pavement Structural Design.



INDUSTRIAL ACCESS

NOT TO SCALE

Revisions		Verified	Date
C	Updated Notes	AJ	05/22
B	Updated Asphalt, Title Block and Text Styles	AJ	09/20
A	Original Issue		

Engineering Certification
Design: ARW Verified: AJ
Drawn: TS Checked: AJ
Digitally signed by Adam Johnston
Date: 2022.05.15 12:43:31 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Suzanne Brown
Date: 2022.06.02 09:02:05 +10'00'

BUNDABERG REGIONAL COUNCIL

ROAD TYPE CROSS SECTIONS
URBAN ROAD - INDUSTRIAL ACCESS

Standard Drawing No.: R2008
Sheet Size: A3
Rev.: C

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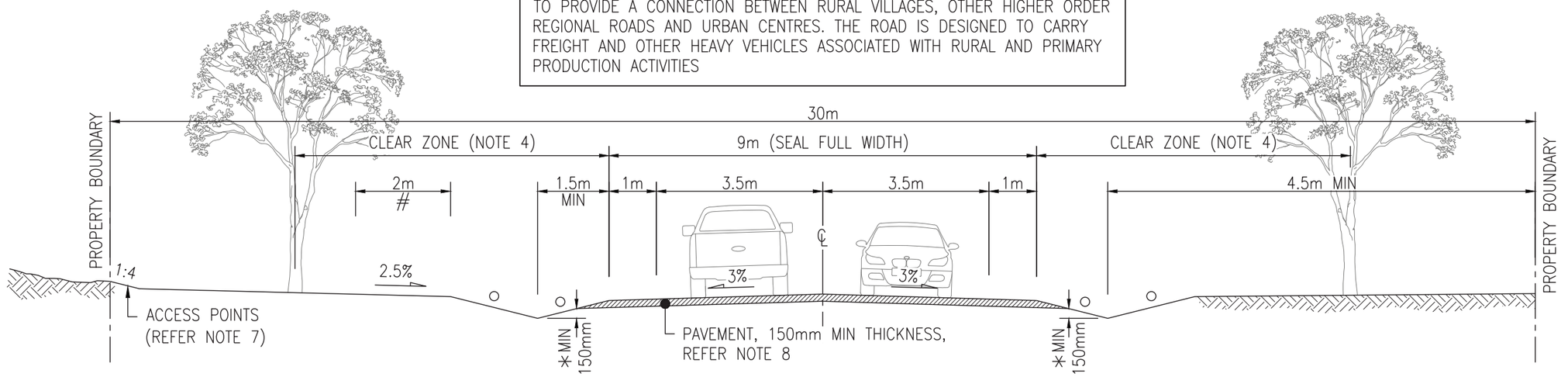
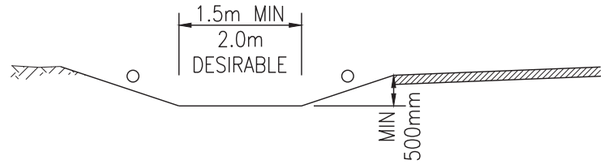
BRC(09/10)

ROAD FUNCTION

TO PROVIDE A CONNECTION BETWEEN RURAL VILLAGES, OTHER HIGHER ORDER REGIONAL ROADS AND URBAN CENTRES. THE ROAD IS DESIGNED TO CARRY FREIGHT AND OTHER HEAVY VEHICLES ASSOCIATED WITH RURAL AND PRIMARY PRODUCTION ACTIVITIES



PRINCIPAL RURAL ROAD



ALTERNATIVE FLAT BOTTOM TABLE DRAIN

LEGEND

- ○ EARTH BATTER–CUT/FILL – ROCK BATTER–CUT.
- # BERM FOR SERVICES WHERE SPECIFIED.
- * 150mm BELOW UNDERSIDE OF PAVEMENT.
- PAVEMENT DESIGN IN ACCORDANCE WITH "AUSTROADS – GUIDE TO PAVEMENT TECHNOLOGY" OR "AUSTROADS PAVEMENT DESIGN – A GUIDE TO THE STRUCTURAL DESIGN OF ROAD PAVEMENTS".

DESIGN CRITERIA	
LGIP TYPE	TRUNK
PRIORITY USERS	MOTORISTS
NOMINAL AADT	>1000 vpd
MAXIMUM LOTS/ DWELLINGS	N/A
DESIGN SPEED	100 km/h
DIRECT ACCESS	YES
LANE MARKING	YES (NOTE 9)
ROAD SURFACING.	PRIME AND 2 COAT SEAL (NOTE 13)
LONGITUDINAL GRADE	MINIMUM 0.3% MAXIMUM 10%
VERTICAL CURVE LENGTH PER 1% CHANGE OF GRADE (K VALUE) REFER "GUIDE TO ROAD DESIGN PART 3: GEOMETRIC DESIGN" (AUSTROADS 2010)	MINIMUM CREST 61m MINIMUM SAG 61m
HORIZONTAL CURVE RADIUS	MINIMUM 463m
SUPERELEVATION	5%
TRAFFIC LOADING	1 X 10^6 ESA

NOTES:

1. TABLE DRAINS STEEPER THAN 5% LONGITUDINAL GRADE (1:20) SHOULD HAVE EROSION PROTECTION MEASURES INSTALLED.
2. CUT AND FILL BATTER SLOPES MAY BE VARIED ON SITE TO ENSURE LONG TERM STABILITY OF BATTERS:
   ROCK BATTER – CUT 1 IN 0.5
   EARTH BATTER – CUT/ FILL:

≤ 0.5m DEEP	1 IN 6
0.5m – 1.0m DEEP	1 IN 4
1.0m – 2.0m DEEP	1 IN 3
> 2.0m DEEP	1 IN 2

   NOTE:
   - BATTER SLOPES SHOWN ARE TYPICAL AND MAY NEED TO BE VARIED TO SUIT SITE CONDITIONS.
   - SLOPES TO BE APPROVED BY COUNCIL ENGINEER.
   - FOR FILL SLOPES STEEPER THAN 1 IN 4, SAFETY BARRIERS TO BE CONSTRUCTED IN ACCORDANCE WITH AUSTROADS "GUIDE TO ROAD DESIGN–PART 6: ROADSIDE DESIGN, SAFETY AND BARRIERS".
3. MINIMUM LONGITUDINAL SLOPE OF TABLE DRAIN INVERTS SHALL BE 0.3% (1 IN 333) UNLESS APPROVED BY COUNCIL ENGINEER.
4. FLOODWAYS SHALL BE CONSTRUCTED WITH CROSS ROAD DRAINAGE.
5. UNSEALED ROADS SHALL BE DESIGNED USING PARAMETERS SET OUT IN AUSTROADS "UNSEALED ROADS MANUAL" UNLESS DIRECTED BY COUNCIL ENGINEER.
6. SEALED ROADS SHALL BE DESIGNED AS PER REQUIREMENTS OF AUSTROADS "GUIDE TO ROAD DESIGN – PART 3: GEOMETRIC DESIGN".
7. ONE ACCESS POINT TO BE CONSTRUCTED TO EACH LOT IN ACCORDANCE WITH STANDARD DRAWINGS R1012 & R1013.
8. PAVEMENT DESIGN AND SEAL TO BE SUBMITTED FOR APPROVAL BY COUNCIL ENGINEER FOR EACH APPLICATION OF OPERATIONAL WORKS.
9. LINEMARKING – CENTRE & EDGE LINE AS SET OUT IN MUTCD.
10. TABLE DRAIN MAY BE VARIED FROM "V" DRAINS TO FLAT BOTTOM WITH MIN WIDTH OF 1.0m, 2.0m DESIRABLE & SIDE SLOPES OF 1 IN 4 AS DIRECTED BY COUNCILS ENGINEER.
11. REFER TO MUTCD FOR PAVEMENT MARKING & EDGE MARKER INSTALLATIONS.
12. LOCAL ROADS OF REGIONAL SIGNIFICANCE (LRRS) ARE NOT COVERED BY THE ABOVE TABLE. CONSULT WITH COUNCIL ENGINEER.
13. IN ACCORDANCE WITH MRS11 AND PLANNING SCHEME POLICY FOR DEVELOPMENT WORKS.
14. REFER GUIDE TO ROAD DESIGN – PART 6: ROADSIDE DESIGN, SAFETY AND BARRIERS.

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Scales: NOT TO SCALE

Revisions		Verified	Date
A	Original Issue		

Quality Certification
Design: AW Verified:
Drawn: Tifa Checked:
Approved By Engineer: Date:
RPEQ:

BUNDABERG REGIONAL COUNCIL

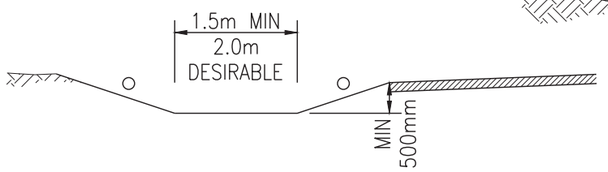
ROAD TYPE CROSS SECTIONS
RURAL ROAD - PRINCIPAL RURAL ROAD

Standard Drawing No.: R3001
Sheet Size: A3
Rev.:

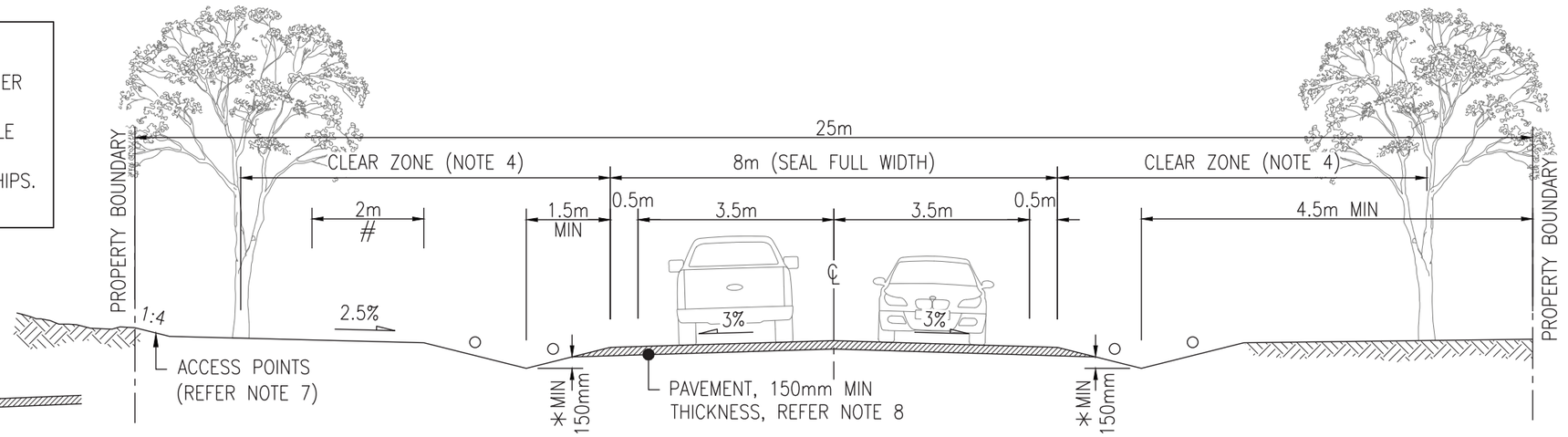
BRC(09/10)

ROAD FUNCTION

TO PROVIDE A CONNECTION BETWEEN ACCESS ROADS AND HIGHER ORDER PRINCILPAL ROADS. THE RURAL/RURAL RESIDENTIAL COLLECTOR ROADS PROVIDE A HIGHER SPEED CONNECTION WHILE THE VILLAGE/TOWNSHIP COLLECTOR ROADS ARE THE PRIMARY TRAFFIC CARRYING STREETS WITHIN RURALVILLAGES AND TOWNSHIPS. BOTH ROADS ARE DESIGNED TO CARRY HEAVY VEHICLES.



ALTERNATIVE FLAT BOTTOM TABLE DRAIN



RURAL/ RURAL RESIDENTIAL COLLECTOR ROAD
AND VILLAGE/ TOWNSHIP COLLECTOR ROAD

DESIGN CRITERIA

ROAD TYPE	RURAL/ RURAL RESIDENTIAL COLLECTOR ROAD	VILLAGE/ TOWNSHIP COLLECTOR ROAD
LGIP TYPE	TRUNK	TRUNK
PRIORITY USERS	MOTORISTS	MOTORISTS
NOMINAL AADT	>250 <=1000 vpd	>250 <=1000 vpd
MAXIMUM LOTS/ DWELLINGS	<= 100	<= 300
DESIGN SPEED	100 km/h	60 km/h
DIRECT ACCESS	YES	YES
LANE MARKING	YES (NOTE 9)	YES (NOTE 9)
ROAD SURFACING.	PRIME AND 2 COAT SEAL (NOTE 13)	PRIME AND 2 COAT SEAL (NOTE 13)
LONGITUDINAL GRADE	MINIMUM 0.3% MAXIMUM 10%	MINIMUM 0.3% MAXIMUM 12%
VERTICAL CURVE LENGTH PER 1% CHANGE OF GRADE (K VALUE) REFER "GUIDE TO ROAD DESIGN PART 3: GEOMETRIC DESIGN" (AUSTROADS 2010)	MINIMUM CREST 61m MINIMUM SAG 61m	MINIMUM CREST 12m MINIMUM SAG 16m
HORIZONTAL CURVE RADIUS	MINIMUM 463m	MINIMUM 98m
SUPERELEVATION	5%	5%
TRAFFIC LOADING	5 X 10^5 ESA	3 X 10^5 ESA

LEGEND

- o EARTH BATTER–CUT/FILL – ROCK BATTER–CUT.
- # BERM FOR SERVICES WHERE SPECIFIED.
- ∗ 150mm BELOW UNDERSIDE OF PAVEMENT.
- PAVEMENT DESIGN IN ACCORDANCE WITH "AUSTROADS – GUIDE TO PAVEMENT TECHNOLOGY" OR "AUSTROADS PAVEMENT DESIGN – A GUIDE TO THE STRUCTURAL DESIGN OF ROAD PAVEMENTS".

NOTES:

1. TABLE DRAINS STEEPER THAN 5% LONGITUDINAL GRADE (1:20) SHOULD HAVE EROSION PROTECTION MEASURES INSTALLED.
2. CUT AND FILL BATTER SLOPES MAY BE VARIED ON SITE TO ENSURE LONG TERM STABILITY OF BATTERS:
   ROCK BATTER – CUT 1 IN 0.5
   EARTH BATTER – CUT/ FILL:

≤ 0.5m DEEP	1 IN 6
0.5m – 1.0m DEEP	1 IN 4
1.0m – 2.0m DEEP	1 IN 3
> 2.0m DEEP	1 IN 2

NOTE:
- BATTER SLOPES SHOWN ARE TYPICAL AND MAY NEED TO BE VARIED TO SUIT SITE CONDITIONS.
- SLOPES TO BE APPROVED BY COUNCIL ENGINEER.
- FOR FILL SLOPES STEEPER THAN 1 IN 4, SAFETY BARRIERS TO BE CONSTRUCTED IN ACCORDANCE WITH AUSTROADS "GUIDE TO ROAD DESIGN–PART 6: ROADSIDE DESIGN, SAFETY AND BARRIERS".

3. MINIMUM LONGITUDINAL SLOPE OF TABLE DRAIN INVERTS SHALL BE 0.3% (1 IN 333) UNLESS APPROVED BY COUNCIL ENGINEER.
4. FLOODWAYS SHALL BE CONSTRUCTED WITH CROSS ROAD DRAINAGE.
5. UNSEALED ROADS SHALL BE DESIGNED USING PARAMETERS SET OUT IN AUSTROADS "UNSEALED ROADS MANUAL" UNLESS DIRECTED BY COUNCIL ENGINEER.
6. SEALED ROADS SHALL BE DESIGNED AS PER REQUIREMENTS OF AUSTROADS "GUIDE TO ROAD DESIGN – PART 3: GEOMETRIC DESIGN".
7. ONE ACCESS POINT TO BE CONSTRUCTED TO EACH LOT IN ACCORDANCE WITH STANDARD DRAWINGS R1012 & R1013.
8. PAVEMENT DESIGN AND SEAL TO BE SUBMITTED FOR APPROVAL BY COUNCIL ENGINEER FOR EACH APPLICATION OF OPERATIONAL WORKS.
9. LINEMARKING – CENTRE & EDGE LINE AS SET OUT IN MUTCD.
10. TABLE DRAIN MAY BE VARIED FROM "V" DRAINS TO FLAT BOTTOM WITH MIN WIDTH OF 1.0m, 2.0m DESIRABLE & SIDE SLOPES OF 1 IN 4 AS DIRECTED BY COUNCILS ENGINEER.
11. REFER TO MUTCD FOR PAVEMENT MARKING & EDGE MARKER INSTALLATIONS.
12. LOCAL ROADS OF REGIONAL SIGNIFICANCE (LRRS) ARE NOT COVERED BY THE ABOVE TABLE. CONSULT WITH COUNCIL ENGINEER.
13. IN ACCORDANCE WITH MRS11 AND PLANNING SCHEME POLICY FOR DEVELOPMENT WORKS.
14. REFER GUIDE TO ROAD DESIGN – PART 6: ROADSIDE DESIGN, SAFETY AND BARRIERS.

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Scales: NOT TO SCALE

	Revisions	Verified	Date
A	Original Issue		

Quality Certification
Design: AW Verified:
Drawn: Tifa Checked:
Approved By Engineer: Date:
RPEQ:

BUNDABERG REGIONAL COUNCIL

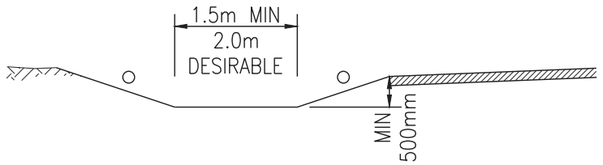
ROAD TYPE CROSS SECTIONS
RURAL ROAD - COLLECTOR ROADS

Standard Drawing No.: R3002
Sheet Size: A3
Rev.:

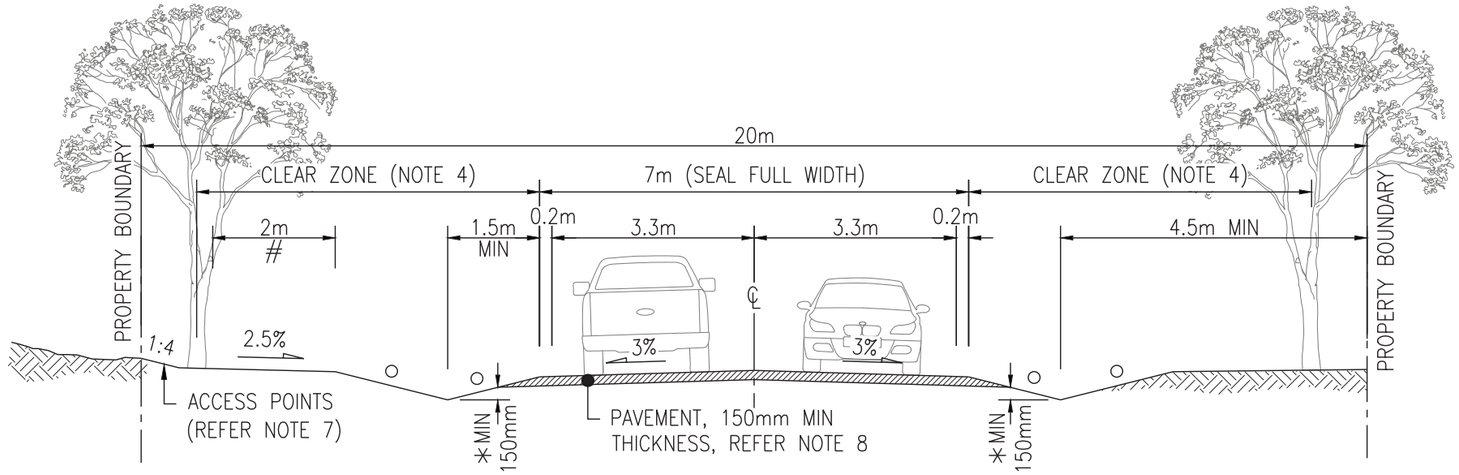
BRC(09/10)

ROAD FUNCTION

TO PROVIDE DIRECT ACCESS TO PROPERTIES IN RURAL, RUAL RESIDENTIAL VILLAGES AND TOWNSHIPS. FOR VILLAGE/TOWNSHIPS ACCESS ROADS CYCLISTS AND MOTORISTS SHARE THE AVAILABLE SPACE IN A LOW SPEED ENVIRONMENT.



ALTERNATIVE FLAT BOTTOM TABLE DRAIN



RURAL/ RURAL RESIDENTIAL ACCESS ROAD
AND VILLAGE/ TOWNSHIP ACCESS ROAD

DESIGN CRITERIA		
ROAD TYPE	RURAL/ RURAL RESIDENTIAL ACCESS ROAD	VILLAGE/ TOWNSHIP ACCESS ROAD
LGIP TYPE	NON–TRUNK	NON–TRUNK
PRIORITY USERS	MOTORISTS	CYCLISTS AND MOTORISTS
NOMINAL AADT	<=250 vpd	<=250 vpd
MAXIMUM LOTS/ DWELLINGS	<= 35	<= 35
DESIGN SPEED	80 km/h	50 km/h
DIRECT ACCESS	YES	YES
LANE MARKING	YES (NOTE 9)	YES (NOTE 9)
ROAD SURFACING.	PRIME AND 2 COAT SEAL (NOTE 13)	PRIME AND 2 COAT SEAL (NOTE 13)
LONGITUDINAL GRADE	MINIMUM 0.3% MAXIMUM 12%	MINIMUM 0.3% MAXIMUM 12%
VERTICAL CURVE LENGTH PER 1% CHANGE OF GRADE (K VALUE) REFER "GUIDE TO ROAD DESIGN PART 3: GEOMETRIC DESIGN" (AUSTROADS 2010)	MINIMUM CREST 30m MINIMUM SAG 28m	MINIMUM CREST 7m MINIMUM SAG 11m
HORIZONTAL CURVE RADIUS	MINIMUM 240m	MINIMUM 56m
SUPERELEVATION	5%	NIL
TRAFFIC LOADING	3 X 10^5 ESA	3 X 10^5 ESA

LEGEND

- o EARTH BATTER–CUT/FILL – ROCK BATTER–CUT.
- # BERM FOR SERVICES WHERE SPECIFIED.
- * 150mm BELOW UNDERSIDE OF PAVEMENT.
- PAVEMENT DESIGN IN ACCORDANCE WITH "AUSTROADS – GUIDE TO PAVEMENT TECHNOLOGY" OR "AUSTROADS PAVEMENT DESIGN – A GUIDE TO THE STRUCTURAL DESIGN OF ROAD PAVEMENTS".

NOTES:

1. TABLE DRAINS STEEPER THAN 5% LONGITUDINAL GRADE (1:20) SHOULD HAVE EROSION PROTECTION MEASURES INSTALLED.
2. CUT AND FILL BATTER SLOPES MAY BE VARIED ON SITE TO ENSURE LONG TERM STABILITY OF BATTERS:
   ROCK BATTER – CUT 1 IN 0.5
   EARTH BATTER – CUT/ FILL:

≤ 0.5m DEEP	1 IN 6
0.5m – 1.0m DEEP	1 IN 4
1.0m – 2.0m DEEP	1 IN 3
> 2.0m DEEP	1 IN 2

NOTE:
- BATTER SLOPES SHOWN ARE TYPICAL AND MAY NEED TO BE VARIED TO SUIT SITE CONDITIONS.
- SLOPES TO BE APPROVED BY COUNCIL ENGINEER.
- FOR FILL SLOPES STEEPER THAN 1 IN 4, SAFETY BARRIERS TO BE CONSTRUCTED IN ACCORDANCE WITH AUSTROADS "GUIDE TO ROAD DESIGN–PART 6: ROADSIDE DESIGN, SAFETY AND BARRIERS".

3. MINIMUM LONGITUDINAL SLOPE OF TABLE DRAIN INVERTS SHALL BE 0.3% (1 IN 333) UNLESS APPROVED BY COUNCIL ENGINEER.
4. FLOODWAYS SHALL BE CONSTRUCTED WITH CROSS ROAD DRAINAGE.
5. UNSEALED ROADS SHALL BE DESIGNED USING PARAMETERS SET OUT IN AUSTROADS "UNSEALED ROADS MANUAL" UNLESS DIRECTED BY COUNCIL ENGINEER.
6. SEALED ROADS SHALL BE DESIGNED AS PER REQUIREMENTS OF AUSTROADS "GUIDE TO ROAD DESIGN – PART 3: GEOMETRIC DESIGN".
7. ONE ACCESS POINT TO BE CONSTRUCTED TO EACH LOT IN ACCORDANCE WITH STANDARD DRAWINGS R1012 & R1013.
8. PAVEMENT DESIGN AND SEAL TO BE SUBMITTED FOR APPROVAL BY COUNCIL ENGINEER FOR EACH APPLICATION OF OPERATIONAL WORKS.
9. LINEMARKING – CENTRE & EDGE LINE AS SET OUT IN MUTCD.
10. TABLE DRAIN MAY BE VARIED FROM "V" DRAINS TO FLAT BOTTOM WITH MIN WIDTH OF 1.0m, 2.0m DESIRABLE & SIDE SLOPES OF 1 IN 4 AS DIRECTED BY COUNCILS ENGINEER.
11. REFER TO MUTCD FOR PAVEMENT MARKING & EDGE MARKER INSTALLATIONS.
12. LOCAL ROADS OF REGIONAL SIGNIFICANCE (LRRS) ARE NOT COVERED BY THE ABOVE TABLE. CONSULT WITH COUNCIL ENGINEER.
13. IN ACCORDANCE WITH MRS11 AND PLANNING SCHEME POLICY FOR DEVELOPMENT WORKS.
14. REFER GUIDE TO ROAD DESIGN – PART 6: ROADSIDE DESIGN, SAFETY AND BARRIERS.

R:\Support Services\Design\Standards & Manuals\Standard Drawings\BRC Standard drawings\Roads\Rural Road Type Cross Sections | 18/12/2017 11:24:06 AM

Scales: NOT TO SCALE

Revisions		Verified	Date
A	Original Issue		

Quality Certification
Design: AW Verified:
Drawn: Tifa Checked:
Approved By Engineer: Date:
RPEQ:

BUNDABERG REGIONAL COUNCIL

ROAD TYPE CROSS SECTIONS
RURAL ROAD - ACCESS ROADS

Standard Drawing No.: R3003
Sheet Size: A3
Rev.:

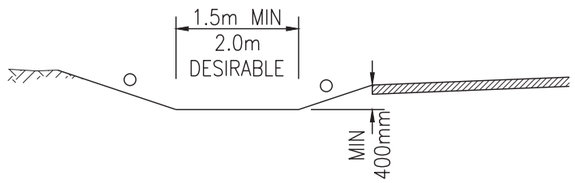
BRC(09/10)

ROAD FUNCTION

TO PROVIDE A RURAL LOW TRAFFIC VOLUME CONNECTION RURAL/RURAL RESIDENTIAL PROPEERTIES AND HIGHER ORDER SEALED ROADS.

DESIGN CRITERIA			
ROAD TYPE	UNSEALED MINOR RURAL ROAD	UNSEALED LOCAL ACCESS ROAD	UNSEALED RURAL TRACK
LGIP TYPE	NON–TRUNK	NON–TRUNK	NON–TRUNK
PRIORITY USERS	MOTORISTS	MOTORISTS	MOTORISTS
NOMINAL AADT	>50 <=150 vpd	>10 <=50 vpd	<=10 vpd
MAXIMUM LOTS/ DWELLINGS	>7 <=20	>2 <=7	<2
DESIGN SPEED	80 km/h	60 km/h	60 km/h
DIRECT ACCESS	YES	YES	YES

ALTERNATIVE FLAT BOTTOM TABLE DRAIN



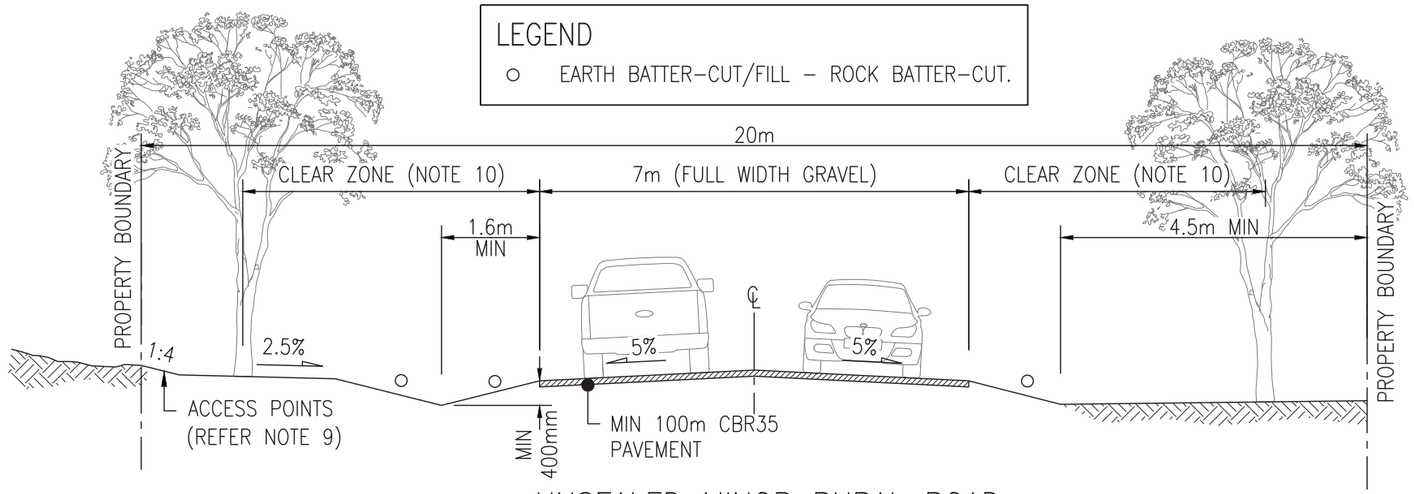
NOTES:

1. UNSEALED ROADS ARE FOR NON–COMMERCIAL USE ONLY AND ARE ONLY TO BE USED WHERE APPROVAL HAS BEEN GIVEN BY COUNCIL ENGINEER.
2. UNSEALED ROADS SHALL BE DESIGNED USING PARAMETERS SET OUT IN AUSTROADS "UNSEALED ROADS MANUAL" UNLESS DIRECTED BY COUNCIL ENGINEER.
3. TABLE DRAINS STEEPER THAN 5% LONGITUDINAL GRADE (1:20) SHOULD HAVE EROSION PROTECTION MEASURES INSTALLED.
4. MINIMUM LONGITUDINAL SLOPE OF TABLE DRAIN INVERTS SHALL BE 0.3% (1 IN 333) UNLESS APPROVED BY COUNCIL ENGINEER.
5. CUT AND FILL BATTER SLOPES GENERALLY TO BE 1 IN 4 BUT MAY BE VARIED ON SITE TO ENSURE LONG TERM STABILITY OF BATTERS:
   ROCK BATTER–CUT 1 IN 0.5
   EARTH BATTER–CUT/FILL:
   ≤ 0.5m DEEP 1 IN 6
   0.5m–1.0m DEEP 1 IN 4
   1.0m–2.0m DEEP 1 IN 3

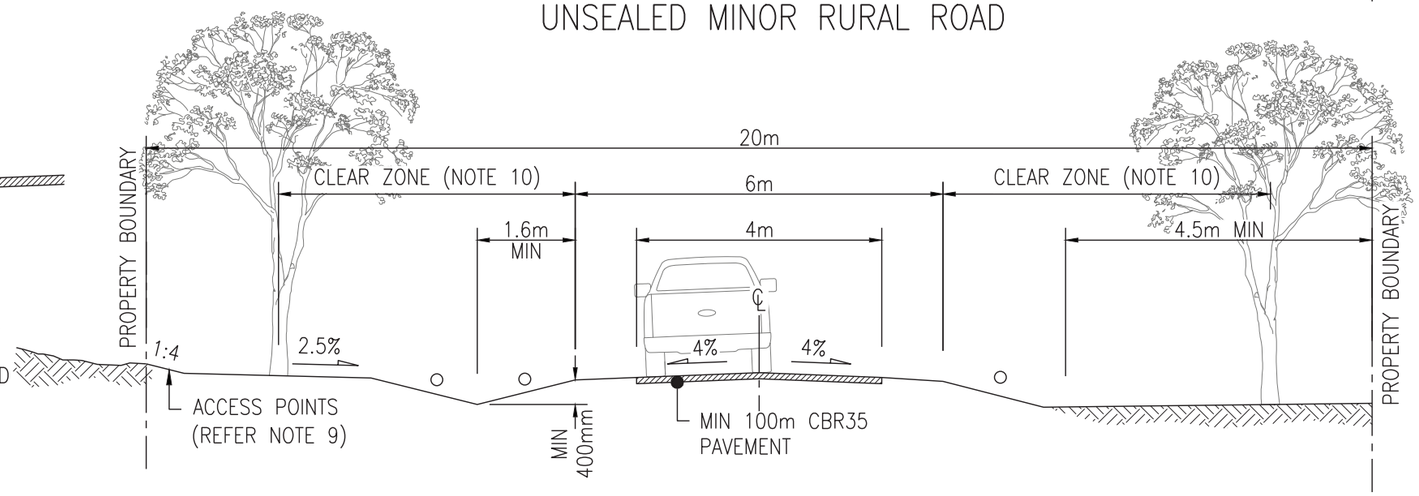
   NOTE:
   - BATTER SLOPES SHOWN ARE TYPICAL AND MAY NEED TO BE VARIED TO SUIT SITE CONDITIONS.
   - FINAL BATTER SLOPES TO BE APPROVED BY COUNCIL ENGINEER.
6. TABLE DRAINS TO BE TURNED OUT AS DIRECTED TO RETURN FLOWS TO OVERLAND FLOW PATHS.
7. TABLE DRAIN MAY BE VARIED FROM "V" DRAINS TO FLAT BOTTOM WITH MIN WIDTH OF 1m MIN, 2m DESIRABLE & SIDE SLOPES AS PER NOTE 5.
8. FLOODWAYS SHALL BE CONSTRUCTED WITH CROSS ROAD DRAINAGE.
9. ACCESS POINT TO BE CONSTRUCTED TO EACH LOT IN ACCORDANCE WITH STANDARD DRAWINGS R1012 & R1013 (UNSEALED).
10. REFER GUIDE TO ROAD DESIGN – PART 6: ROADSIDE SAFETY AND BARRIERS.

LEGEND

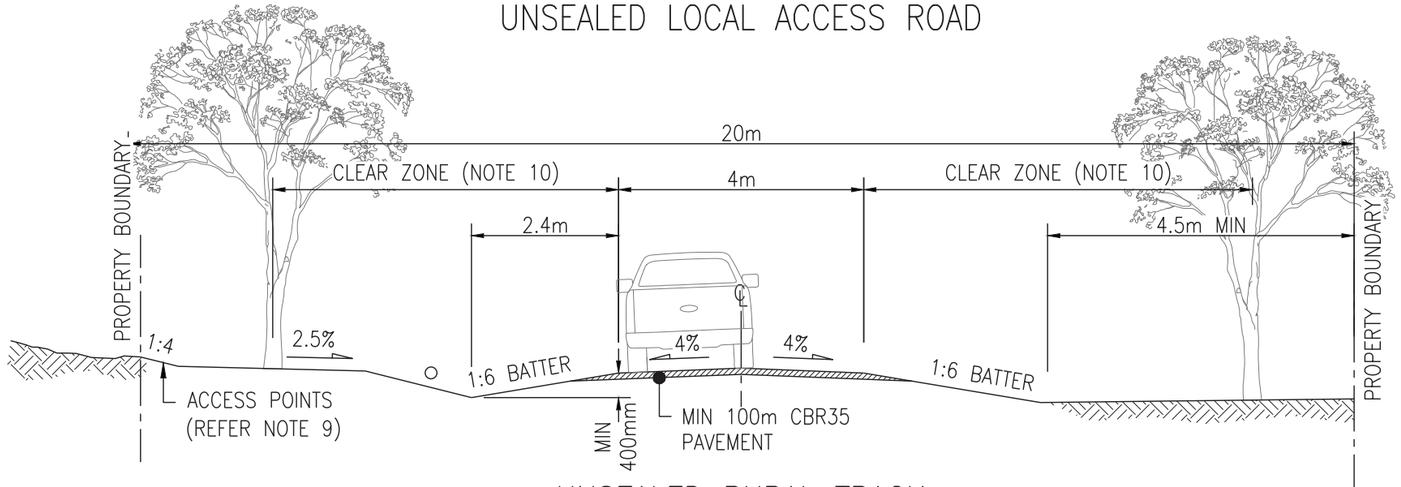
○ EARTH BATTER–CUT/FILL – ROCK BATTER–CUT.



UNSEALED MINOR RURAL ROAD



UNSEALED LOCAL ACCESS ROAD



UNSEALED RURAL TRACK

Scales	Revisions		Verified	Date
NOT TO SCALE				
	A	Original Issue		

Quality Certification
Design: AW Verified:
Drawn: Tifa Checked:
Approved By Engineer: Date:
RPEQ:

BUNDABERG REGIONAL COUNCIL

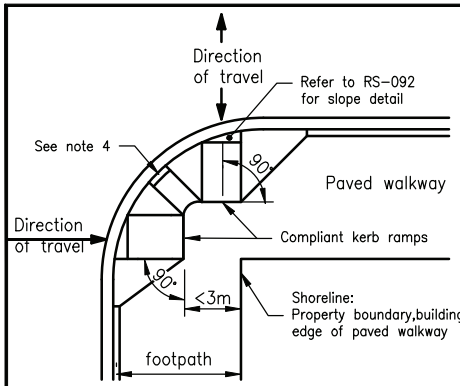
ROAD TYPE CROSS SECTIONS
RURAL ROAD - UNSEALED ROADS

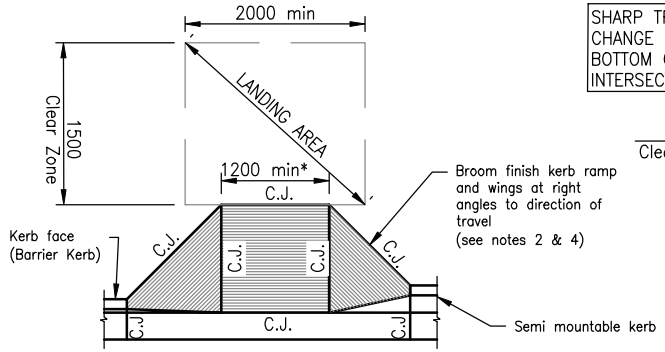
Standard Drawing No.: R3004

Sheet Size: A3

Rev.:

R:\Support Services\Design\Standards & Manuals\Standard Drawings\BRC Standard drawings\Roads\Rural Road Type Cross Sections | 18/12/2017 11:24:07 AM

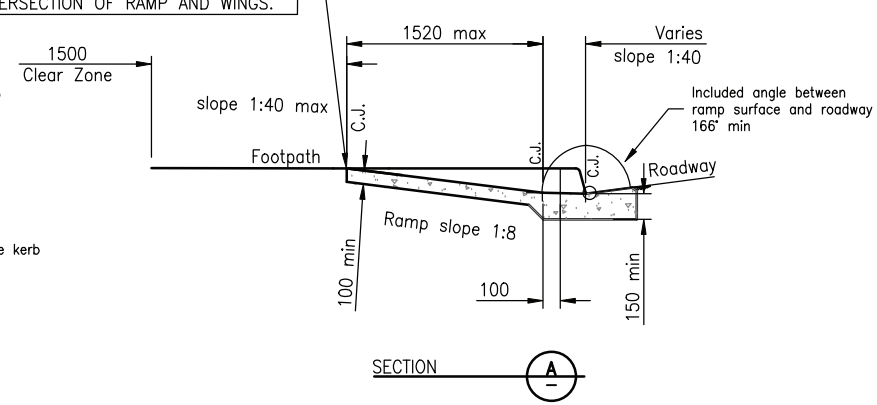




COMPLIANT KERB RAMP ALIGNMENT

SHARP TRANSITION (NO ROUNDING) AT CHANGE OF GRADE AT TOP AND BOTTOM OF RAMP AND AT INTERSECTION OF RAMP AND WINGS.

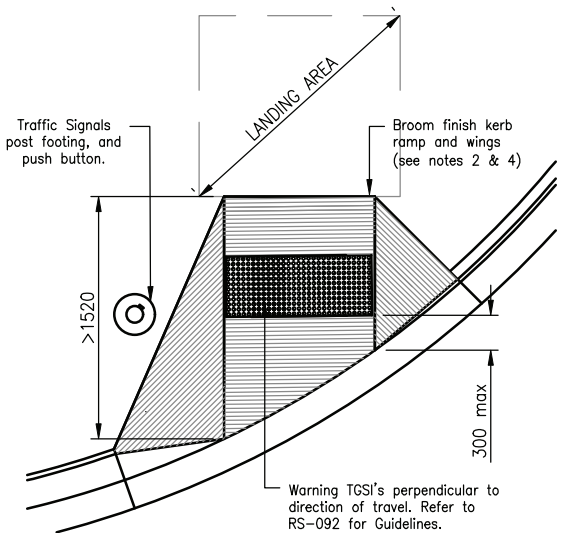
Barrier kerb shown. Details similar for semi mountable kerb



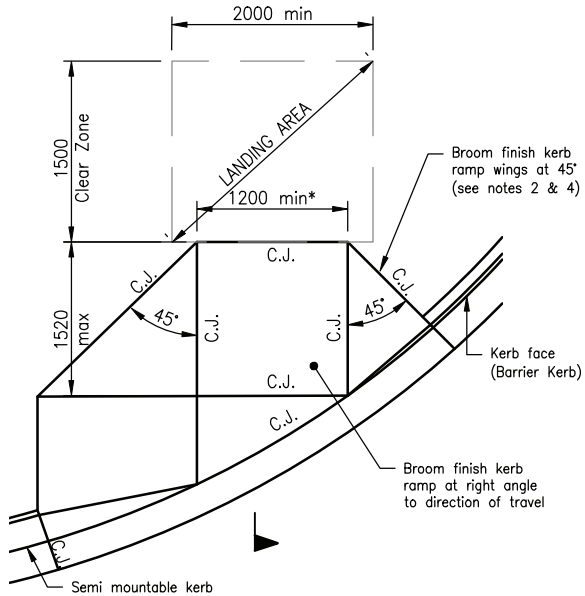
SECTION A–A

COMPLIANT KERB RAMP ALIGNMENT

Refer drawing RS-092 for criteria where TGSI's are required.



NON-COMPLIANT KERB RAMP PLAN VIEW



COMPLIANT KERB RAMP PLAN VIEW

*Kerb ramp to be 1200 min wide or as specified on construction drawings.

NOTES:

A compliant kerb ramp exists where all the following are satisfied:

1. TOP OF RAMP: There shall be a minimum obstruction free wheelchair turnaround distance of 1500 beyond the top of the ramp. The sharp transition at the top and bottom of the ramp shall be perpendicular to the direction of travel. The top of ramp landing area shall have a minimum of 2000 long by 1500 wide clear zone.
2. RAMP: maximum ramp slope for wheelchair access shall be 1:8. A sharp transition (no rounding) is to be maintained at the intersection of graded plane surfaces (top & bottom of ramp and intersection of ramp and wings). The intersection of the ramp and wings should be a tooled joint.
3. RAMP ALIGNMENT: Ramps shall be aligned parallel to the pedestrian direction of travel. Ramps on both sides of a carriageway shall be aligned with one another and the direction of travel.
4. KERB RAMP WINGS: The required wing angle is 45°. Subject to the approval of the superintendent, wings may be angled at less than 45° if the wing is required to be clear of traffic signals hardware, other wings or utility pits/manholes. Wing angle may also be reduced at obtuse angled intersections. Wing widths shall be between 600 and 1500. A maximum slope of 1 on 4 is to be maintained on the wings at the kerb face (ie min 600 wide wing for a 150 kerb). At least a 1 metre kerb upstand is desirable between adjacent kerb ramps wings on an intersection corner.

General:

5. CONCRETE to be Class N32/10. All concrete to be broom finished. Ramp to be cast monolithically with the channel or tray.
6. Pathway surface finish to comply with Note 30 on Standard Drawing RS-050.
7. All dimensions are in millimetres unless shown otherwise.

Australian Standards:

AS 2876 Concrete kerbs and channels (gutters) – Manually or Machine placed
AS 1428.1 Design for access and mobility – Part 1 General requirements for access – New building work
AS/NZS 1428.4.1 Design for access and mobility – Part 4.1 Means to assist the orientation of people with vision impairment – Tactile Ground Surface Indicators

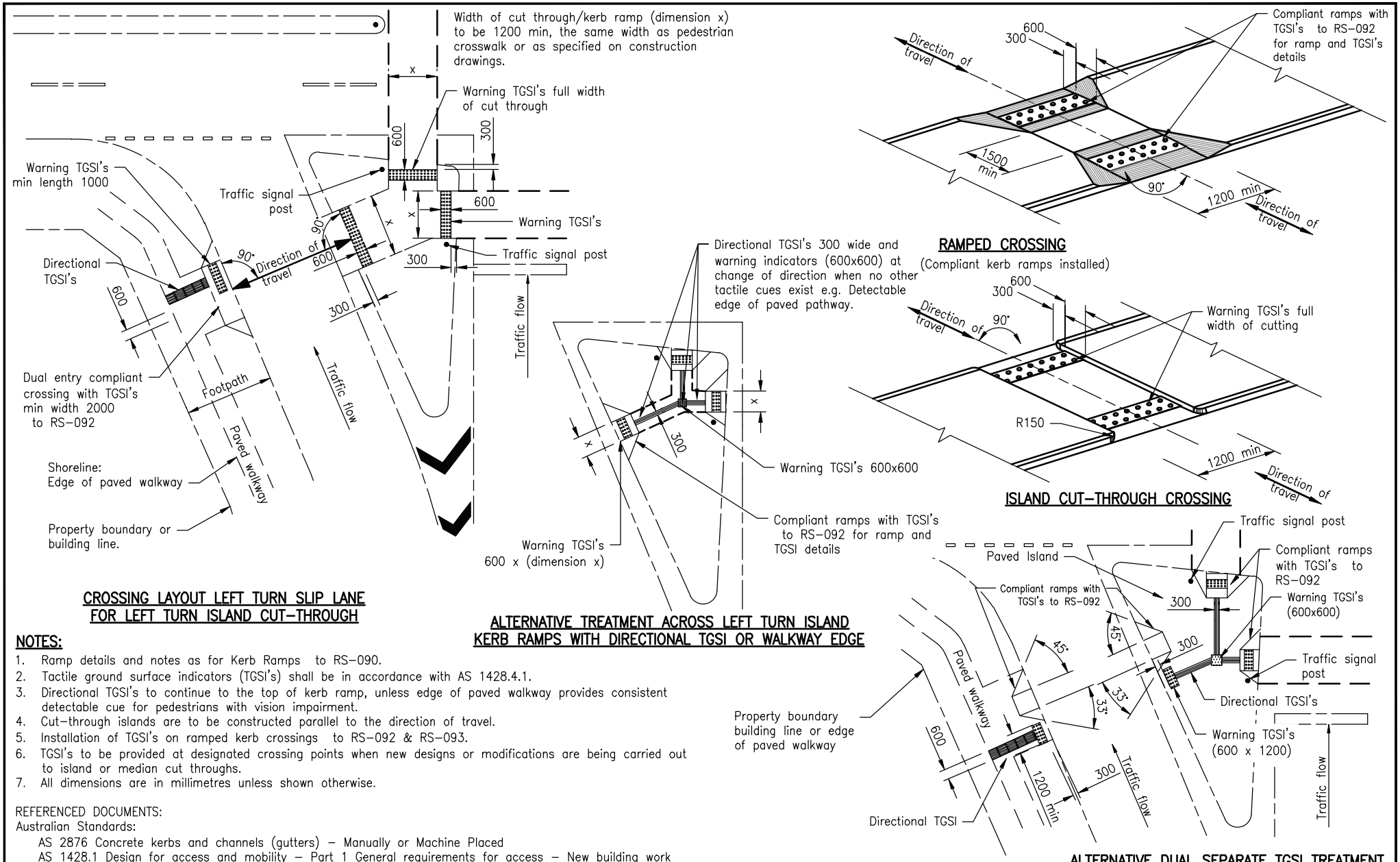
These drawings have been developed in consultation between the participating Councils.
BEFORE USE, the user shall confirm that the drawing has been adopted by the appropriate Council.

Rv.	DATE	REVISIONS
J	10/17	Notes Amended
I	12/16	Kerb Ramp Angle Changed
H	06/16	Review
G	06/14	Review
F	03/14	Amended Standard Drawings
E	12/11	Drawing number changed from SEQ R-090 to RS-090
		03/08 ORIGINAL ISSUE

INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALASIA
STANDARD DRAWINGS

KERB RAMPS
RAMPED PEDESTRIAN CROSSINGS

RS-090



CROSSING LAYOUT LEFT TURN SLIP LANE FOR LEFT TURN ISLAND CUT-THROUGH

ALTERNATIVE TREATMENT ACROSS LEFT TURN ISLAND KERB RAMPS WITH DIRECTIONAL TGSI OR WALKWAY EDGE

ALTERNATIVE DUAL SEPARATE TGSI TREATMENT ACROSS LEFT TURN SLIP LANE

NOTES:

1. Ramp details and notes as for Kerb Ramps to RS-090.
2. Tactile ground surface indicators (TGSI's) shall be in accordance with AS 1428.4.1.
3. Directional TGSI's to continue to the top of kerb ramp, unless edge of paved walkway provides consistent detectable cue for pedestrians with vision impairment.
4. Cut-through islands are to be constructed parallel to the direction of travel.
5. Installation of TGSI's on ramped kerb crossings to RS-092 & RS-093.
6. TGSI's to be provided at designated crossing points when new designs or modifications are being carried out to island or median cut throughs.
7. All dimensions are in millimetres unless shown otherwise.

REFERENCED DOCUMENTS:
Australian Standards:

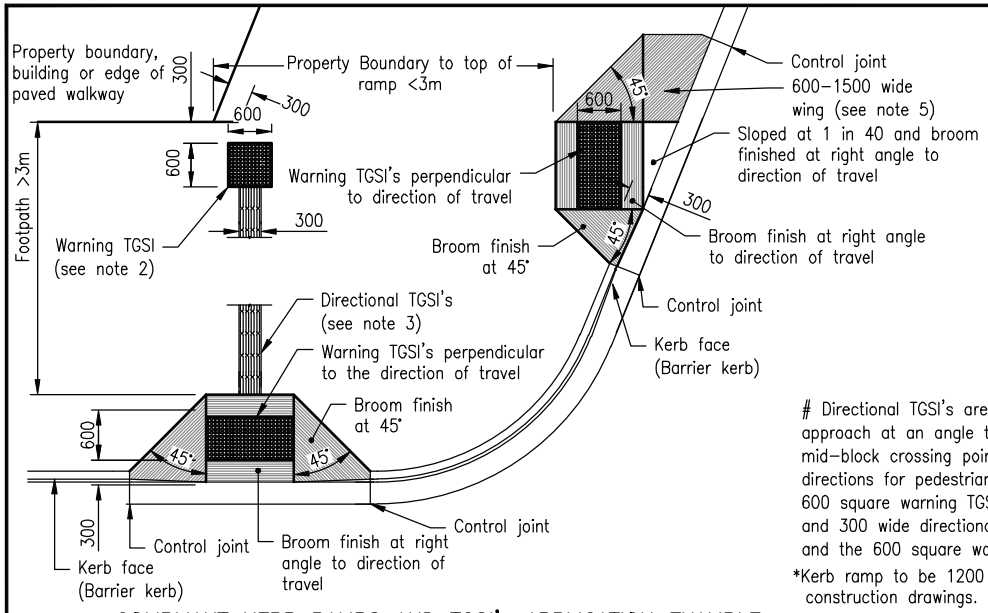
AS 2876 Concrete kerbs and channels (gutters) – Manually or Machine Placed
AS 1428.1 Design for access and mobility – Part 1 General requirements for access – New building work
AS/NZS 1428.4.1 Design for access and mobility – Part 4.1 Means to assist the orientation of people with vision impairment – Tactile Ground Surface Indicators

Rv.	DATE	REVISIONS
G	06/16	Review
F	06/14	Review
E	12/11	Drawing number changed from SEQ R-091 to RS-091
D	06/11	Review
C	06/10	Review
B	06/09	Review
		03/09 ORIGINAL ISSUE

INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALASIA
STANDARD DRAWINGS

KERB RAMPS
RAMPED AND CUT THROUGH TREATMENTS FOR PEDESTRIAN CROSSINGS SLIP LANES AND MEDIANS

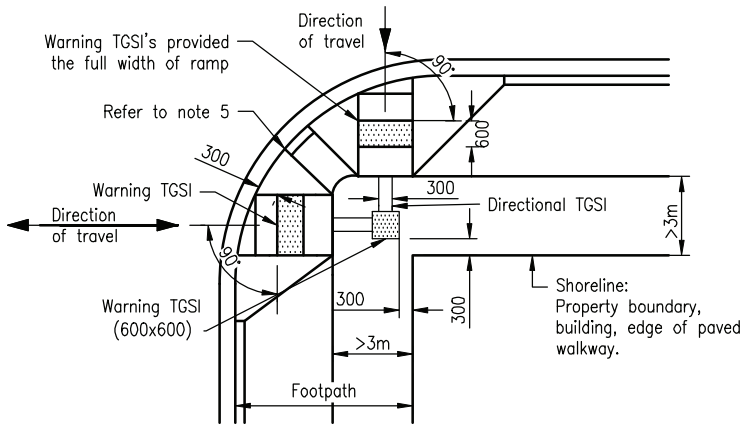
RS-091



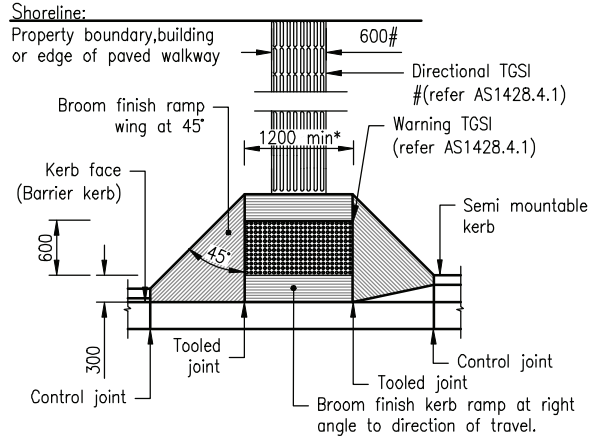
COMPLIANT KERB RAMPS AND TGSI's APPLICATION EXAMPLE PLAN VIEW

Directional TGSI's are 600 wide where pedestrians approach at an angle to the path of travel (eg at a mid–block crossing point). If there is a choice of directions for pedestrians (eg on intersection corner) install 600 square warning TGSI's pad 300 from the shore line/s and 300 wide directional TGSI's between top of kerb ramp and the 600 square warning TGSI's pad.

*Kerb ramp to be 1200 min wide or as specified on construction drawings.



COMPLIANT KERB RAMP ALIGNMENT – incl. TGSI's



COMPLIANT MID BLOCK KERB RAMP incl. TGSI's

GUIDELINES

For the installation of Tactile Ground Surface Indicators (TGSI) for pedestrians with a vision impairment at ramped kerb crossings (kerb ramps):

A. Warning and directional TGSI's shall conform with AS/NZS 1428.4.1 Design for Access and Mobility – Part 4: Tactile Indicators.
B. Tactile indicators shall have luminance contrast in all conditions (eg wet/dry, day/night). Tactile indicators and their base shall be slip resistant. Refer AS/NZS 1428.4.1 for luminance contrast and slip resistance requirements.
C. Warning TGSI's shall be installed (dimensions in brackets are warning TGSI dimensions):
   a) to warn pedestrians with a vision impairment of hazards.
   b) 300 from any hazard e.g. roadway (600 deep x full width of kerb ramp, path of travel or cut through median/island)
   c) perpendicular to the direction of travel.
   d) at the intersection of 2 (or more) directional indicator strips to indicate a change of direction (600 x 600).
   e) When kerb ramp gradient is shallower than 1:8.5.
D. Directional TGSI's shall be installed (dimensions in brackets are directional TGSI dimensions):
   a) to give directional guidance to pedestrians with a vision impairment in the absence of normally available cues.
   b) along the centreline of the direction of travel.
   d) at mid–block kerb ramps or street crossings to direct pedestrians with a vision impairment to the crossing point (600 x property boundary to top of kerb ramp).
   e) between a warning indicator pad indicating a choice of directions and the top of kerb ramps where 2 pedestrian crossings exist on a corner of an intersection.
E. The installation of TGSI should be prioritised as follows:
   a) NO TGSI's REQUIRED when all criteria at Note G are satisfied;
   b) Multiple entry kerb ramp treatment installed (Dual entry or Dual separate). Multiple entry kerb ramps must only be installed when there is sufficient space on both sides of the crossing (see AS/NZS 1428.4.1 for details of multiple entry treatments);
   c) Warning TGSI on the face of a compliant kerb ramp.
F. If a warning TGSI treatment is installed, a warning TGSI treatment must be installed on the other side of the crossing.
G. TGSI's are not required at a crossing point if:
   a) a compliant kerb ramp is installed refer to RS–090.
   b) the top of ramp is within 3 metres of the end of the shore line (property boundary, building line or edge of paved walkway), and
   c) the ramp is in direct continuous accessible path of travel from the shore line (property line, building line or paved walkway) orientated in terms of normally available cues.
   In these situations, a colour treatment of the full width and length of the face of the ramp may assist pedestrians with a vision impairment.
H. Examples of normally available cues that aid people with a vision impairment are:
   a) sharp transitions in grade between surfaces eg top and bottom of a 1 on 8 kerb ramp; change in grade between ramp and ramp wings.
   b) audio tactile push buttons, refer MUTCD Parts 10 and 14 for location and orientation of pedestrian push buttons. Note, an audio tactile push button alone is an insufficient cue for a pedestrian with a vision impairment to find the crossing point.
   c) a detectable edge of a paved walkway or cut through island.

NOTES:

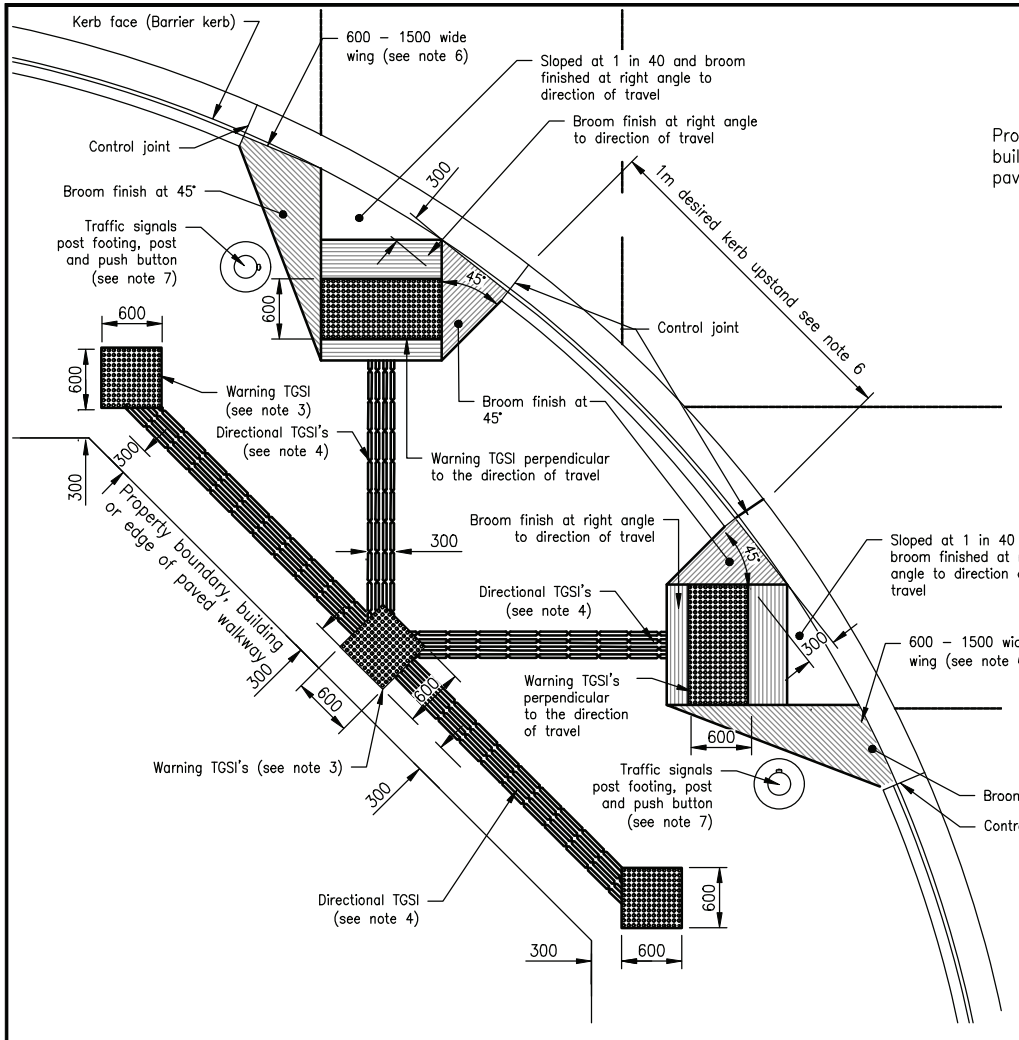
1. For details of compliant kerb ramps refer to RS–090 and RS–091.
2. Warning indicators required adjacent to shoreline (property boundary) to indicate change/choice of direction.
3. Directional indicators are required from the warning indicator pad to the top of the kerb ramps.
4. Warning indicators are required on the kerb ramp to warn of the hazard (the road/traffic). Can be omitted if kerb ramp is in accordance with AS 1428.1 & < 3 metres from the building line.
5. Kerb ramp wings may be angled at less than 45° if required to be clear of signals hardware, other kerb ramps or utility pits/manholes. Kerb ramp wings may also be reduced at obtuse angled intersections, wings shall have a width between 600mm and 1500mm. A maximum of 1:4 slope on kerb ramp wings should be maintained (600mm wide wing for a 150mm kerb). A 1m kerb upstand is desirable between adjacent ramp wings (which may necessitate reduced wing angles).
6. All Dimensions are in millimetres unless shown otherwise

Rv.	DATE	REVISIONS
H	12/16	Kerb Ramp Angle Changed
G	02/16	Amendment to Guideline B
F	06/14	Review
E	03/14	Amended Drawing Number
D	12/11	Drawing number changed from SEQ R–092 to RS–092.
C	06/11	Review

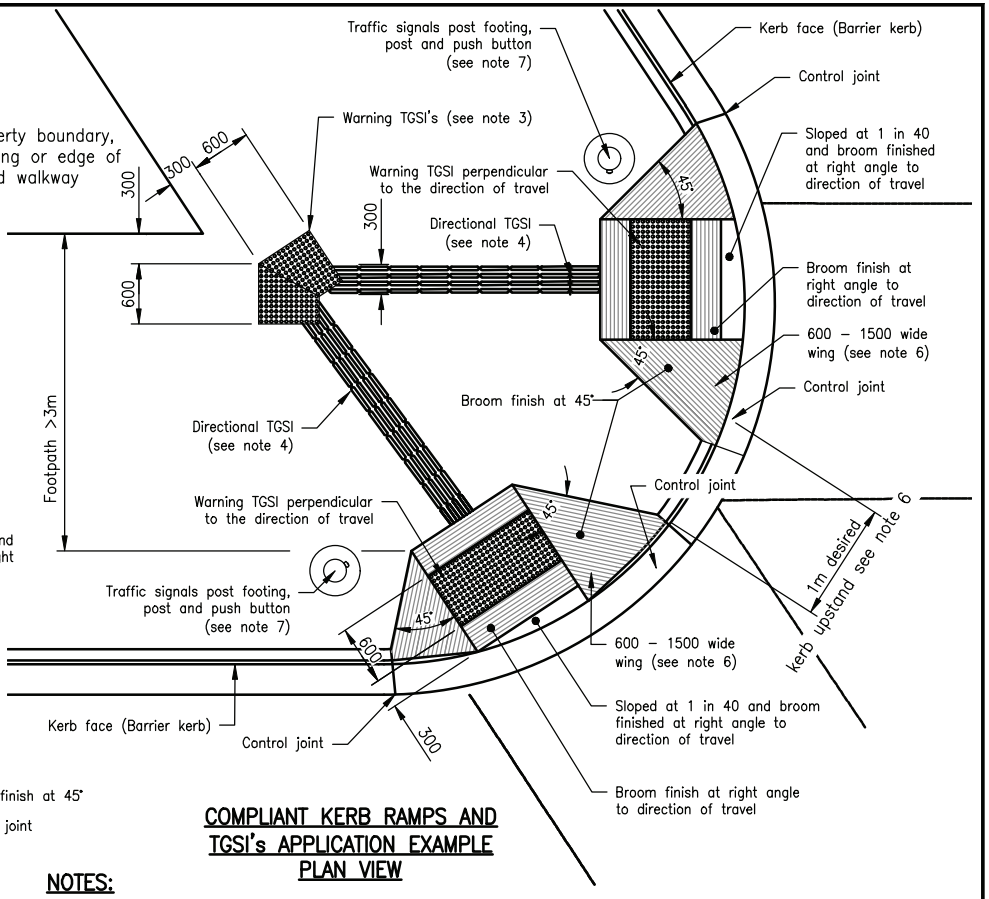
INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALASIA
STANDARD DRAWINGS

KERB RAMPS
INSTALLATION OF TGSI's
ON RAMPED KERB CROSSINGS

RS–092



COMPLIANT KERB RAMPS AND TGSI's APPLICATION EXAMPLE PLAN VIEW



COMPLIANT KERB RAMPS AND TGSI's APPLICATION EXAMPLE PLAN VIEW

NOTES:

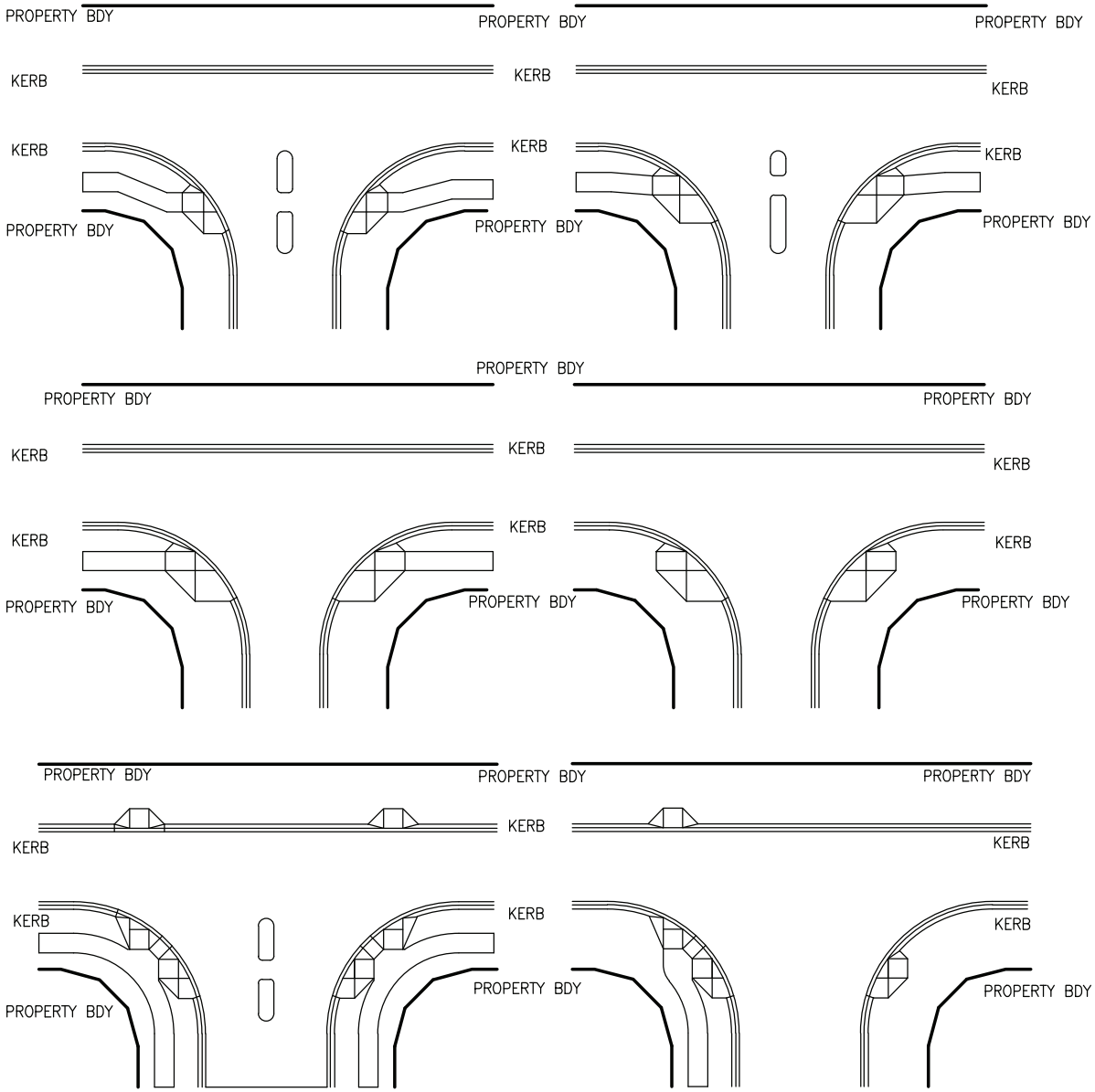
1. For details of compliant kerb ramps refer to RS–090.
2. For details of warning and directional TGSI's, refer to AS 1428.4.1
3. Warning indicators required adjacent to property boundary to indicate change of direction.
4. Directional indicators are required from the warning indicator pad to the top of the kerb ramps.
5. Warning indicators are required on the kerb ramp to warn of the hazard (the road/traffic)
6. Kerb ramp wings may be angled at less than 45° if required to be clear of signals hardware, other kerb ramps or utility pits/manholes. Kerb ramp wings may also be reduced at obtuse angled intersections, wings shall have a width between 600mm and 1500mm. A maximum of 1:4 slope on kerb ramp wings should be maintained (600mm wide wing for a 150mm kerb). A 1m kerb upstand is desirable between adjacent ramp wings (which may necessitate reduced wing angles).
7. For location of traffic signal posts and location and orientation of pedestrian push button assemblies refer to MUTCD Part 14. The push button post should be located on a level surface and the push button assembly located within the zone of common reach. Refer to AS 1428.2 i.e. button to be no more than 400mm outside the edge of a pathway or kerb ramp.
8. All dimensions are in millimetres unless shown otherwise.

Rv.	DATE	REVISIONS
F	12/16	Kerb Ramp Angle Changed
E	06/14	Review
D	03/14	Amended Drawing Number
C	12/11	Drawing number changed from SEQ R–093 to R–093.
B	06/10	Review
A	06/09	ORIGINAL ISSUE

INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALASIA
STANDARD DRAWINGS

KERB RAMPS
INSTALLATION OF TGSI's ON RAMPED KERB CROSSINGS
APPLICATION EXAMPLES

RS–093



KERB RAMPS MUST ALWAYS ALIGN WITH THE OPPOSITE KERB RAMP & MEDIAN/ISLAND CUT THROUGHS

NOTES:

1. For details of compliant kerb ramps refer to RS–090.
2. For details of warning and directional TGSI's, refer to AS1428.4.1.
3. All dimensions are in millimetres unless shown otherwise.

These drawings have been developed in consultation between the participating Councils.
BEFORE USE, the user shall confirm that the drawing has been adopted by the appropriate Council.

RV.	DATE	REVISIONS
F	06/14	Review
E	05/14	Amended Drawing Layers & Text Style
D	03/14	Amended Drawing Number
C	12/11	Drawing number changed from SEQ R-094 to R-094
B	06/10	Review
H	12/16	Kerb Ramp Angle Changed
	06/09	ORIGINAL ISSUE

INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALASIA
STANDARD DRAWINGS

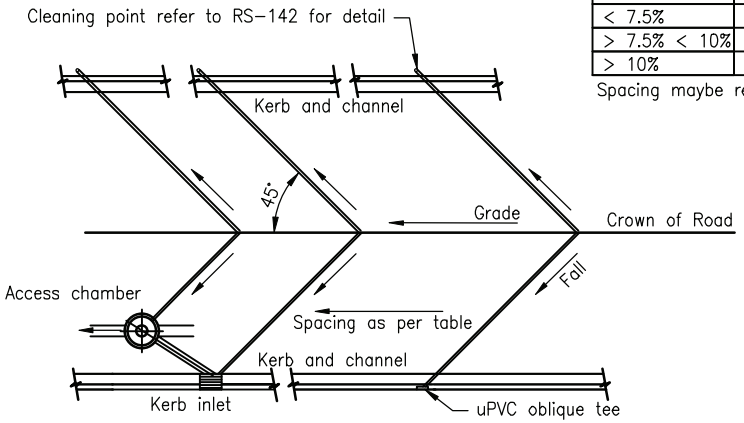
KERB RAMPS
LOCATIONS AND CONFIGURATIONS

RS–094

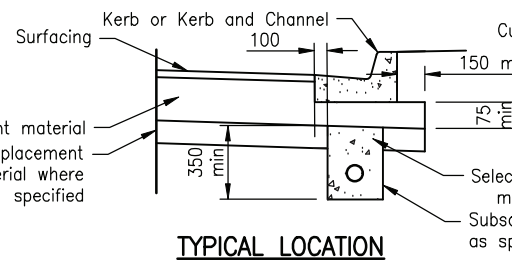
MITRE DRAIN SPACING

nom GRADE	SPACING
< 7.5%	40m centres
> 7.5% < 10%	30m centres
> 10%	20m centres

Spacing maybe reduced if required

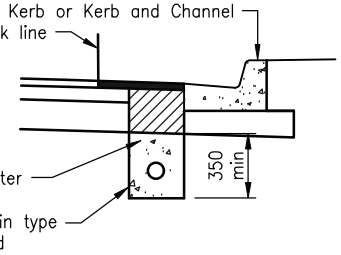


TYPICAL MITRE DRAIN LOCATIONS

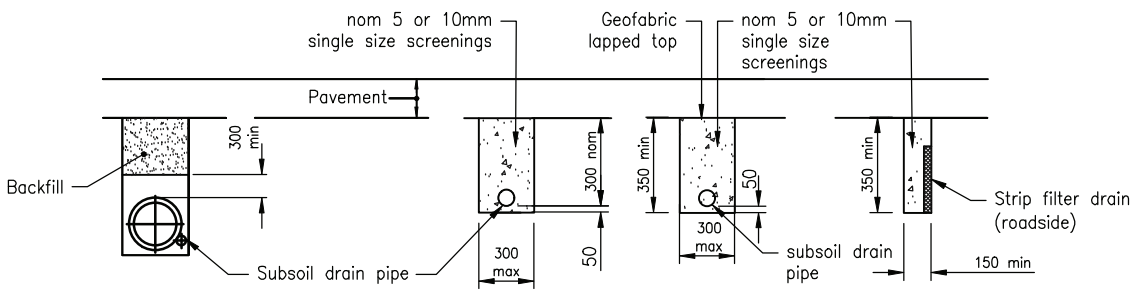


TYPICAL LOCATION NEW CONSTRUCTION

ALTERNATIVE LOCATION TO BE APPROVED BY RELEVANT COUNCIL

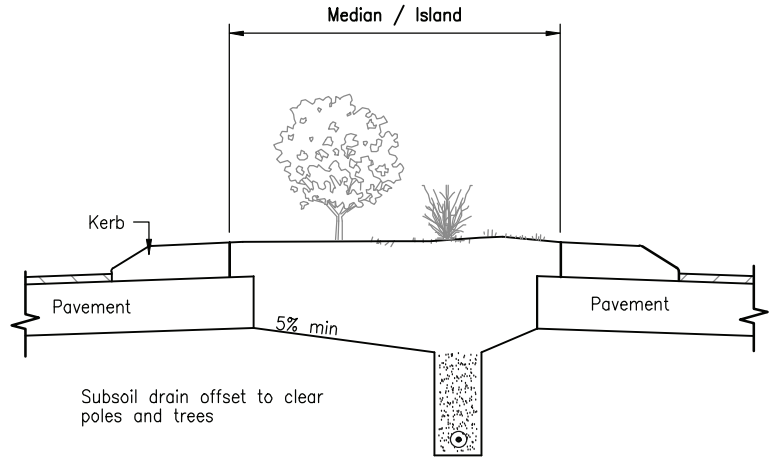


TYPICAL LOCATION WITH EXISTING K&C



STORMWATER DRAINAGE TRENCHES WITH SUBSOIL DRAINAGE

TYPE A/B TYPE B/C TYPE B/D

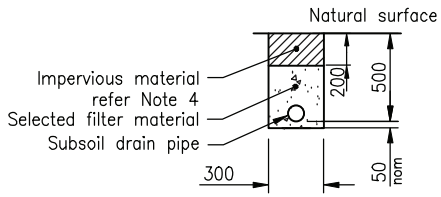


ALTERNATIVE LOCATION LANDSCAPE MEDIAN

A.S. SIEVE SIZE	5mm nom size % BY WT. PASSING	10mm nom size % BY WT. PASSING
13.20 mm	–	100
9.50 mm	–	85 – 100
6.70 mm	100	–
4.75 mm	85 – 100	0 – 20
2.36 mm	0 – 40	0 – 5
75 μm	0 – 2	0 – 2

FILTER MATERIAL GRADING

Unless otherwise specified



TYPE E

STANDARD SUBSOIL DRAIN

NOTES:

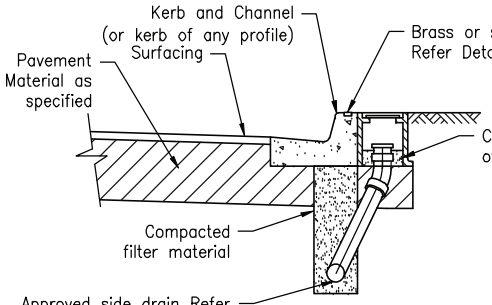
1. All subsoil drains to be Class 1000 polyethylene corrugated slotted pipe to AS 2439.1. Drains shall outlet at drainage pit, preferably or stormwater pipe 200 above invert min grade 0.5%, unless approved otherwise. Other pipes and fittings to be uPVC to AS 1254.
2. Filter materials not complying with the specified grading requirements may be used when approved by the relevant Council. A geofabric may be used to line trenches where approved by the relevant Council.
3. Refer to RS-142 for subsoil drainage access point details.
4. Impervious material to be provided where subsoil drainage is not under a pavement. When impervious material is omitted the backfill/selected filter material shall extend to underside of pavement.
5. All dimensions are in millimetres unless shown otherwise.

Rv.	DATE	REVISIONS
H	06/16	Review
G	06/14	Review
F	03/14	Amended Drawing Number
E	12/11	Drawing number changed from SEQ R-140 to RS-140
D	06/11	Review
C	06/10	Review

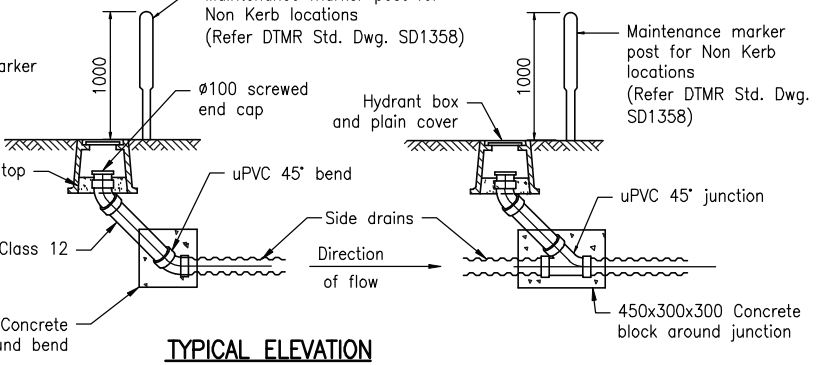
INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALASIA
STANDARD DRAWINGS

SUBSOIL DRAINS
DETAILS AND LOCATIONS

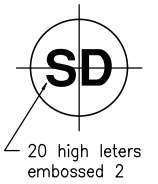
RS-140



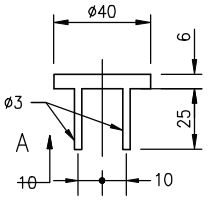
BEHIND KERB



TYPICAL ELEVATION



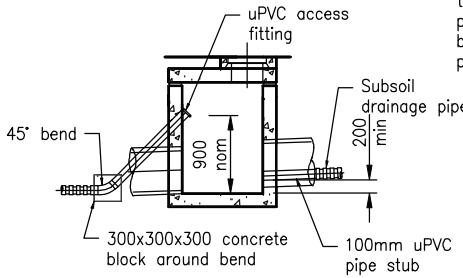
PLAN



SECTION

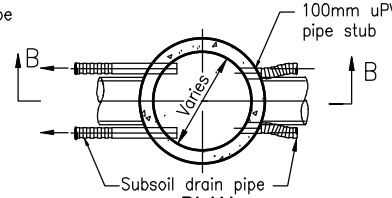
Approved propriety stainless steel markers also permitted

BRASS MARKER DETAIL



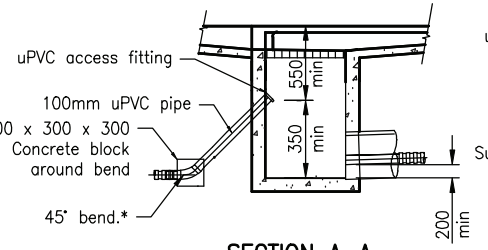
SECTION B-B

* Bend may be omitted where there is insufficient depth to the side drain trench. A min fall of 100mm is to be provided in the connection pipe between the cap and the side drain pipe

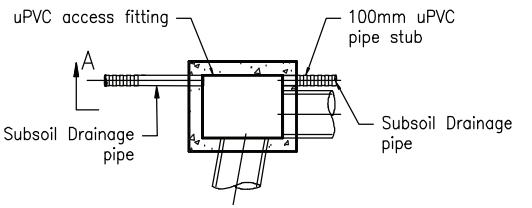


PLAN

CONNECTION DETAIL - ACCESS CHAMBER

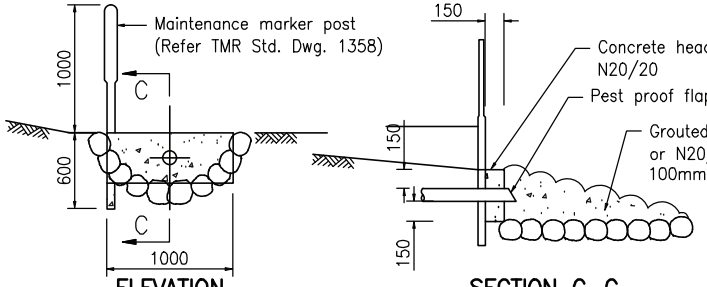


SECTION A-A



PLAN

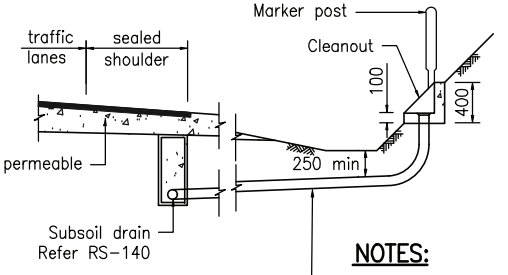
CONNECTION DETAIL - KERB INLET



ELEVATION

SECTION C-C

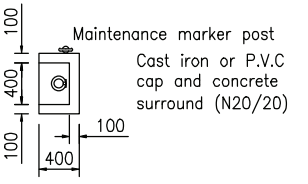
OUTLET TO NATURAL SURFACE



Subsoil drain cleanout - 100 dia upvc SH pipe
Cleanouts at head of pipe and at 60m maximum spacings(50m spacing for strip filter drains)

CUTTING CROSS SECTION

SUBSOIL DRAIN AND CLEANOUT



CLEANOUT

NOTES:

1. Refer to RS-140 for subsoil drain details and locations.
2. All pipes and fittings other than subsoil drains to be 100 dia Class 12 pipe.
3. All subsoil drains shall be in accordance with DTMR specification MRTS03.
4. Concrete anchors to be N25 in accordance with AS 1379 and AS 3600.
5. All dimensions are in millimetres unless shown otherwise.

These drawings have been developed in consultation between the participating Councils. BEFORE USE the user shall confirm that the drawing has been adopted by the appropriate Council.

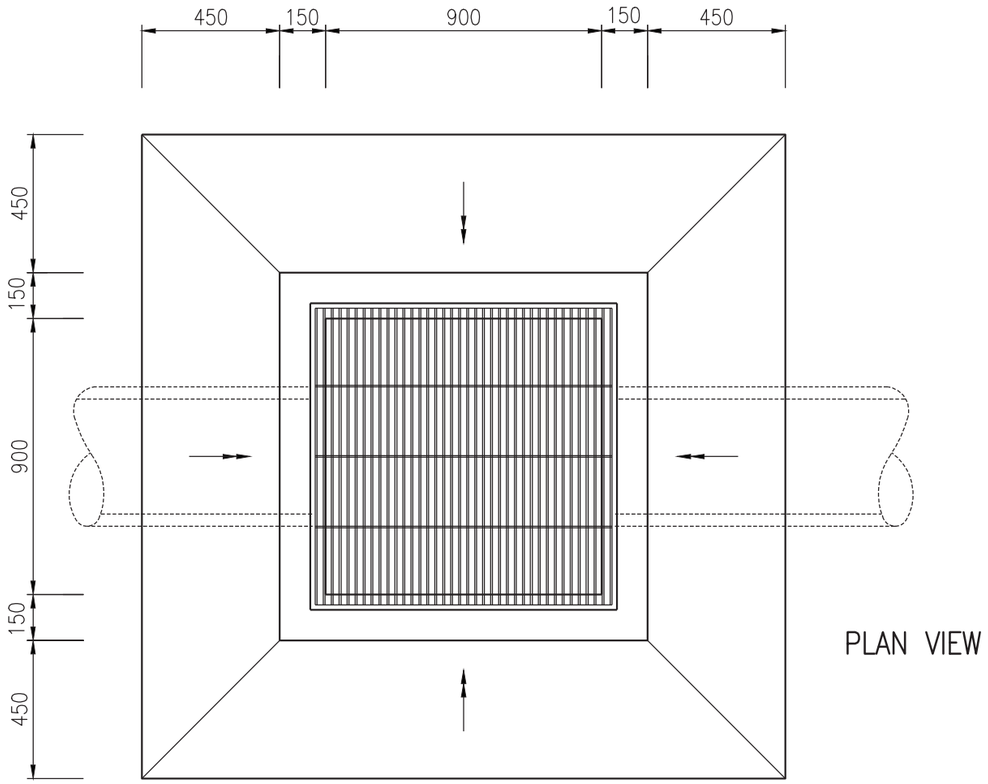
Rv.	DATE	REVISIONS
G	06/16	Review
F	06/14	Review
E	03/14	Amended Drawing number
D	12/11	Drawing number changed from SEQ R-142 to RS-142
C	06/11	Review
B	06/09	Review
	03/08	ORIGINAL ISSUE

INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALASIA
STANDARD DRAWINGS

SUBSOIL DRAINS
ACCESS POINTS

RS-142

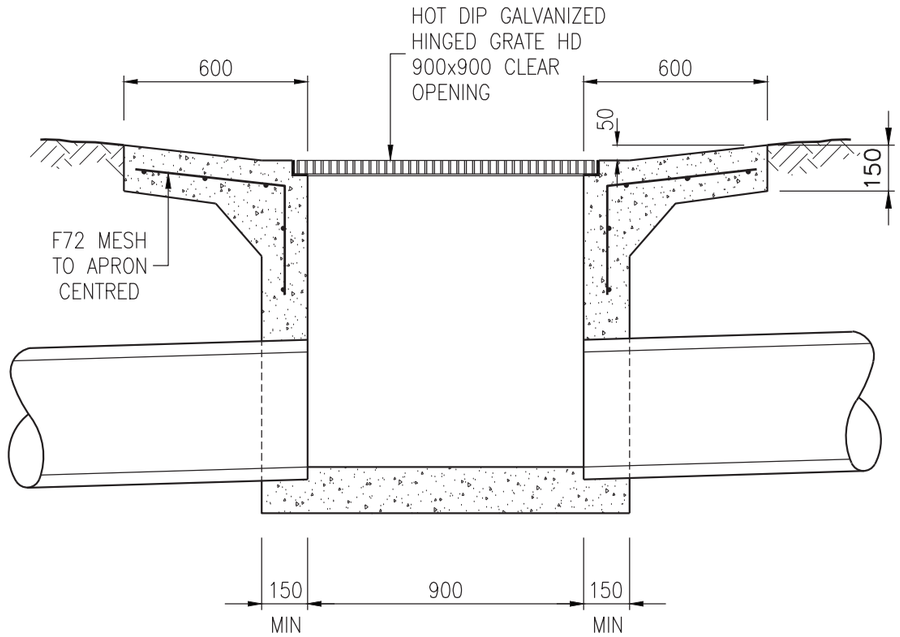
BRC(03/09)



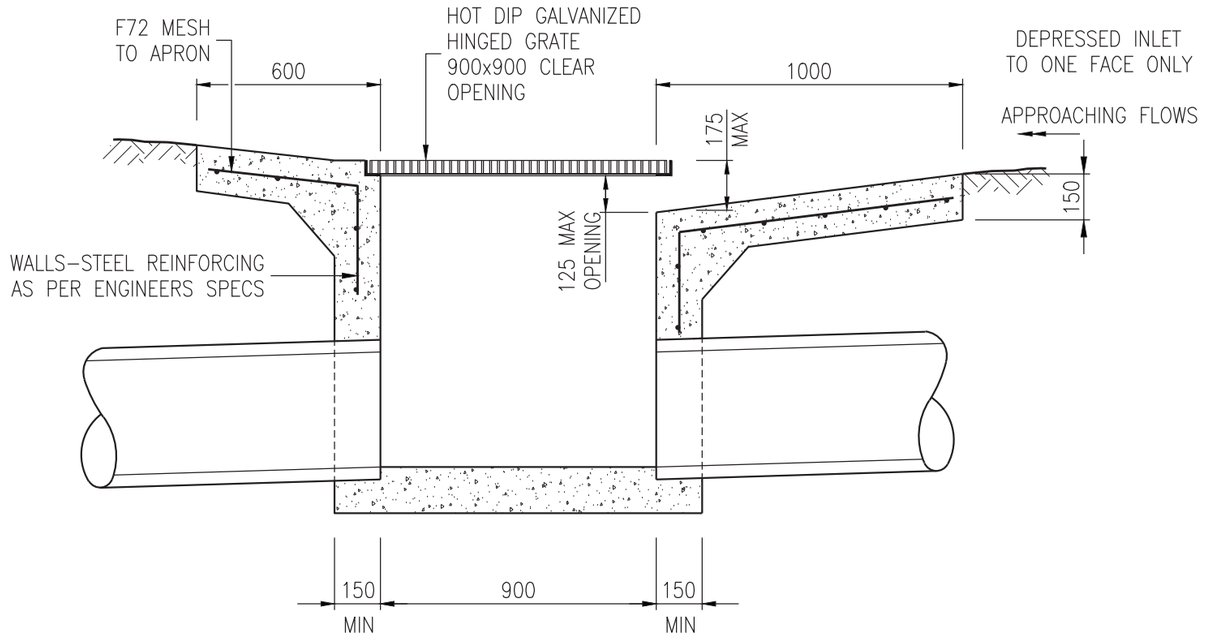
PLAN VIEW

NOTES:

1. CONCRETE N32 IN ACCORDANCE WITH AS1379 AND AS3600.
2. ALL WELDS TO AS1554.
3. GRATE AND FRAME TO BE HOT DIP GALVANIZED AFTER FABRICATION TO AS1101.3.
4. REINFORCING BARS GRADE 250 TO AS1302 – 50mm COVER MIN.
5. ALL FLATS GRADE 250 TO AS3678.
6. ALL ANGLES GRADE 250 TO AS3679.
7. HEXAGONAL HEAD BOLTS TO AS1111.
   NUTS TO AS1112.
   WASHERS TO AS1237.
   GALVANIZING TO AS1214.
8. GRATE TOP TO BE DESIGNED TO WITHSTAND LOADS TO AS3996–92.
9. GRATE TOPS TO BE DESIGNED TO SUIT TO REQUIRED USE. EG. PEDESTRIAN SAFE BICYCLE SAFE.
10. LID DESIGN TO BE SUBMITTED TO COUNCIL FOR APPROVAL.
11. ALL DIMENSIONS IN MILLIMETRES.
12. BOLLARD/FENCE TO COUNCIL ENGINEER DIRECTIONS.
13. SQUARE PIT MAYBE REPLACED WITH CYLINDRICAL PIT 900mm DIAMETER.



TYPICAL FIELD INLET



TYPICAL DEPRESSED INLET

Scales	Revisions		Verified	Date
NOT TO SCALE				
	A	Original Issue		

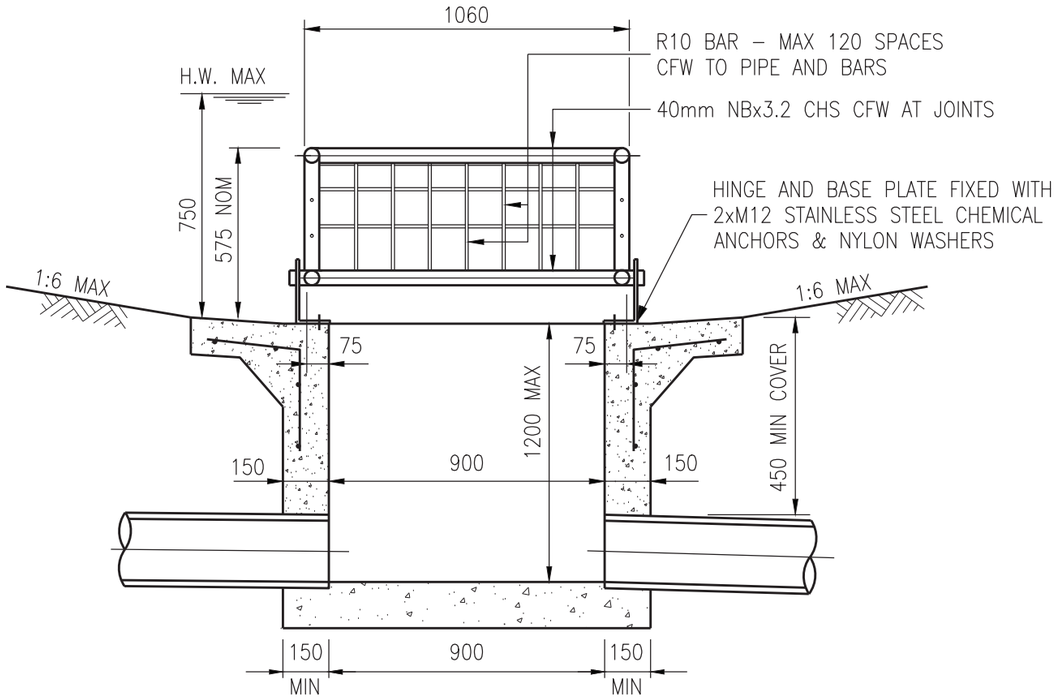
Quality Certification	
Design:	Verified:
Drawing: Tifa	Checked:
Approved by Engineer	
Date:	RPEQ:

BUNDABERG REGIONAL COUNCIL

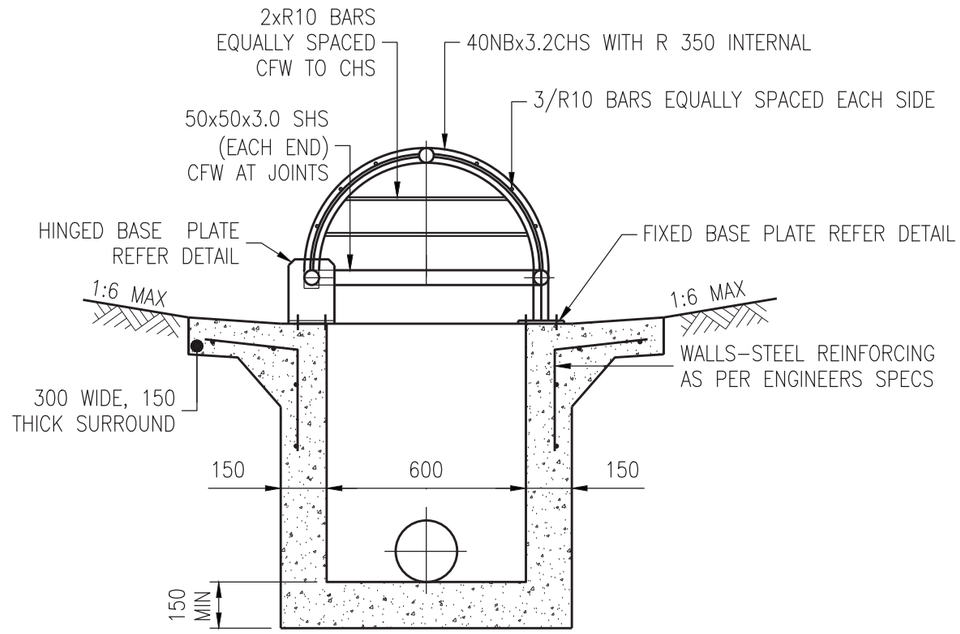
FIELD INLET
Field Inlet / Grated Gully Pit
Profiles And Dimensions

Standard Drawing No	Sheet Size	Rev
D1001	A3	

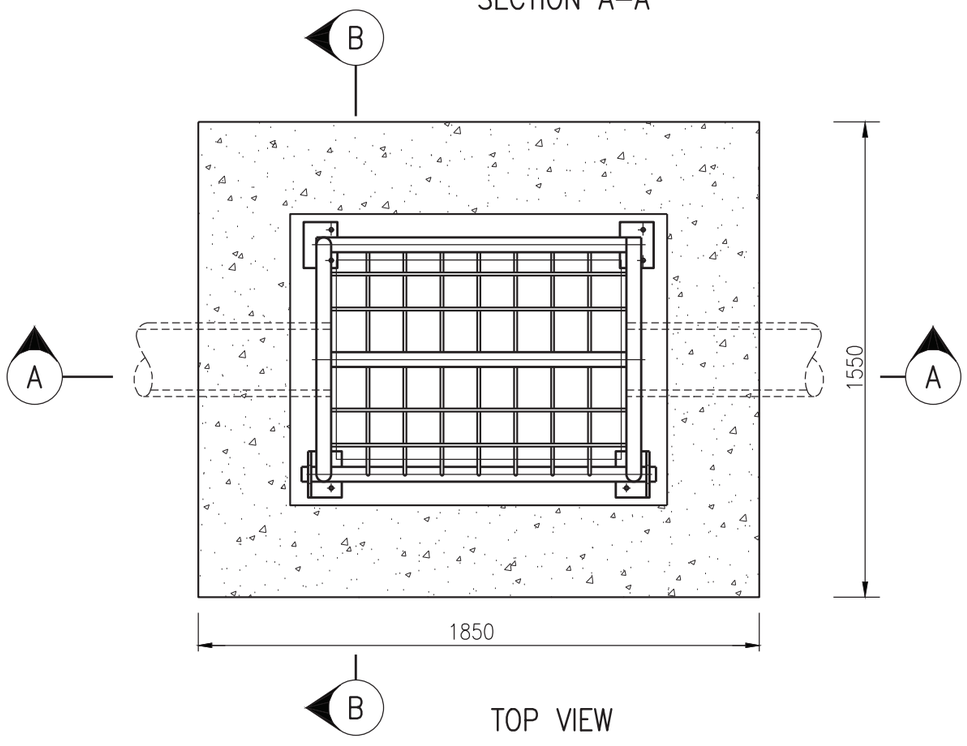
S:\Support Services\Design\Standards & Manuals\Standard Drawings\BRC Standard drawings\Drainage\D1001 | 8/07/2010 3:43:57 PM



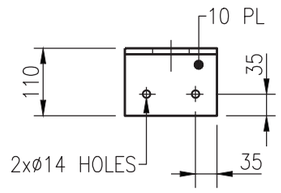
SECTION A–A



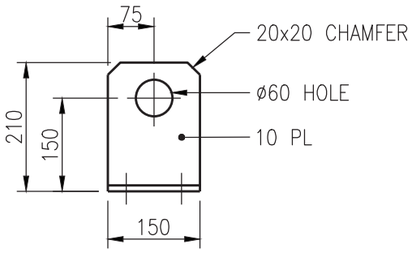
SECTION B–B



TOP VIEW

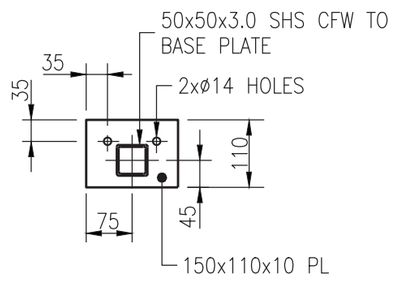


TOP VIEW



FRONT VIEW

HINGED BASE PLATE



TOP VIEW

FIXED BASE PLATE

NOTES:

1. CONCRETE N32 IN ACCORDANCE WITH AS1379 AND AS3600.
2. GRATE AND HINGE TO BE HOT DIP GALVANISED AFTER FABRICATION, THEN POWDERCOATED 'DULUX – COLORBOND CAULFIELD GREEN' OR APPROVED EQUIVALENT.
3. ALL DIMENSIONS ARE IN MILLIMETRES.

Scales	Revisions		Verified	Date
NOT TO SCALE				
	A	Original Issue		

Quality Certification	
Design:	Verified:
Drawing: Tifa	Checked:
Approved by Engineer	
Date:	RPEQ:

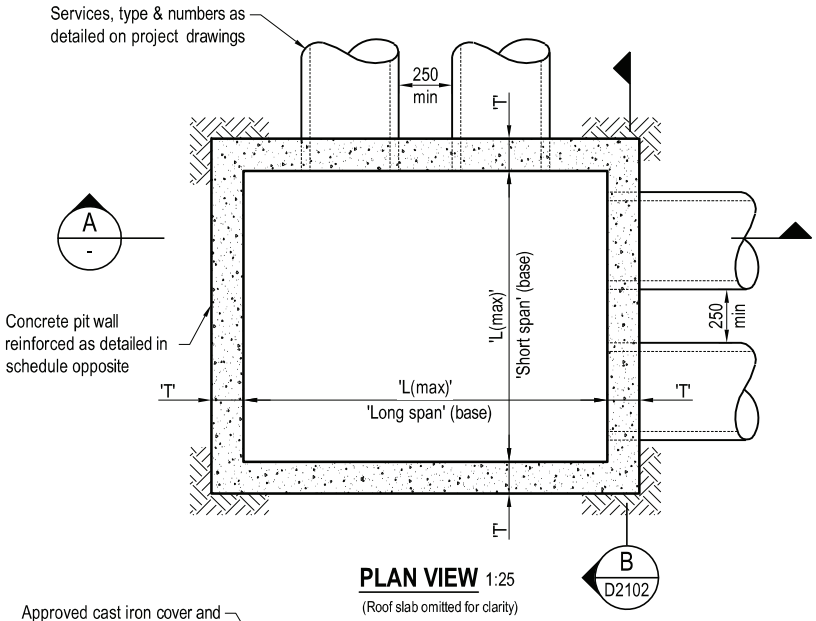
BUNDABERG REGIONAL COUNCIL

FIELD INLET
Field Inlet Pit Dome Top Cover
Partially Submerged Inlet

Standard Drawing No **D1002**

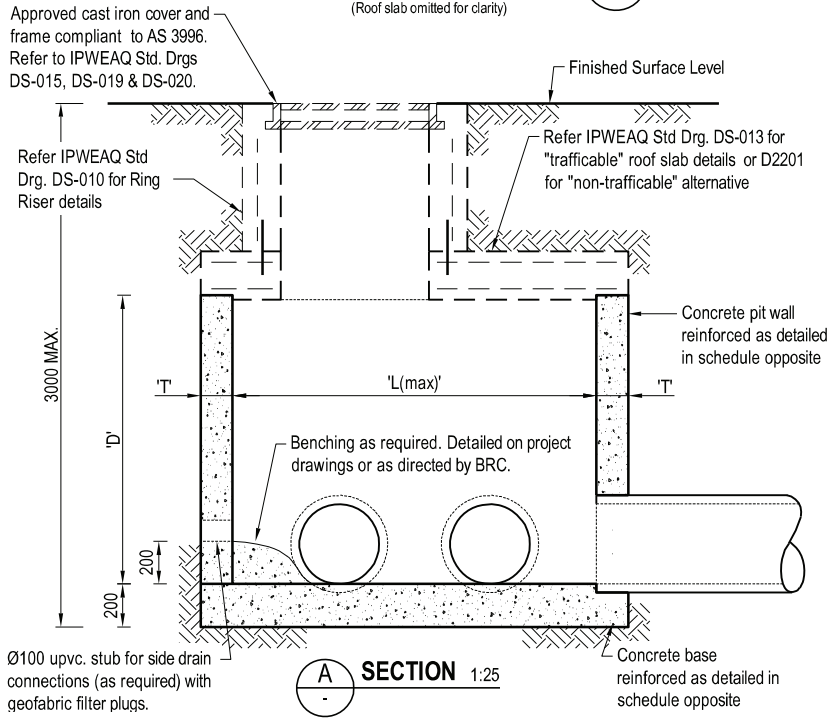
Sheet Size **A3**

Rev



PLAN VIEW 1:25

(Roof slab omitted for clarity)



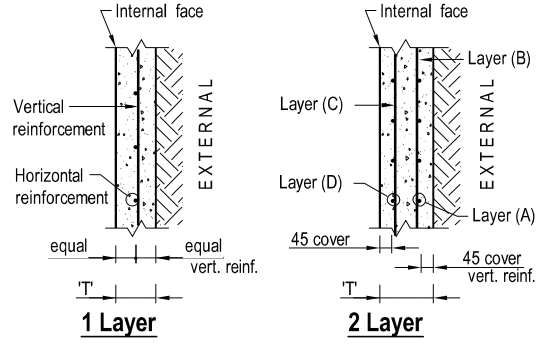
SECTION 1:25

NOTES:

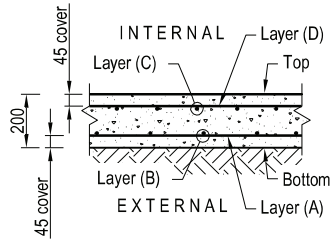
1. Scope: This Standard drawing provides details of cast insitu concrete stormwater pits of a maximum depth below finished surface level of 3000mm. Pit sizes greater than those shown on this drawing shall be a project specific design.
2. Stormwater Pit design suitable for standard soil conditions including S, M, H1 and H2 classifications however excludes E and P sites. Minimum allowable bearing pressure of **125kPa** has been achieved.
3. Stormwater Pit design in accordance with AS3600.
4. Traffic loads and traffic loads surcharge in accordance with AS5100.
5. Concrete Exposure Classication:
   - Freshwater : B1 - N32/20
   - Sea water : B2 - N40/20
   - In accordance with AS1379 and AS3600.
6. Reinforcement: Deformed bars grade D500N in accordance with AS4671, mesh grade D500L in accordance with AS4671. All reinforcing steel shall be ACRS certified.
7. Laps to reinforcement shall be:

Mesh	250mm (min two bar lap)
N12	500mm
N16	600mm
N20	800mm

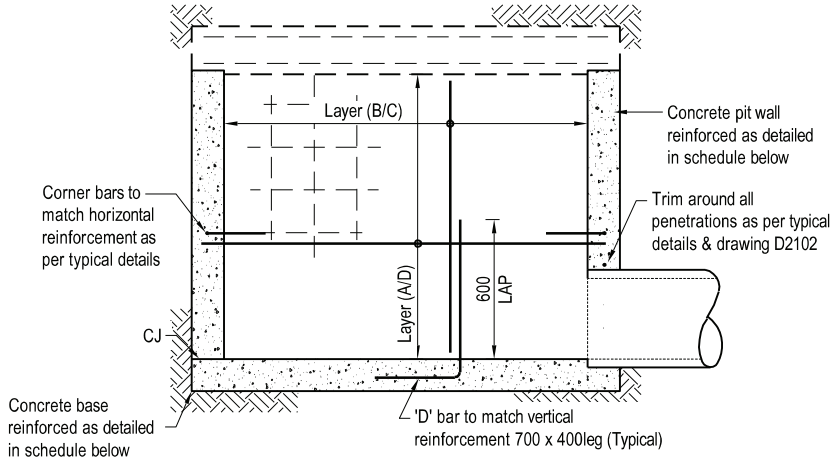
8. Formwork in accordance with AS3610.
9. Reinforcement cover 45mm minimum. Non-corrosive bar chairs to be used to achieve cover as required.
10. For details of roof slab refer IPWEAQ Standard Drawing DS-013.for "trafficable" roof slab details or D2201/D2202 for "non-trafficable" alternative.
11. For details of chamber access refer IPWEAQ Standard Drawing DS-010.
12. All dimensions in millimetres.
13. Refer DTMR standard drawing 1043 for standard bar shapes



WALL BAR LAYING SEQUENCE 1:20



BASE SLAB BAR LAYING SEQUENCE 1:20



PIT WALL REINFORCEMENT ELEVATION 1:25

BASE REINFORCEMENT SCHEDULE

MAX WALL LENGTH (L)	BASE DETAILS	PIT DEPTH (D)	
		≤2000	≤3000
≤3000	BASE THICKNESS	200	200
	SHORT SPAN	N12@200 (A)	N12@200 (A)
		N12@200 (D)	N12@200 (D)
	LONG SPAN	N12@200 (B)	N12@200 (B)
		N12@200 (C)	N12@200 (C)
	MESH ALTERNATIVE	SL81 MESH TOP & BOTTOM	SL81 MESH TOP & BOTTOM

PIT WALL SCHEDULE

MAX WALL LENGTH (L)	WALL DETAILS	PIT DEPTH (D)	
		≤2000	≤3000
≤1500	WALL THICKNESS (T)	150	175
	HORIZONTAL REINFORCEMENT	N16@200 I.F.	N16@200 I.F.
	VERTICAL REINFORCEMENT	N12@200 Central	N12@200 Central
≤2000	WALL THICKNESS (T)	175	200
	HORIZONTAL REINFORCEMENT	N16@200 I.F.	N16@150 I.F.
	VERTICAL REINFORCEMENT	N12@200Central	N12@200 Central
≤3000	WALL THICKNESS (T)	200	200
	HORIZONTAL REINFORCEMENT	N16@150 I.F.	N12@200(A)
			N20@150(D) I.F.
	VERTICAL REINFORCEMENT	N12@200 Central	N12@200 (B)
			N12@200 (C)

Note: All dimensions in millimetres (I.F.= Internal Face)

Revisions		Verified	Date
		-	-
A	Original Issue		

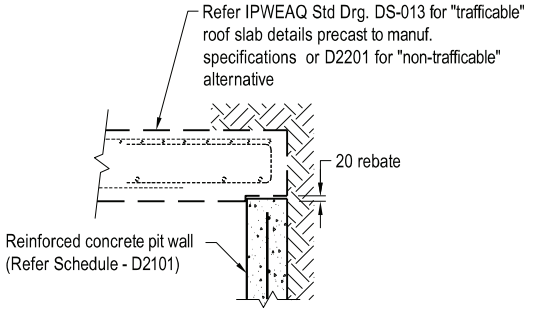
Engineering Certification
Design: ES. Verified: KM.
Drawn: HB. Checked: ES.
RPEQ #7250

Approved
Branch Manager
Engineering Services
Digitally signed by Dwayne Honor
Date: 2020.01.17 16:07:35 +10'00'

BUNDABERG REGIONAL COUNCIL

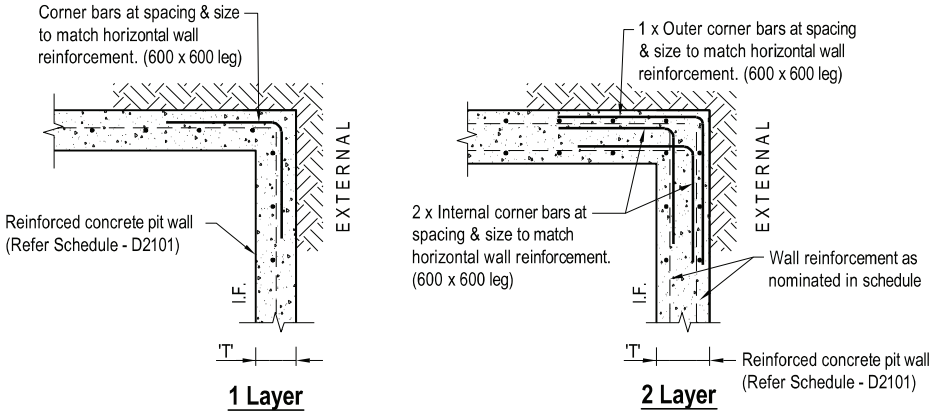
BRC STANDARD CONCRETE STORMWATER PIT PROFILES AND DIMENSIONS

Standard Drawing No.: D2101
Sheet Size: A3
Rev.: A



ELEVATION

TYPICAL PIT WALL TOP RESTRAINT 1:20



PLAN VIEW

TYPICAL WALL CORNER REINFORCEMENT DETAILS 1:20

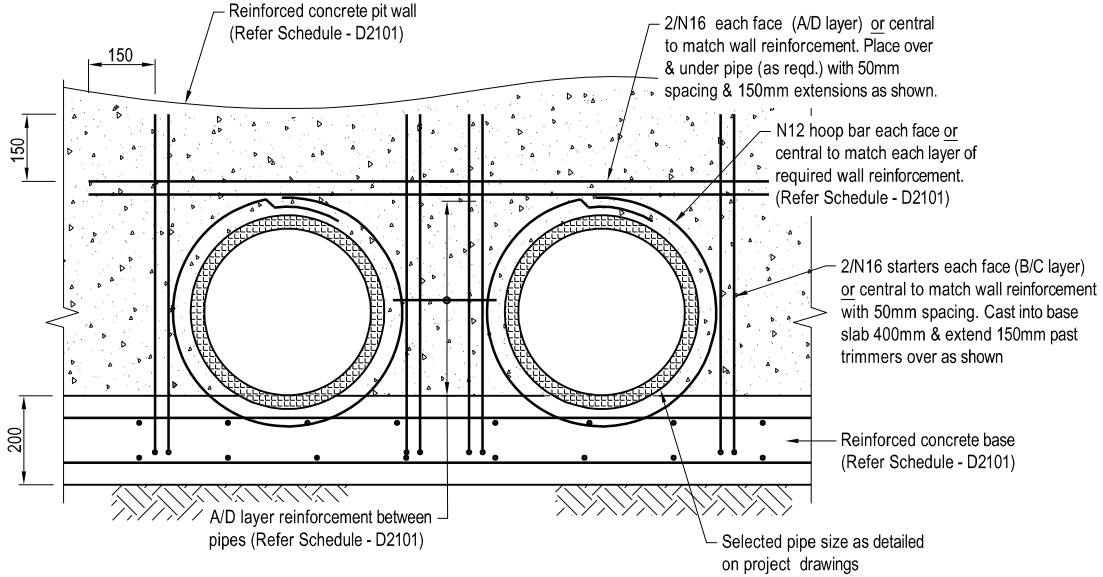
NOTES:

1. Scope: This Standard drawing provides details of cast insitu concrete stormwater pits of a maximum depth below finished surface level of 3000mm. Pit sizes greater than those shown on this drawing shall be a project specific design.
2. Stormwater Pit design suitable for standard soil conditions including S, M, H1 and H2 classifications however excludes E and P sites. Minimum allowable bearing pressure of **125kPa** has been achieved.
3. Stormwater Pit design in accordance with AS3600.
4. Traffic loads and traffic loads surcharge in accordance with AS5100.
5. Concrete Exposure Classication:

Freshwater	:	B1 - N32/20
Sea water	:	B2 - N40/20

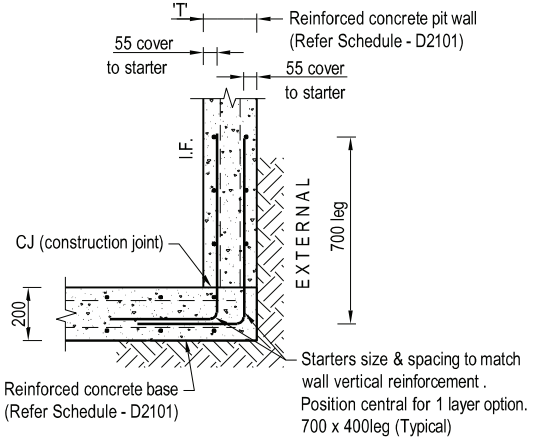
   In accordance with AS1379 and AS3600.
6. Reinforcement: Deformed bars grade D500N in accordance with AS4671, mesh grade D500L in accordance with AS4671. All reinforcing steel shall be ACRS certified.
7. Laps to reinforcement shall be:

Mesh	250mm (min two bar lap)
N12	500mm
N16	600mm
N20	800mm
8. Formwork in accordance with AS3610.
9. Reinforcement cover 45mm minimum. Non-corrosive bar chairs to be used to achieve cover as required.
10. For details of roof slab refer IPWEAQ Standard Drawing DS-013.for "trafficable" roof slab details or D2201/D2202 for "non-trafficable" alternative.
11. For details of chamber access refer IPWEAQ Standard Drawing DS-010.
12. All dimensions in millimetres.
13. Refer DTMR standard drawing 1043 for standard bar shapes



B D2101 **SECTION**

TYPICAL WALL PIPE PENETRATION REINFORCEMENT NTS



ELEVATION

TYPICAL WALL TO BASE FIXING 1:20

Revisions	Verified	Date
A Original Issue	-	-

Engineering Certification
Design: ES. Verified: KM.
Drawn: HB. Checked: ES.
RPEQ #7250

Approved
Branch Manager
Engineering Services
Digitally signed by Dwayne Honor
Date: 2020.01.17 16:08:02 +10'00'

BUNDABERG REGIONAL COUNCIL

BRC STANDARD
TYPICAL STORMWATER PIT DETAILS
PROFILES AND DIMENSIONS

Standard Drawing No.: D2102
Sheet Size: A3
Rev.: A

BRC(06/19)

TABLE A : 'S' BARS

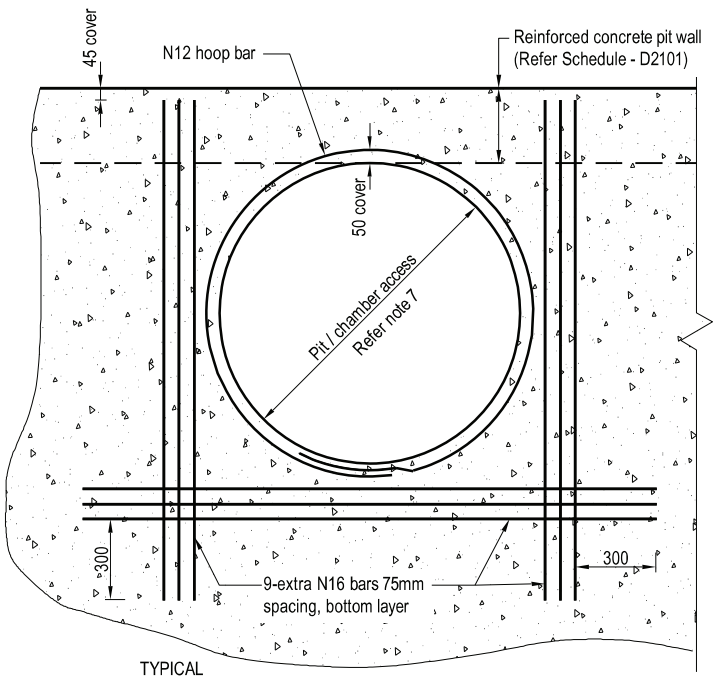
SHORT SPAN	LONG SPAN 1500	LONG SPAN 2000	LONG SPAN 3000	SLAB DEPTH
1500	N12@200	N12@200	N12@200	150
2000	-	N12@200	N16@200	175
3000	-	-	N16@200	200

Note: All dimensions in millimetres

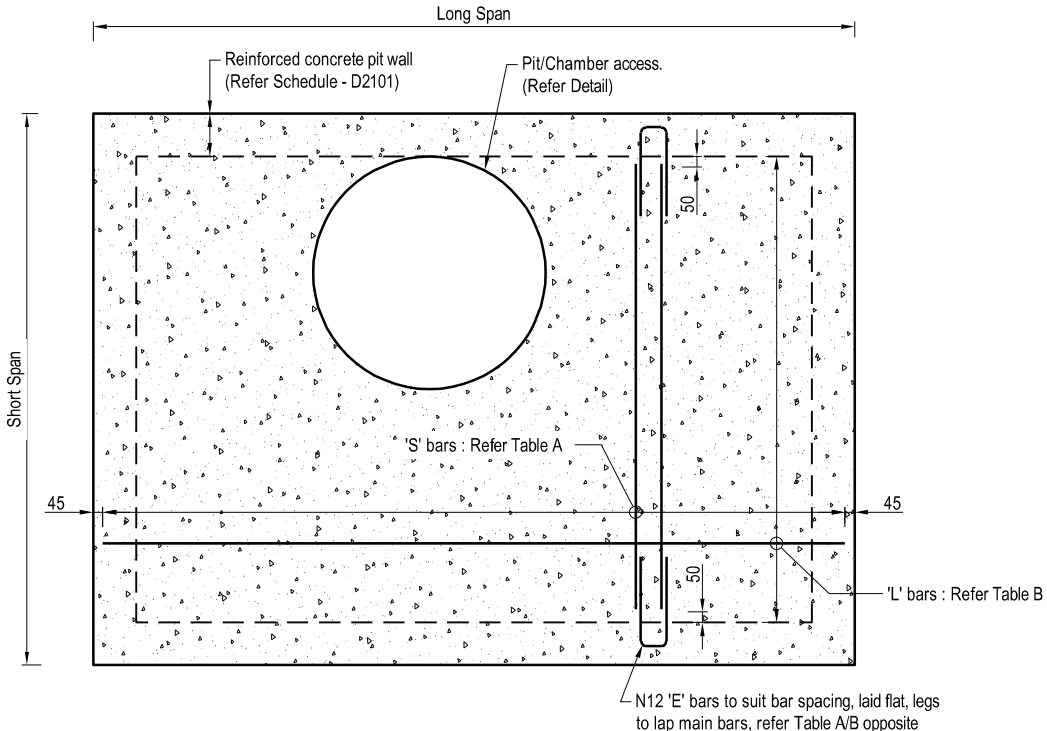
TABLE B : 'L' BARS

SHORT SPAN	LONG SPAN 1500	LONG SPAN 2000	LONG SPAN 3000	SLAB DEPTH
1500	N12@200	N12@200	N12@200	150
2000	-	N12@175	N12@175	175
3000	-	-	N12@150	200

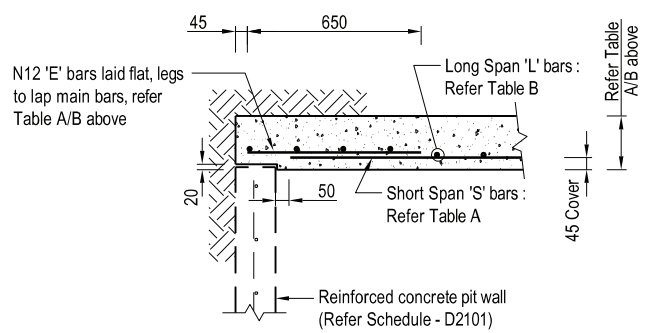
Note: All dimensions in millimetres



TYPICAL
ROOF SLAB REINFORCEMENT AROUND CHAMBER ACCESS 1:20



TYPICAL
(NON-TRAFFICABLE) ROOF SLAB REINFORCEMENT 1:25



TYPICAL
ROOF SLAB SECTION 1:20

NOTES:

1. Concrete Exposure Classication:
   - Freshwater : B1 - N32/20
   - Sea water : B2 - N40/20
   - In accordance with AS1379 and AS3600.
2. Reinforcement :-
   Bars N12 and N16, Grade 500 to AS 1302
3. Laps to reinforcement shall be:
   - Mesh 250mm (min two bar lap)
   - N12 500mm
   - N16 600mm
   - N20 800mm
4. Formwork in accordance with AS3610.
5. Reinforcement cover 45mm minimum. (U.N.O) Non-corrosive bar chairs to be used to achieve cover as required.
6. Maximum fill over roof slab shall be 1500mm.
7. For details of pit/chamber access refer IPWEAQ Standard DS-010.
8. For details of pit/chamber walls and floors refer Standard Drawing D2101, D2102 and project specific documentation.
9. All dimensions in millimetres.
10. Refer DTMR standard drawing 1043 for standard bar shapes

Revisions	Verified	Date
-	-	-
A Original Issue		

Engineering Certification
Design: ES. Verified: KM.
Drawn: HB. Checked: ES.
RPEQ #7250

Approved
Branch Manager
Engineering Services
Digitally signed by Dwayne Honor
Date: 2020.01.17 16:09:03 +10'00'

BUNDABERG REGIONAL COUNCIL

BRC STANDARD CONCRETE STORMWATER PIT CLASS 'B' ROOF SLAB

Standard Drawing No.: D2201
Sheet Size: A3
Rev.: A

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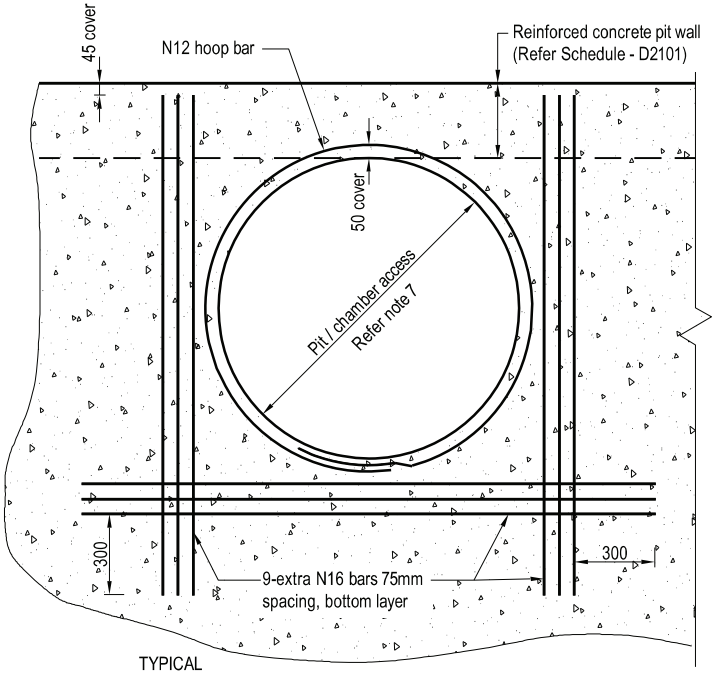
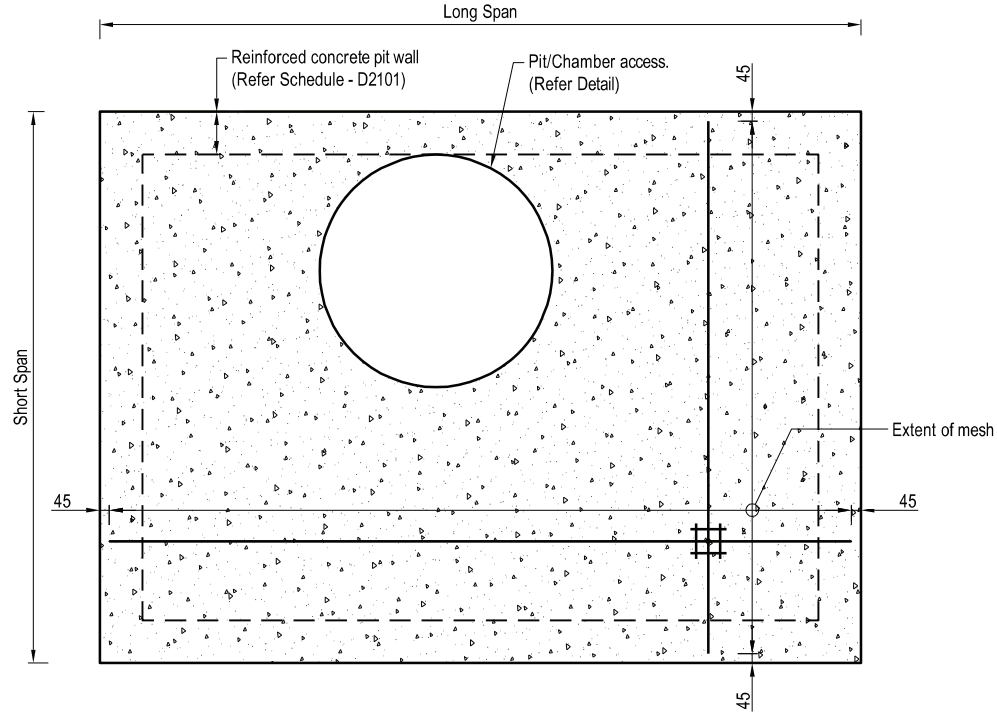
BRC(06/19)

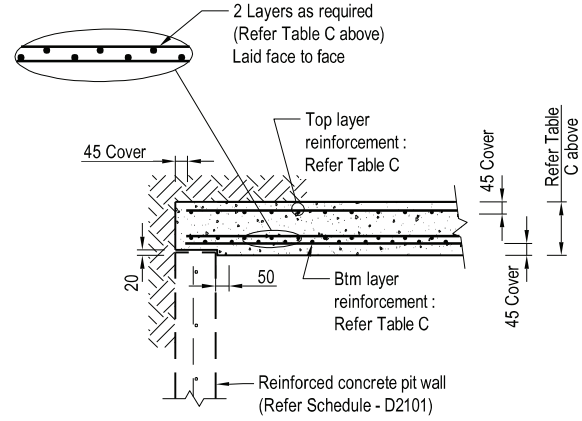
TABLE C : MESH OPTION					
		LONG SPAN			SLAB DEPTH
		1500	2000	3000	
SHORT SPAN	1500	SL81 MESH TOP & BOTTOM	SL81 MESH TOP & BOTTOM	SL81 MESH TOP & BOTTOM	150
	2000	-	SL81 MESH TOP & BOTTOM	SL81 MESH TOP & BOTTOM	175
	3000	-	-	SL81 MESH TOP 2 x SL81 MESH BTM	200
Note: All dimensions in millimetres					



TYPICAL
ROOF SLAB REINFORCEMENT AROUND CHAMBER ACCESS 1:20



TYPICAL
(NON-TRAFFICABLE) ROOF SLAB REINFORCEMENT 1:25



TYPICAL
ROOF SLAB SECTION 1:20

NOTES:

1. Concrete Exposure Classication:
   Freshwater : B1 - N32/20
   Sea water : B2 - N40/20
   In accordance with AS1379 and AS3600.
2. Reinforcement :-
   Bars N12 and N16, Grade 500 to AS 1302
3. Laps to reinforcement shall be:

Mesh	250mm (min two bar lap)
N12	500mm
N16	600mm
N20	800mm

4. Formwork in accordance with AS3610.
5. Reinforcement cover 45mm minimum. (U.N.O) Non-corrosive bar chairs to be used to achieve cover as required.
6. Maximum fill over roof slab shall be 1500mm.
7. For details of pit/chamber access refer IPWEAQ Standard DS-010.
8. For details of pit/chamber walls and floors refer Standard Drawing D2101, D2102 and project specific documentation.
9. All dimensions in millimetres.
10. Refer DTMR standard drawing 1043 for standard bar shapes

Revisions		Verified	Date
-		-	-
A	Original Issue		

Engineering Certification
Design: ES. Verified: KM.
Drawn: HB. Checked: ES.
RPEQ #7250

Approved
Branch Manager
Engineering Services
Digitally signed by Dwayne Honor
Date: 2020.01.17 16:09:24 +10'00'

BUNDABERG REGIONAL COUNCIL

BRC STANDARD
CONCRETE STORMWATER PIT
CLASS 'B' ROOF SLAB (MESH ALTERNATIVE)

Standard Drawing No.: D2202
Sheet Size: A3
Rev.: A

BRC(06/19)

TABLE A : 'S' BARS

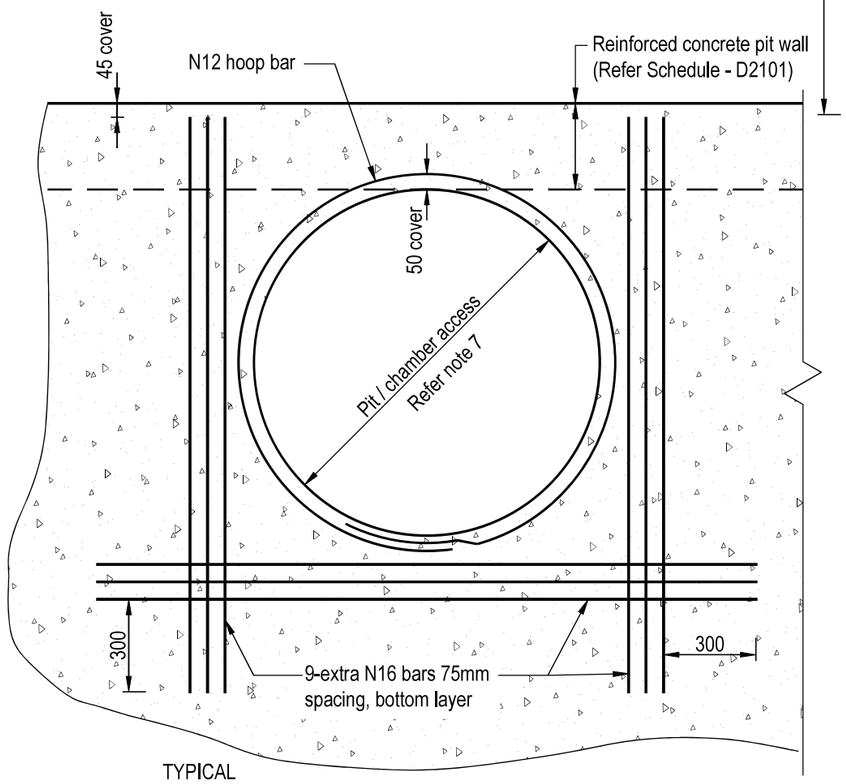
SHORT SPAN \ LONG SPAN	1500	2000	3000	SLAB DEPTH
1500	N16@200	N16@200	N16@175	200
2000	-	N16@175	N16@150	200
3000	-	-	SL82 MESH TOP N16@150 BTM	225

Note: All dimensions in millimetres

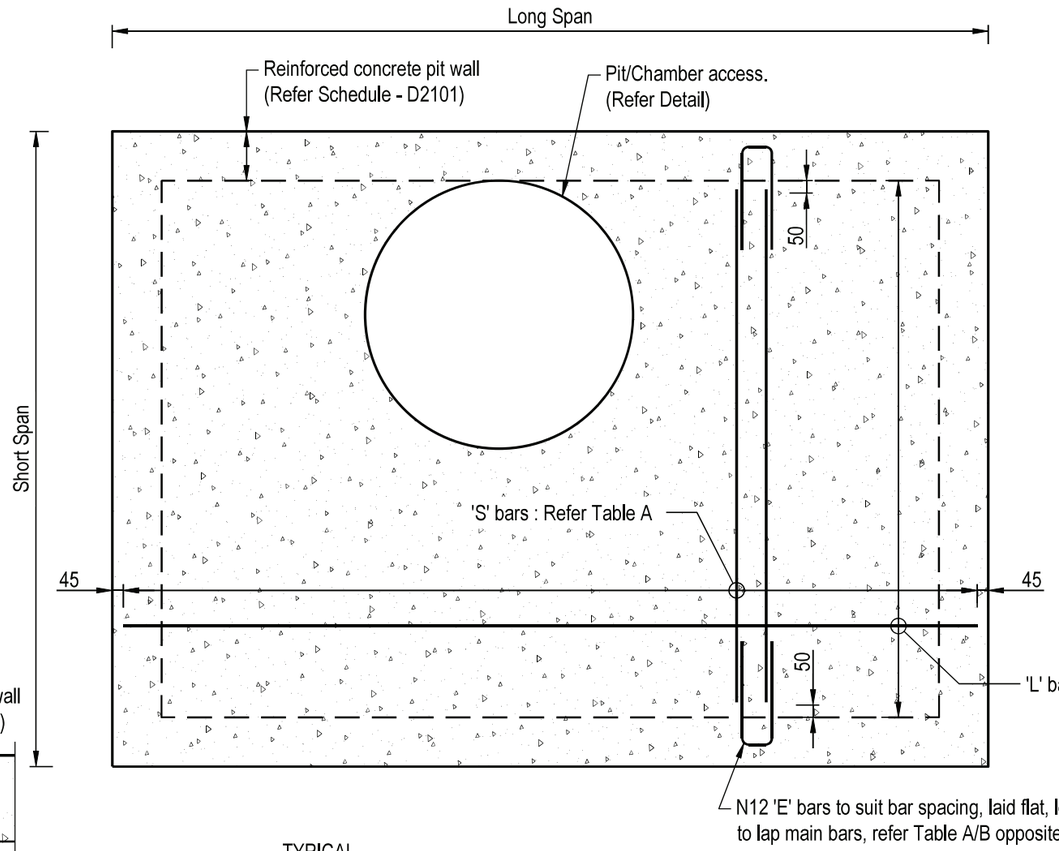
TABLE B : 'L' BARS

SHORT SPAN \ LONG SPAN	1500	2000	3000	SLAB DEPTH
1500	N16@200	N16@200	N16@200	200
2000	-	N16@175	N16@200	200
3000	-	-	SL82 MESH TOP N16@150 BTM	225

Note: All dimensions in millimetres



TYPICAL
ROOF SLAB REINFORCEMENT AROUND CHAMBER ACCESS 1:20



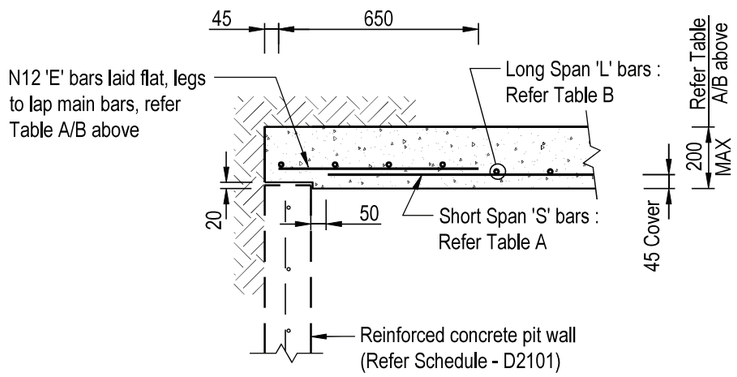
TYPICAL
(TRAFFICABLE) ROOF SLAB REINFORCEMENT 1:25

NOTES:

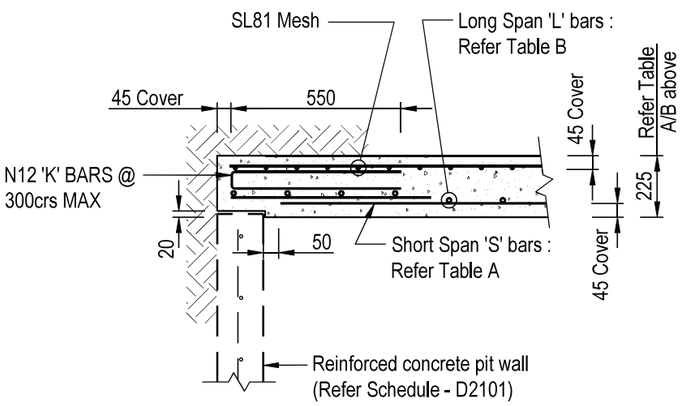
1. Concrete Exposure Classication:
   Freshwater : B1 - N32/20
   Sea water : B2 - N40/20
   In accordance with AS1379 and AS3600.
2. Reinforcement :-
   Bars N12 and N16, Grade 500 to AS 1302
3. Laps to reinforcement shall be:

Mesh	250mm (min two bar lap)
N12	500mm
N16	600mm
N20	800mm

4. Formwork in accordance with AS3610.
5. Reinforcement cover 45mm minimum. (U.N.O) Non-corrosive bar chairs to be used to achieve cover as required.
6. Maximum fill over roof slab shall be 1500mm.
7. For details of pit/chamber access refer IPWEAQ Standard DS-010.
8. For details of pit/chamber walls and floors refer Standard Drawing D2101, D2102 and project specific documentation.
9. All dimensions in millimetres.
10. Refer DTMR standard drawing 1043 for standard bar shapes



TYPICAL
ROOF SLAB SECTION 1:20
200 THICK



TYPICAL
ROOF SLAB SECTION 1:20
225 THICK

Revisions		Verified	Date
-		-	-
A	Original Issue		

Engineering Certification
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RPEQ #7250

Approved
Branch Manager
Engineering Services

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BRC STANDARD CONCRETE STORMWATER PIT CLASS 'D' ROOF SLAB

Standard Drawing No.: D2301
Sheet Size: A3
Rev.: A

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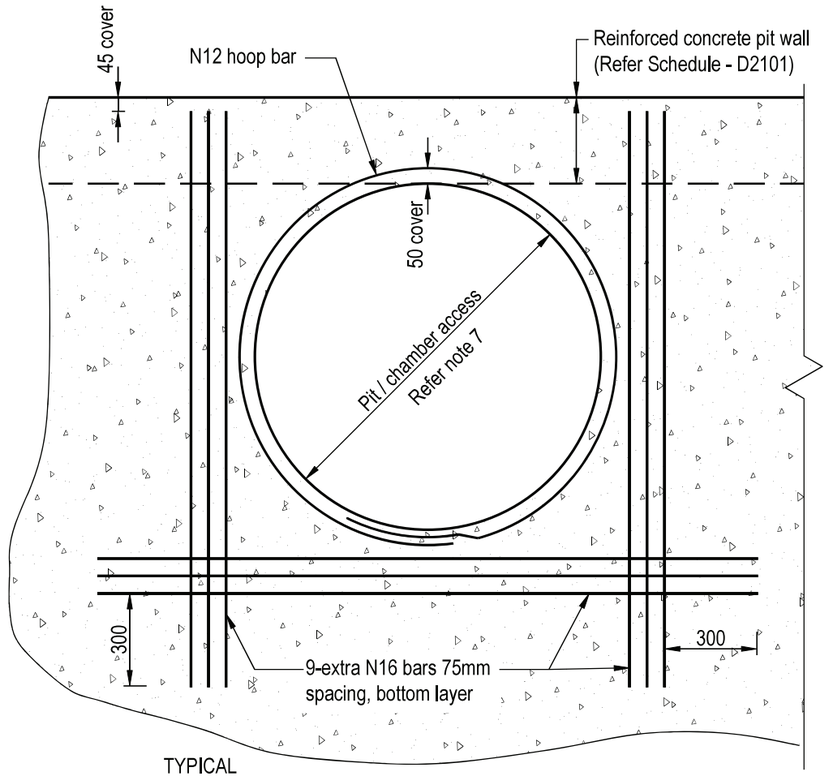
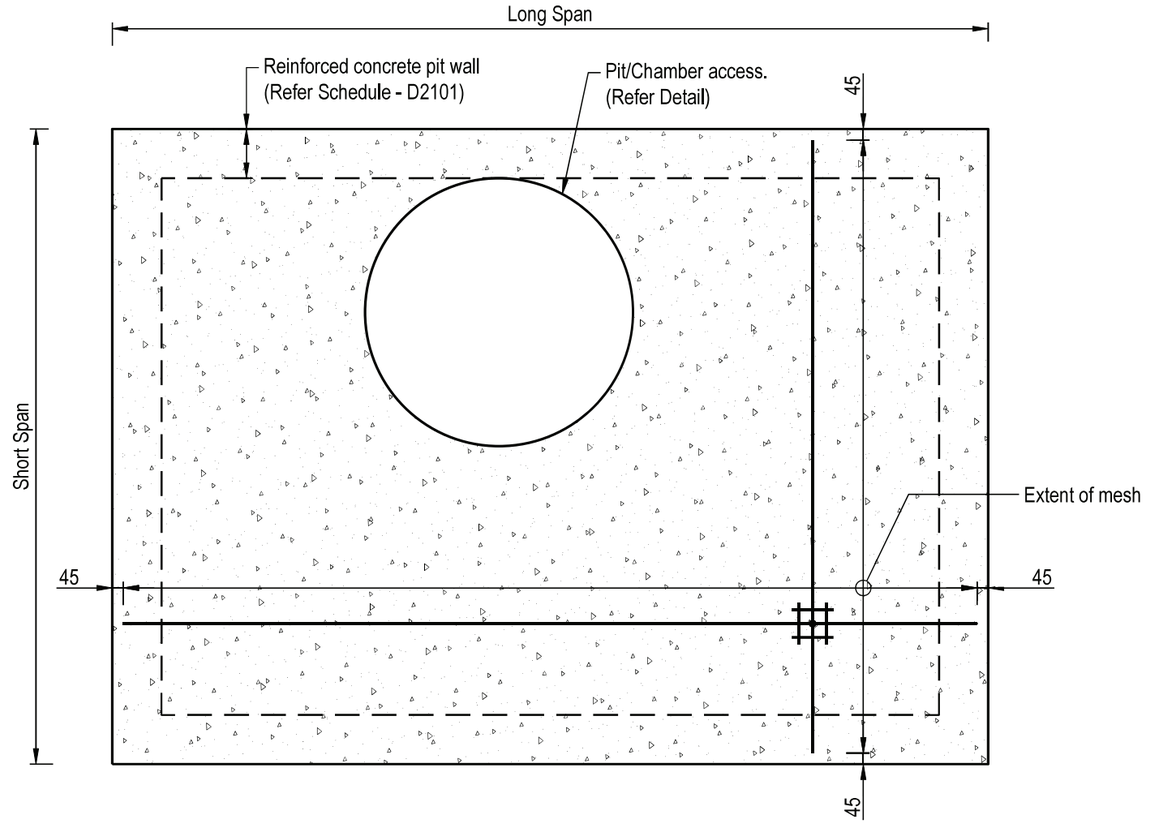
BRC(06/19)

TABLE C : MESH OPTION					
		LONG SPAN			SLAB DEPTH
		1500	2000	3000	
SHORT SPAN	1500	SL81 MESH TOP 2 x SL81 MESH BTM	SL81 MESH TOP 2 x SL81 MESH BTM	SL81 MESH TOP 2 x SL81 MESH BTM	225
	2000	-	SL81 MESH TOP 2 x SL81 MESH BTM	SL81 MESH TOP 2 x SL81 MESH BTM	250
	3000	-	-	SL81 MESH TOP 2 x SL81 MESH BTM	275
Note: All dimensions in millimetres					



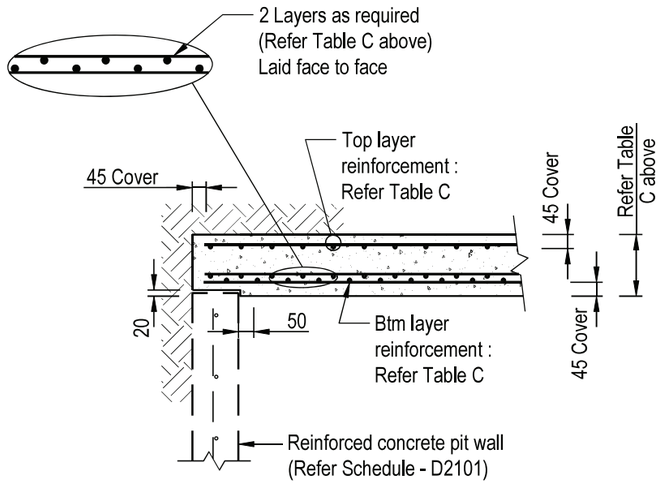
TYPICAL

ROOF SLAB REINFORCEMENT AROUND CHAMBER ACCESS 1:20



TYPICAL

(TRAFFICABLE) ROOF SLAB REINFORCEMENT 1:25



TYPICAL

ROOF SLAB SECTION 1:20

NOTES:

1. Concrete Exposure Classication:
   - Freshwater : B1 - N32/20
   - Sea water : B2 - N40/20
   - In accordance with AS1379 and AS3600.
2. Reinforcement :-
   Bars N12 and N16, Grade 500 to AS 1302
3. Laps to reinforcement shall be:
   - Mesh 250mm (min two bar lap)
   - N12 500mm
   - N16 600mm
   - N20 800mm
4. Formwork in accordance with AS3610.
5. Reinforcement cover 45mm minimum. (U.N.O) Non-corrosive bar chairs to be used to achieve cover as required.
6. Maximum fill over roof slab shall be 1500mm.
7. For details of pit/chamber access refer IPWEAQ Standard DS-010.
8. For details of pit/chamber walls and floors refer Standard Drawing D2101, D2102 and project specific documentation.
9. All dimensions in millimetres.
10. Refer DTMR standard drawing 1043 for standard bar shapes

Revisions		Verified	Date
-		-	-
A	Original Issue		

Engineering Certification
Design: ES. Verified: KM.
Drawn: HB. Checked: ES.
RPEQ #7250

Approved
Branch Manager
Engineering Services

BUNDABERG REGIONAL COUNCIL

BRC STANDARD
CONCRETE STORMWATER PIT
CLASS 'D' ROOF SLAB (MESH ALTERNATIVE)

Standard Drawing
No.: D2302
Sheet Size: A3
Rev.: A

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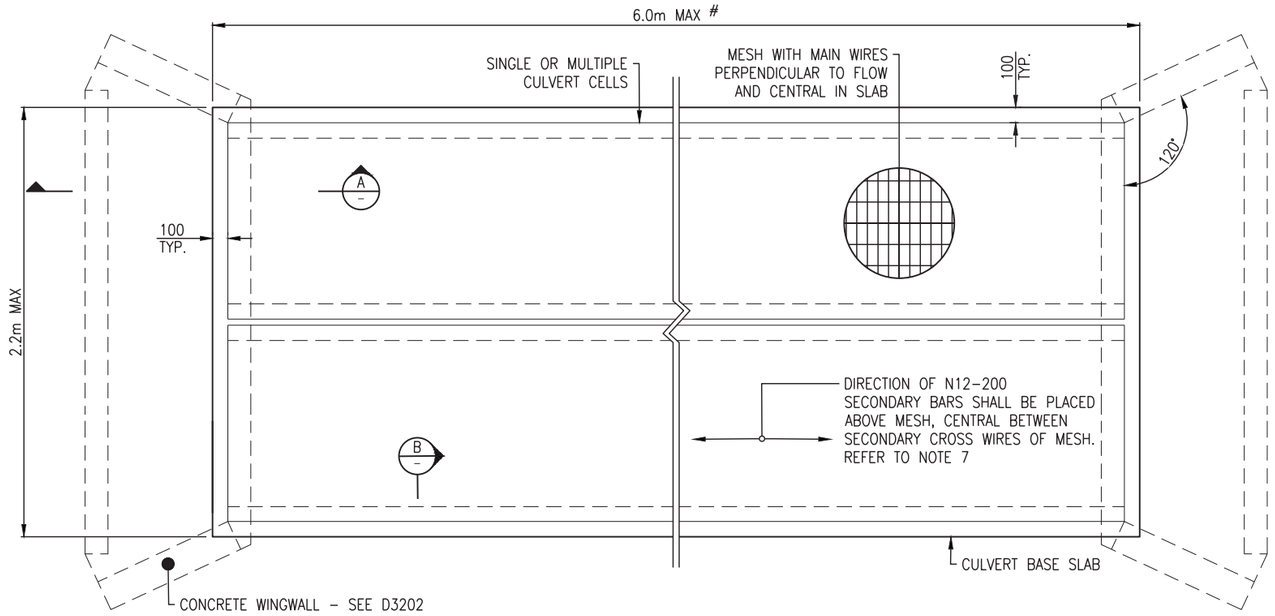
BRC(09/10)



CULVERT BASE SLAB PLAN

LEGEND

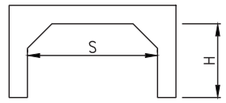
\# UNLESS OTHERWISE APPROVED BY BRC ENGINEER

BASE SLAB DETAILS

SPAN "S"	SLAB DEPTH "D"	MESH	SECONDARY BARS
≤ 900	130	RL918	N12–200
1200	150	RL1018	N12–200
> 1200	REFER TMR STD DWG 1317, 1318		

CULVERT BASE SLAB NOTES

1. DESIGN VEHICLE LOADING: 5.0kPa OR 31kN IN ACCORDANCE WITH AS/NZS1170.1
2. FILL HEIGHT: MAXIMUM FILL HEIGHT OVER THE CULVERT CROWN IS 300mm.
3. UNIT DIMENSIONS:

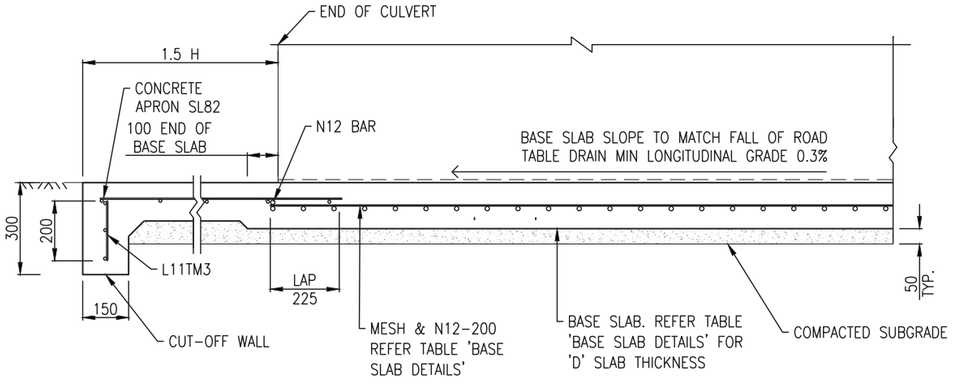


H = CLEAR HEIGHT OF CULVERT OPENING
S = CLEAR SPAN/WIDTH OF CULVERT OPENING

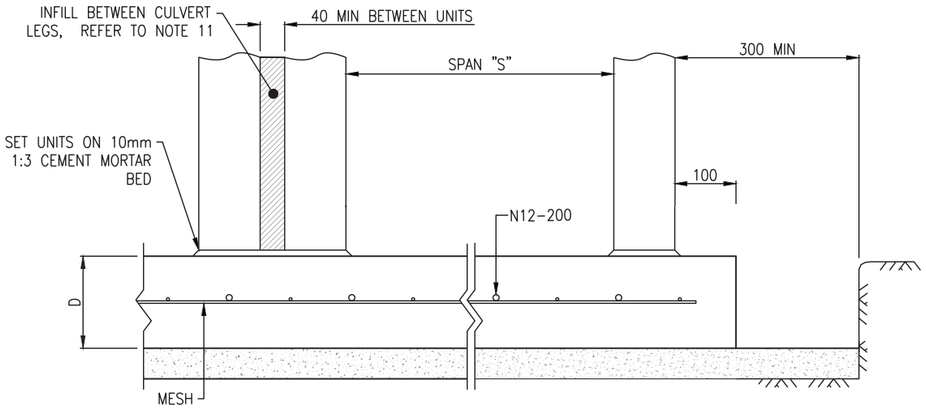
4. CONCRETE SHALL BE IN ACCORDANCE WITH AS3600. REQUIREMENTS FOR CONCRETE ARE INDICATED IN THE TABLE BELOW:

MINIMUM EXPOSURE CLASSIFICATION	B2
MINIMUM CONCRETE CLASS	N32/20
MINIMUM COVER TO REINFORCEMENT UNO	45mm

5. ALL EXPOSED EDGES SHALL HAVE 19 x 19 CHAMFERS.
6. REINFORCING STEEL SHALL BE IN ACCORDANCE WITH AS/NZS4671 – DEFORMED BARS GRADE D500N AND REINFORCING MESH GRADE D500L. REINFORCEMENT SHALL BE HOT DIP GALVANISED TO AS/NZS4680 WHERE SHOWN.
7. REINFORCEMENT BARS IN THE SECONDARY DIRECTION SHALL BE OFFSET FROM THE SECONDARY (CROSS) WIRES OF THE MESH BY 100mm.
8. FOUNDATION: MINIMUM ALLOWABLE BEARING PRESSURE IS 100kPa. CONSULT BRC ENGINEER IF MINIMUM ALLOWABLE BEARING PRESSURE CANNOT BE ACHIEVED.
9. THIS DRAWING DOCUMENTS THE CULVERT BASE SLAB AND APRON ONLY. CONCRETE WINGWALL SEE D3202.
10. BASE SLAB HAS BEEN DESIGNED TO SUIT SINGLE OR DOUBLE RCBC.
11. INFILL BETWEEN LEGS OF MULTIPLE CELL CULVERTS SHALL BE ACHIEVED BY PLACING CONCRETE PLUGS OF 250 MINIMUM LENGTH AT BOTH ENDS OF THE CULVERT, USING SAME GRADE OF CONCRETE AS HEADWALL, AND INFILL THE REMAINING GAP WITH 1: 10 LEAN MIX HAVING MAXIMUM AGGREGATE SIZE OF 10MM PACKED DRY.
    DO NOT USE FLUID GROUT AS HYDROSTATIC HEAD WILL DAMAGE CULVERT LEGS.
12. DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.



A – SECTION
NTS
FOR SPANS OF 900 & 1200



B – SECTION
NTS
FOR SPANS OF 900 & 1200

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Scales

NOT TO SCALE

	Revisions	Verified	Date
B	NIBS REMOVED AND NOTES AMENDED	RMC	24/10/18
A	Original Issue		

Quality Certification

Design: GB Verified: CG
Drawn: LWN Checked: GB
Approved By Engineer: Date:
RPEQ:

BUNDABERG REGIONAL COUNCIL

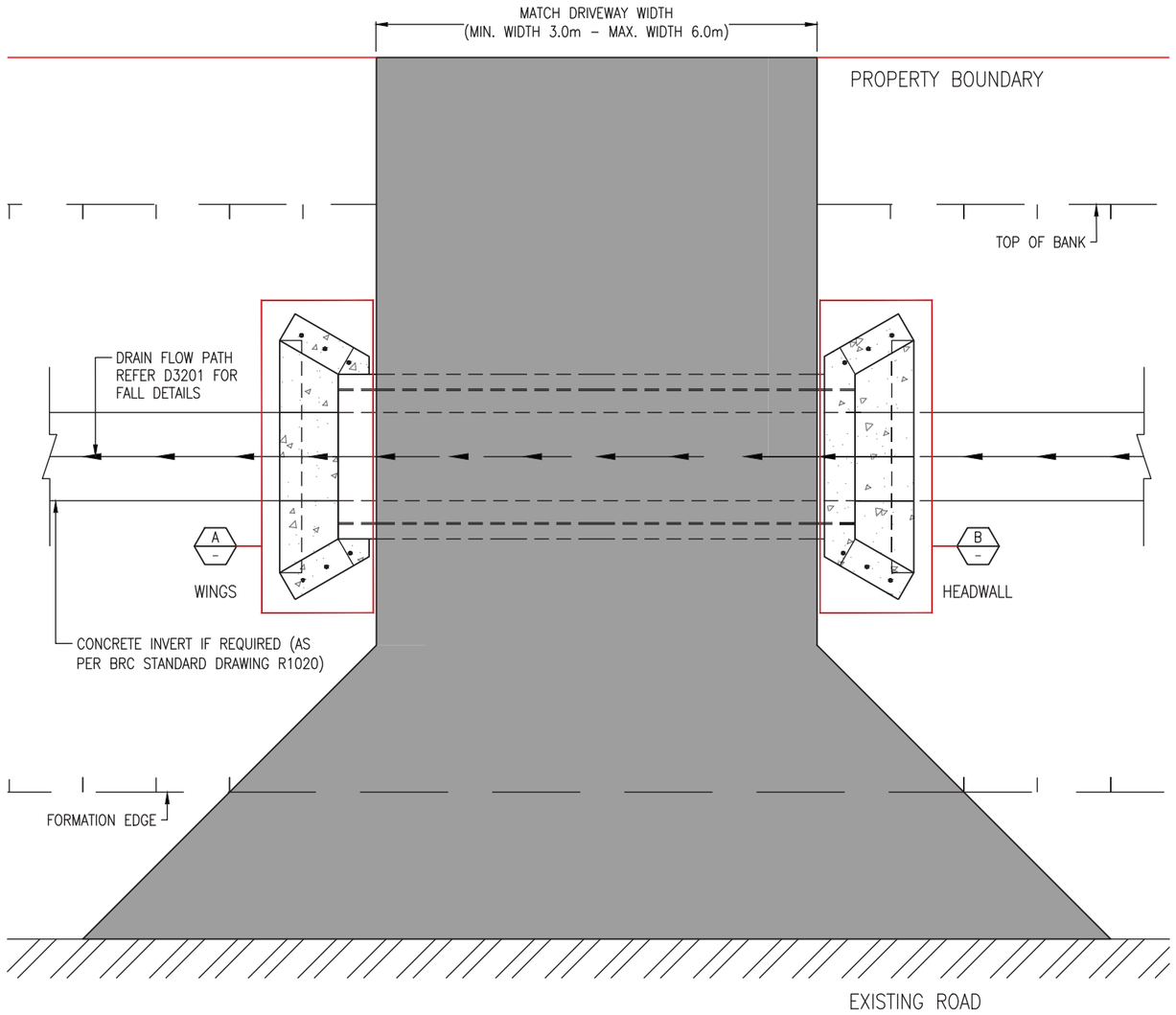
Residential Property Access
Standard Box Culvert Base Slabs

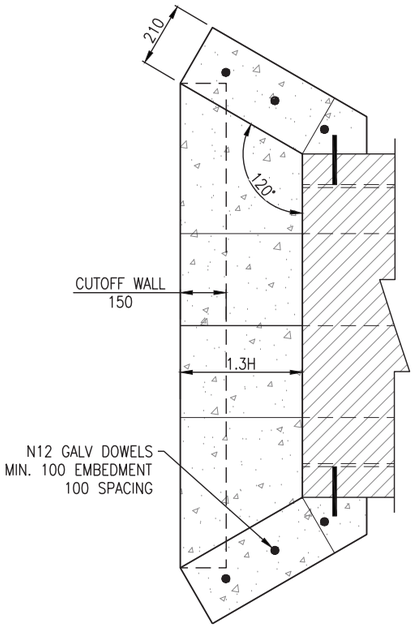
Standard Drawing No.: D3201

Sheet Size: A3

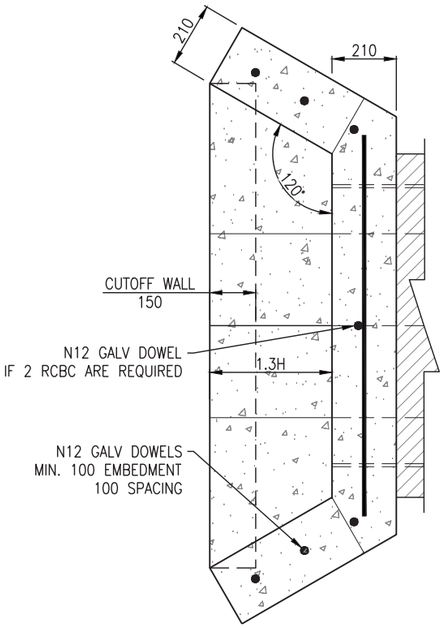
Rev.: B

BRC(09/10)





A – DETAIL – PLAN
NTS
WINGS



B – DETAIL – PLAN
NTS
HEADWALL

NOTES:

1. ALL CONCRETE TO BE N32.
2. REINFORCING STEEL:
   D500N DEFORMED BARS N12.
   N12 GALV. DOWELS.
3. MINIMUM 45mm COVER TO REINFORCING
4. DOWELS TO BE EPOXY SET INTO EXISTING CONCRETE
5. DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.

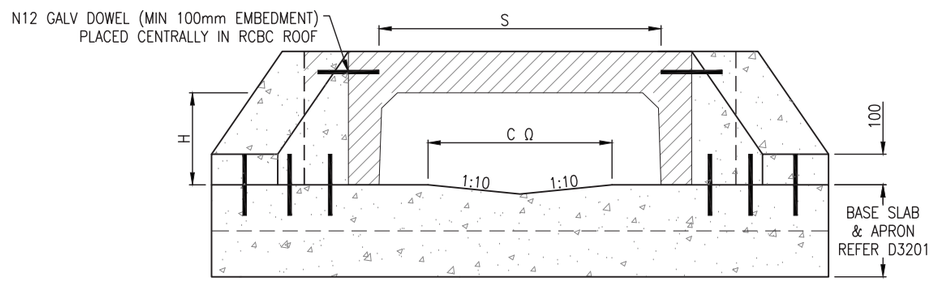
LEGEND: DIMENSIONS

S	RCBC SPAN (MAX 1200)
H	RCBC HEIGHT (MAX 600)
HwH	HEADWALL HEIGHT (MIN 150 – MAX 300)
C	600 OR 900 AS DIRECTED REFER BRC STD DRG R1020

LEGEND: MATERIAL

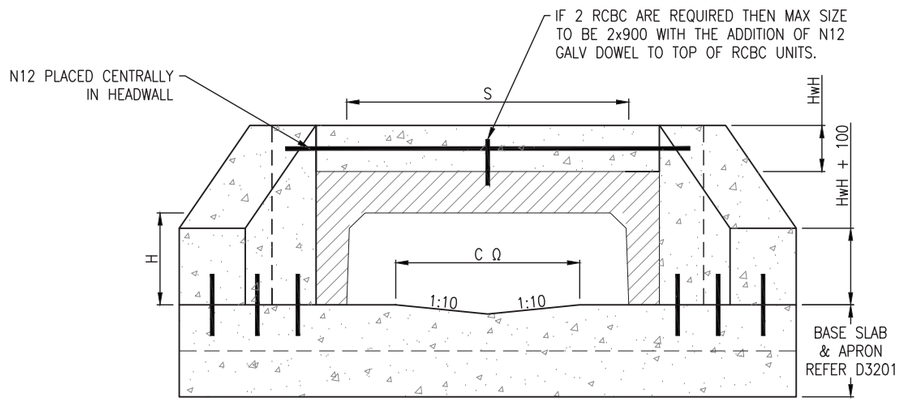
DRIVEWAY CONSTRUCTED AS PER BRC STANDARD DRAWING R1012

CONCRETE END WALL ARRANGEMENT AND RCBC



Ω WHEN CONCRETE INVERT IS NOT REQUIRED UPSTREAM OR DOWNSTREAM OF PROPOSED RCBC IGNORE DIMENSION "C" AND DELETE INVERT THROUGH PROPOSED BASE SLAB

A – DETAIL – ELEVATION
NTS
WINGS



Ω WHEN CONCRETE INVERT IS NOT REQUIRED UPSTREAM OR DOWNSTREAM OF PROPOSED RCBC IGNORE DIMENSION "C" AND DELETE INVERT THROUGH PROPOSED BASE SLAB

B – DETAIL – ELEVATION
NTS
HEADWALL

Scales

NOT TO SCALE

Revisions	Verified	Date
A Original Issue		

Quality Certification

Design: Verified:

Drawn: LWN Checked:

Approved By Engineer: Date:

RPEQ:

BUNDABERG REGIONAL COUNCIL

Residential Property Access
Standard Box Culvert Wings/ Headwalls

Standard Drawing No.: D3202

Sheet Size: A3

Rev.: A

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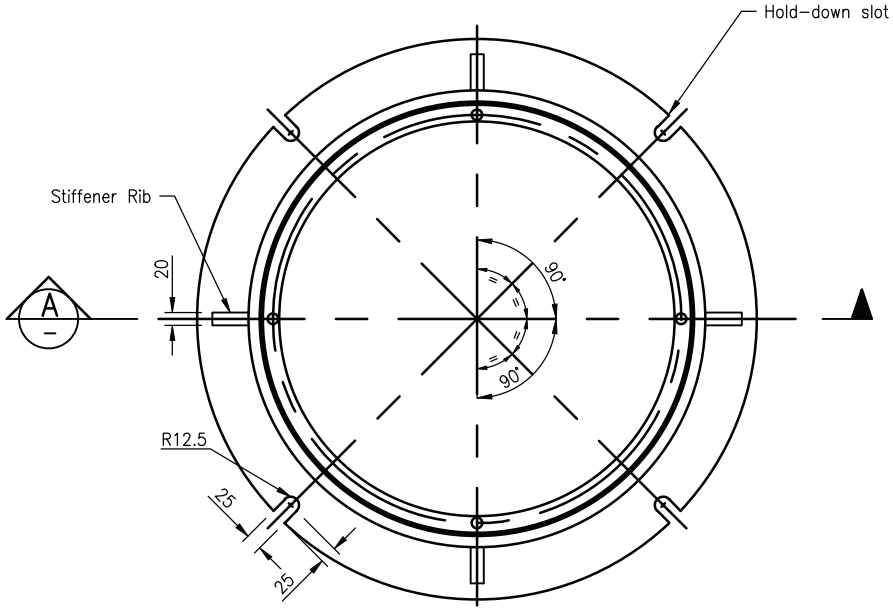
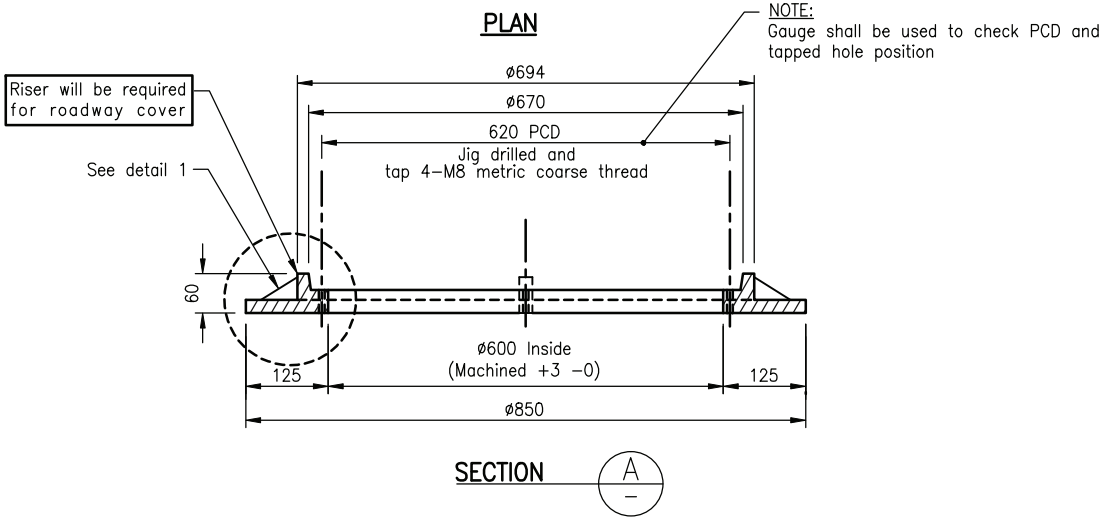
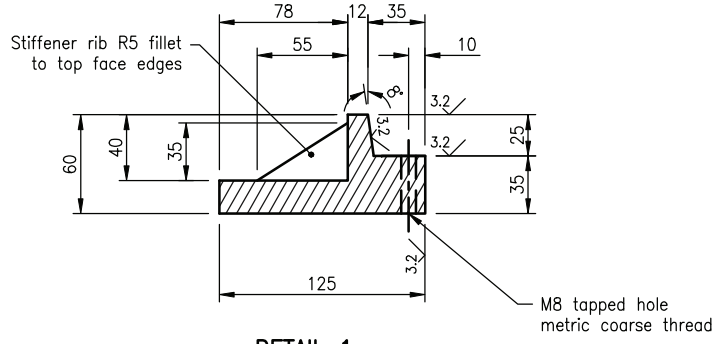


PLAN



SECTION A–A



DETAIL 1

NOTES:

1. All edges to be square.
2. Casting to be free of burrs and pits.
3. Material
   Grey Cast iron (AS 1830)
   Tensile strength : >T220
   Hardness : 145–185 (HB)
   Design Load = 210kN (AS 3996)
   Mass = 59.5Kg
4. Tolerances
   Cast size ± 1.00mm
   Angle Profile ± 0.25°
   Machined size ± 0.125mm
   Overall diameter of cover + 0mm–0.25mm
   DFT of coating 50 µm
5. Machine surface symbol: 3.2
6. All machined surfaces shall have a coating approved as fit for the purpose of providing a rust proof, non-stick and gas/water proof joint.
7. Refer Std Dwg No DS–018 for manhole riser details.
8. Refer Std Dwg No DS–019, DS–020 and DS–021 for manhole cover details.
9. All dimensions are in millimetres unless shown otherwise.

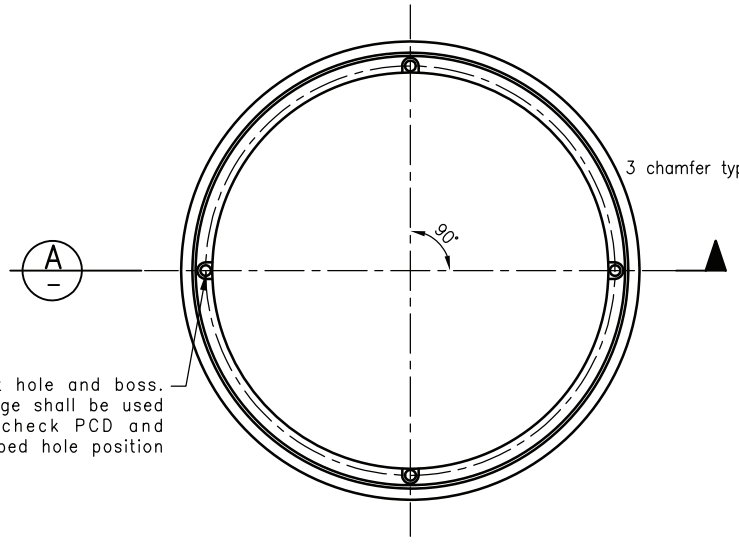
Rv.	DATE	REVISIONS
C	06/14	Review
B	03/14	Amended Drawing Number
A	10/12	ORIGINAL ISSUE

INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALASIA
STANDARD DRAWINGS

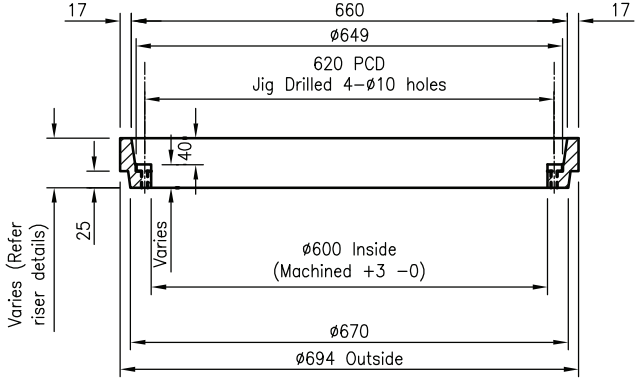
MANHOLE FRAME
(ROADWAY AND NON–ROADWAY)
1050 TO 2100 DIAMETER

DS–015

C B A Rv.



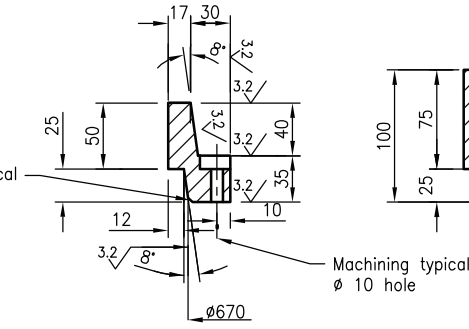
PLAN



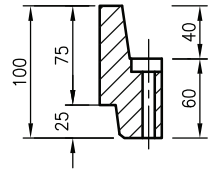
SECTION A

TABLE 1

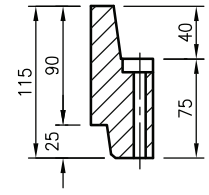
RISER HEIGHT	BOLT LENGTH	
	FOR RISER ONLY	FOR RISER WITH COVER
35	60	100
60	90	130
75	110	150
90	115	160



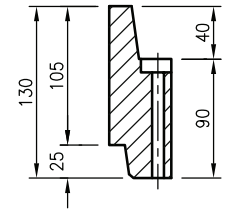
35 RISER
MASS: 27.5kg



60 RISER
MASS: 32kg



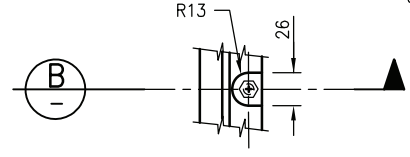
75 RISER
MASS: 38kg



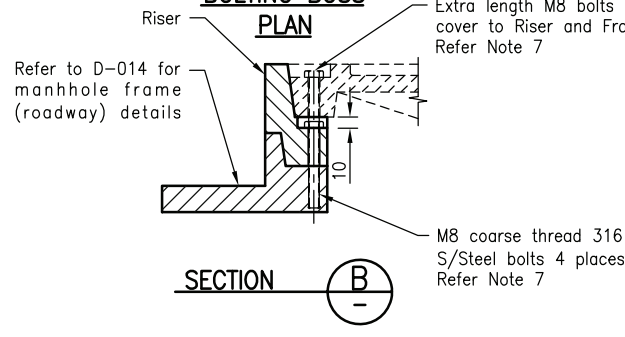
90 RISER
MASS: 44kg

RISER DETAILS

(Refer to 35 riser for typical dimensions for all risers)



BOLTING BOSS PLAN



SECTION B

TYPICAL ASSEMBLY

Bolts: 60 long for 35 riser
90 long for 60 riser
110 long for 75 riser
115 long for 90 riser

NOTES:

1. All edges to be square.
2. Casting to be free of burrs and pits.
3. Material
   Ductile cast iron
   Tensile strength : 600–3 (AS 1831)
   Hardness : 145–185 (HB)
   Design load = 210kN (AS 3996)
   Mass = varies
4. Tolerances
   Cast size ± 1.00mm
   Angle profile ± 0.25°
   Machined size ± 0.125mm
   Overall diameter of cover +0mm–0.25mm
   DFT of coating 50 µm
5. Machine surface symbol: 3.2
6. All machined surfaces shall have a coating approved as fit for the purpose of providing a rust proof, non stick and gas/water proof joint.
7. Four (4) M8 Course Thread Stainless Steel Bolts must be supplied and used to fix riser to frame, where cover is required to be bolted down, min two extra length bolts must be used to secure cover and raiser to frame, with two remaining bolts securing riser to frame. Refer TABLE 1 for bolt Lengths
8. Refer Std Dwg DS–015 for manhole frame details.
9. Refer Std Dwg DS–019, DS–020 and DS–021 for manhole cover details.
10. All dimensions are in millimetres unless shown otherwise.

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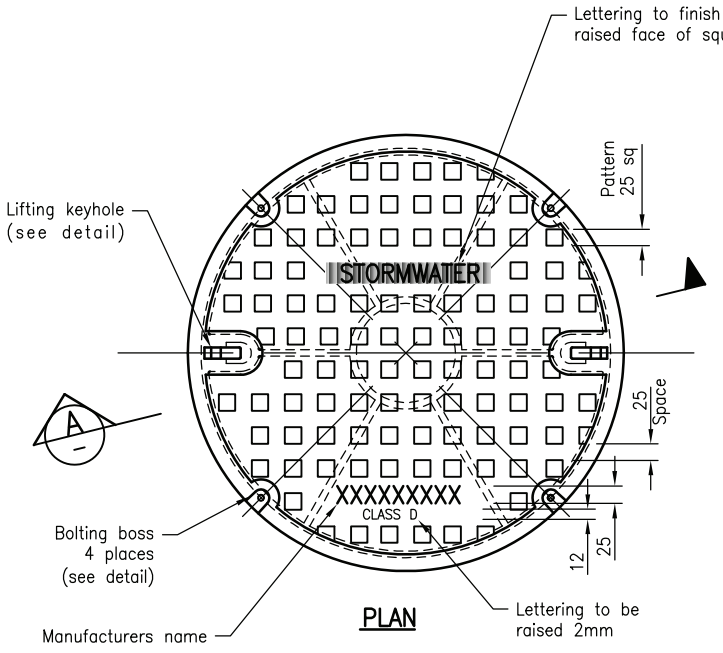
STANDARD DRAWINGS

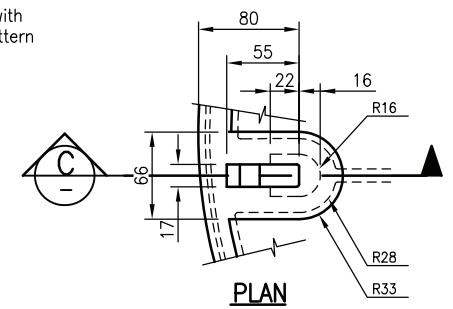
MANHOLE RISER DETAILS
(ROADWAY)

DS–018

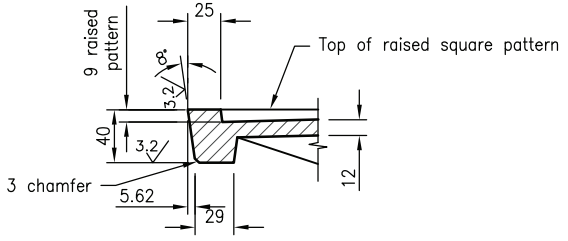
Rv. C B A



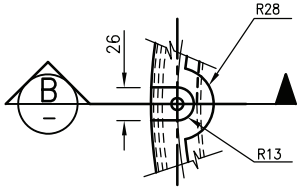
PLAN



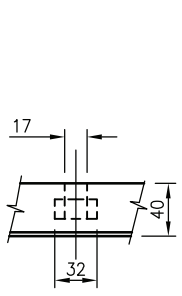
PLAN



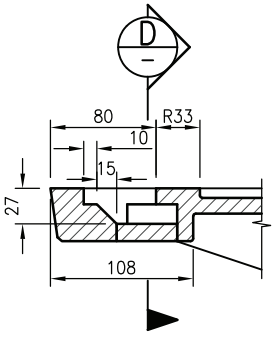
TYPICAL EDGE DETAIL



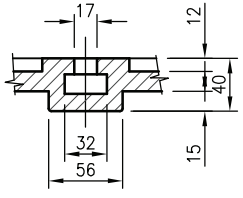
PLAN



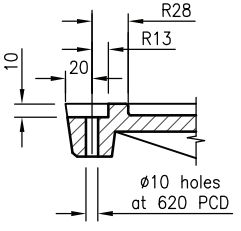
END ELEVATION



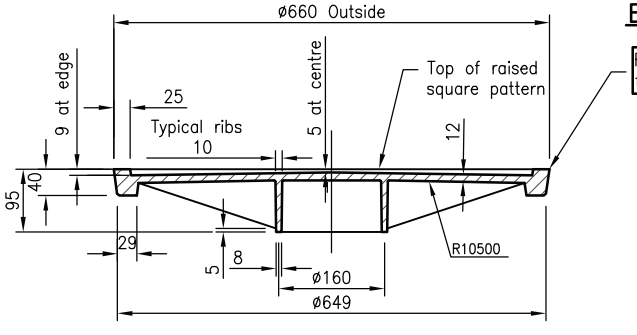
SECTION C



SECTION D



SECTION B



SECTION A

Riser will be required for roadway cover

LIFTING KEYHOLE DETAIL

BOLTING BOSS DETAIL

NOTES:

1. All edges to be square.
2. Casting to be free of burrs and pits.
3. Material
   Ductile cast iron
   Tensile Strength: 600–3 (AS 1831)
   Hardness: 145–185 (HB)
   Design Load = 210kN (AS 3996)
   Mass = 49kg
4. Tolerances
   Cast Size ± 1.00mm
   Angle profile ± 0.25°
   Machined Size ± 0.125mm
   Overall diameter of cover +0mm–0.25mm
   DFT of coating 50 μm
5. Machine surface symbol: 3.2
6. All machine surfaces shall have a coating approved as fit for purpose of providing a rust proof, non–stick and gas/water proof joint.
7. Lids to be bolted down if directed by Designer. min two extra length bolts must be used to secure Cover and Riser to frame. Refer to D–018 for Riser detail and Bolt lengths.
8. Refer Std Dwg DS–015 for manhole frame details.
9. Refer Std Dwg DS–018 for manhole riser details.
10. Refer Std Dwg DS–020 and DS–021 for alternate cover details.
11. All dimensions are in millimetres unless shown otherwise.

These drawings have been developed in consultation between the participating Councils.
BEFORE USE, the user shall confirm that the drawing has been adopted by the appropriate Council.

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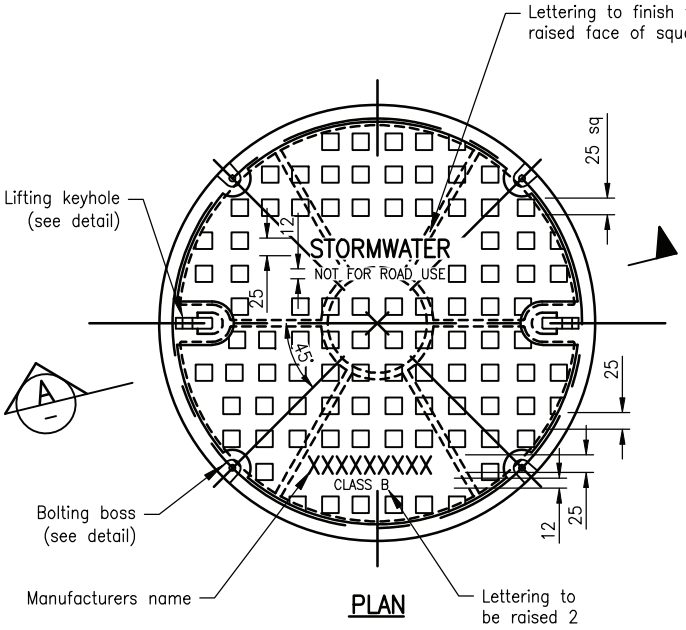
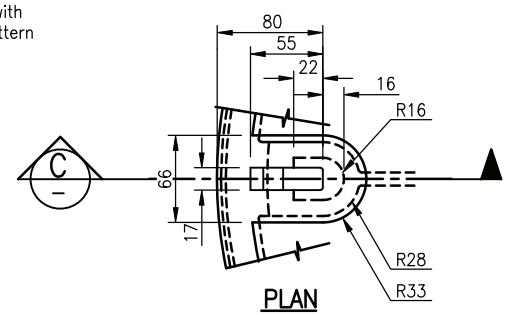
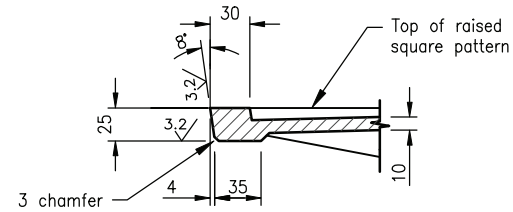
STANDARD DRAWINGS

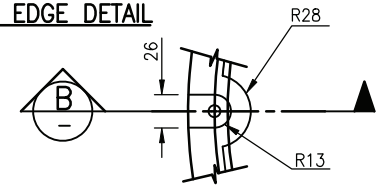
MANHOLE COVER
(ROADWAY)
1050 TO 2100 DIAMETER

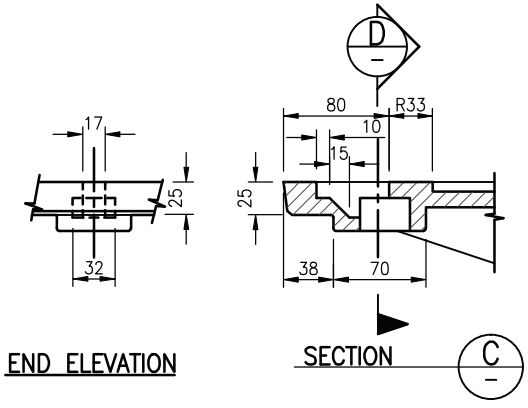
DS–019

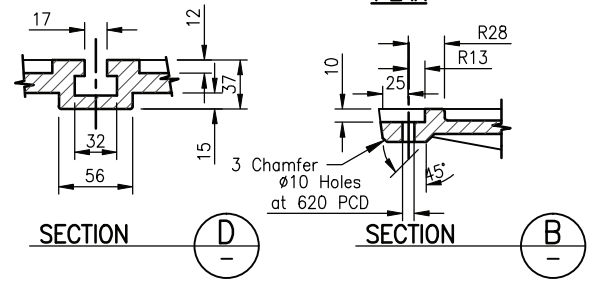






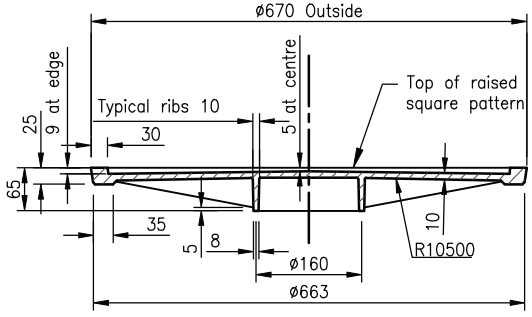






LIFTING KEYHOLE DETAIL

BOLTING BOSS DETAIL



NOTES:

1. This drawing is for use in non commercial loading applications where vehicle loads are less than 3.5t.
2. All edges to be square.
3. Casting to be free of burrs and pits.
4. Material
   Ductile cast iron
   Tensile strength : 600–3 (AS 1831)
   Hardness : 145–185 (HB)
   Design load = 80kN (AS 3996)
   Mass = 39kg
5. Tolerances
   Cast size ± 1.00mm
   Angle profile ± 0.25°
   Machined size ± 0.125mm
   Overall diameter of cover +0mm–0.25mm
   DFT of coating 50 μm
6. Machine surface symbol: 3.2
7. All machine surfaces shall have a coating approved as fit for purpose of providing a rust proof, non–stick and gas/water proof joint.
8. Lids to be bolted down if required by Design, using M8 coarse thread 316 stainless steel bolts in four (4) places.
9. Refer Std Dwg DS–015 for manhole frame details.
10. Refer Std Dwg DS–018 for manhole riser details.
11. Refer Std Dwg DS–019 and DS–021 for alternate cover details.
12. All dimensions are in millimetres unless shown otherwise.

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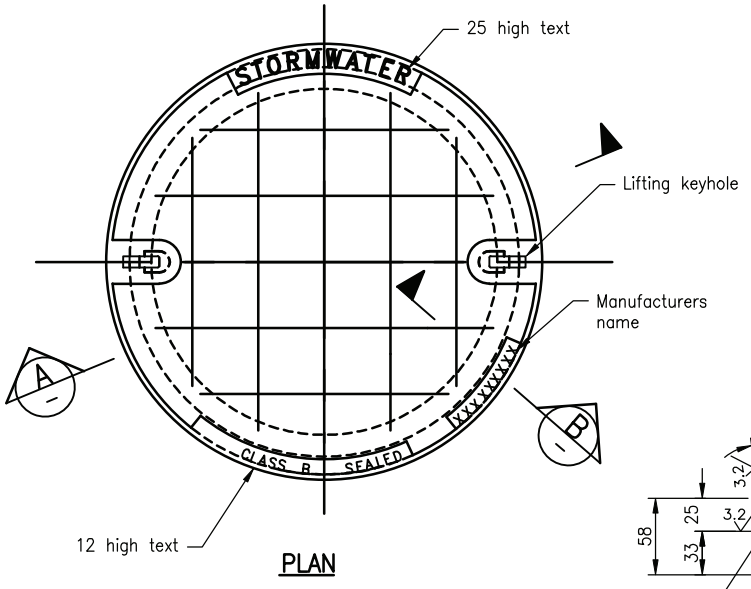
INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALASIA
STANDARD DRAWINGS

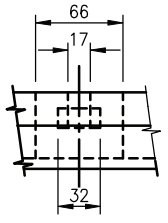
MANHOLE COVER
(NON ROADWAY)
1050 TO 2100 DIAMETER

DS–020

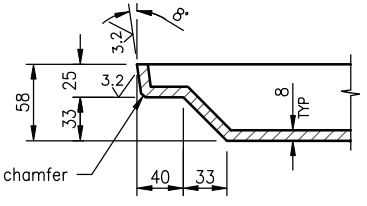
C B A Rv.



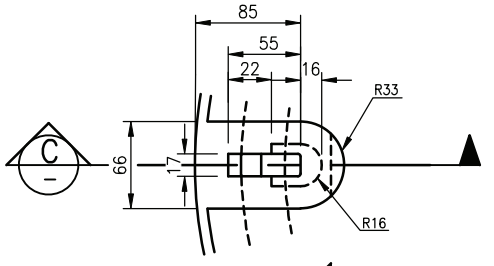
PLAN



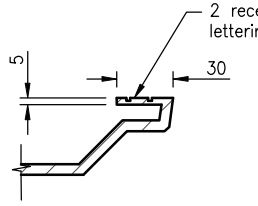
END ELEVATION



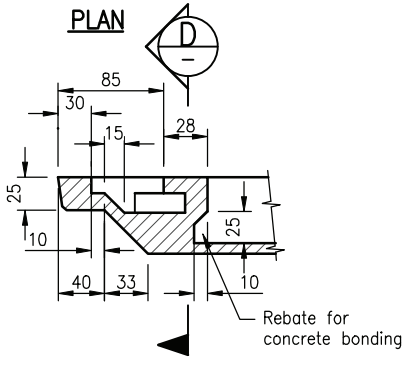
DETAIL 1



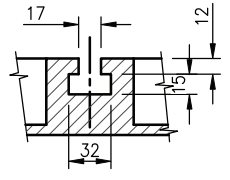
PLAN



SECTION B

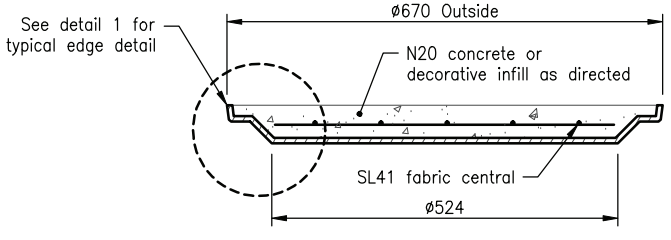


SECTION C



SECTION D

LIFTING KEYHOLE DETAILS



SECTION A

NOTES:

1. This drawing is for use in non roadway application subject to pedestrian loadings only.
2. All edges to be square
3. Casting to be free of burrs and pits.
4. Material
   Ductile cast iron
   Tensile strength : 600–3 (AS 1831)
   Hardness : 145–185 (HB)
   Design Load : 80kN (AS 3996)
   Mass = 59.5kg
5. Tolerances
   Cast size ± 1.00mm
   Angle profile ± 0.25°
   Machined size ± 0.125mm
   Overall diameter of cover +0mm–0.25mm
   DFT of coating 50µm
6. Machine surface symbol: 3.2
7. All machined surfaces shall have a coating approved as fit for the purpose of providing a rust proof non–stick and gas/water proof joint.
8. Refer Std Dwg DS–015 for manhole frame details.
9. Refer Std Dwg DS–018 for manhole riser details.
10. Refer Std Dwg DS–019 and DS–020 for alternate cover details.
11. All dimensions are in millimetres unless shown otherwise.

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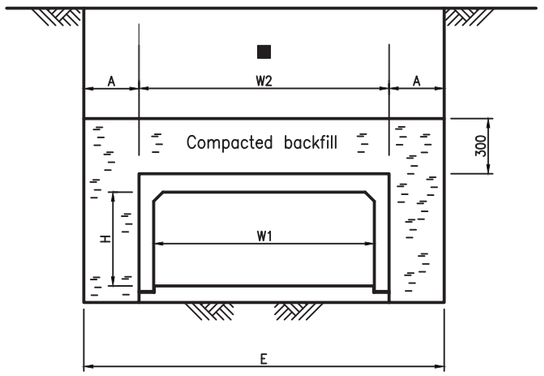
STANDARD DRAWINGS

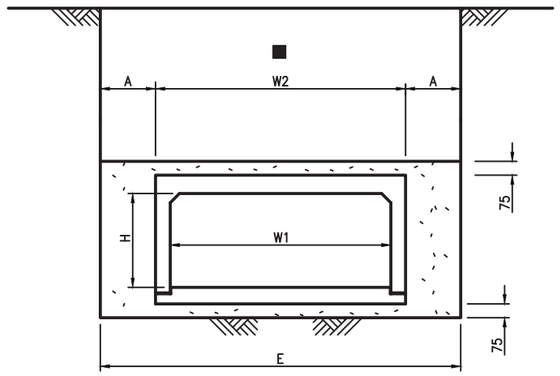
MANHOLE COVER CONCRETE INFILL (PEDESTRIAN TRAFFIC) 1050 TO 2100 DIAMETER

DS–021

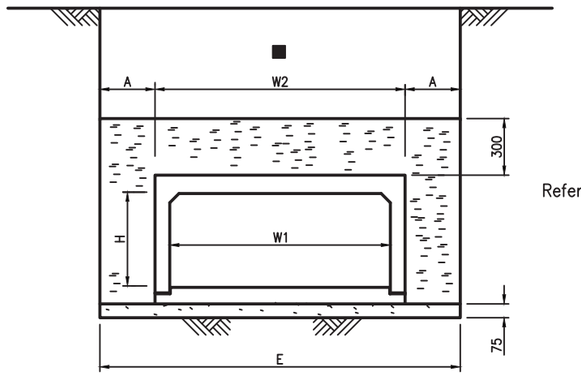
Rv. C B A



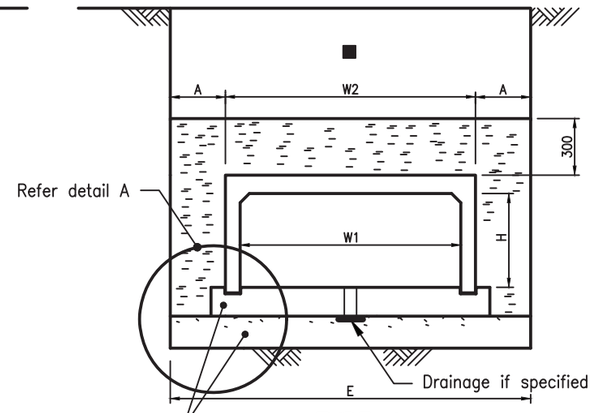
TYPE 1
NATURAL BEDDING



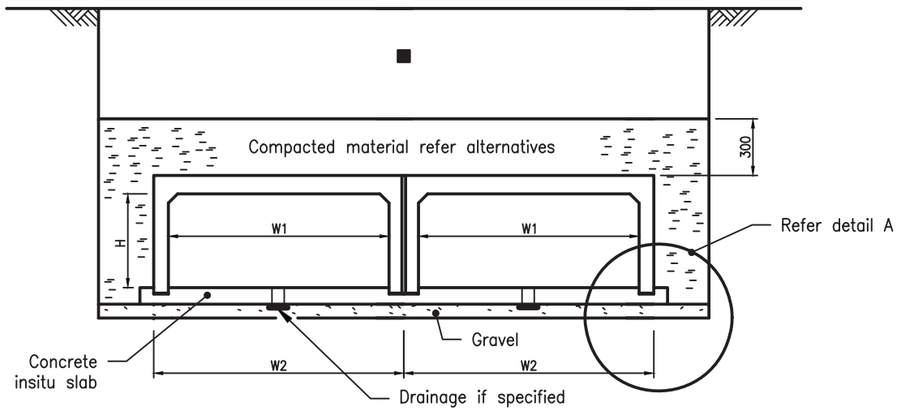
TYPE 2
SAND SURROUND



TYPE 3
SAND BEDDING



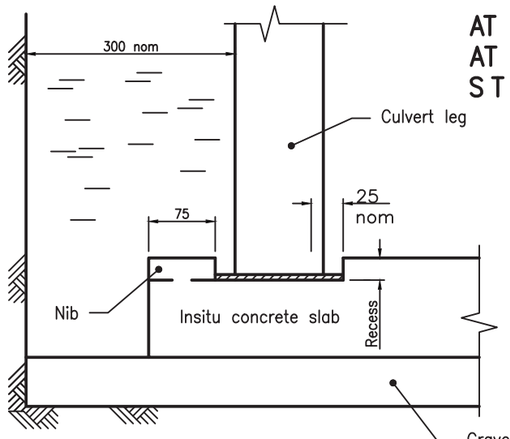
TYPE 4
INSITU BASE SLAB



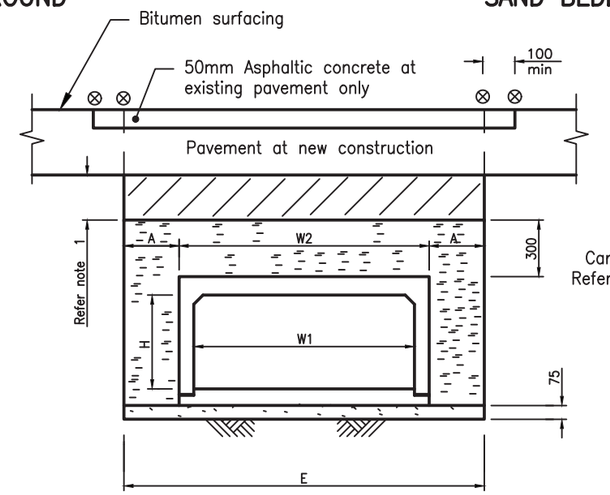
MULTIPLE CULVERTS

W1	W2	E nom
300	420	1000
375	500	1100
450	570	1200
600	730	1300
750	890	1500
900	1050	1700
1200	1360	2000
1520	1700	2300
1820	2010	2600
2130	2340	3000
2440	2670	3300

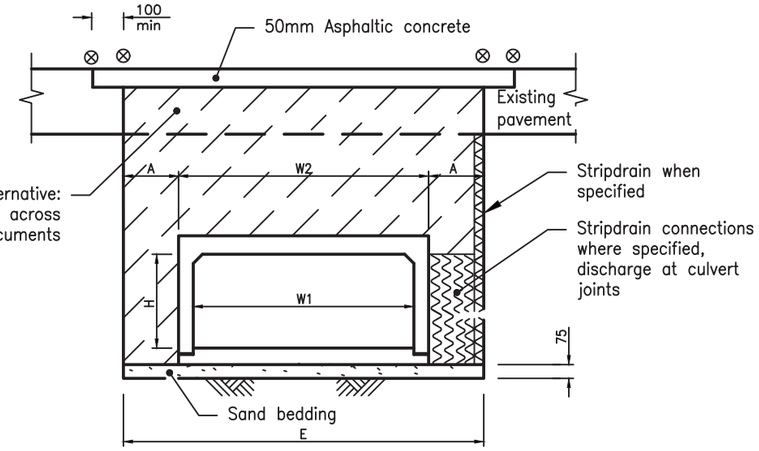
EXCAVATION WIDTH



TYPICAL DETAIL A



ALTERNATIVE A
AT EXISTING SURFACED PAVEMENTS OR AT NEW PAVEMENTS ON RESIDENTIAL STREETS & RURAL ROADS



ALTERNATIVE B
AT EXISTING SURFACED PAVEMENTS OR ON INDUSTRIAL, TRUNK COLLECTOR, SUB-ARTERIAL STREETS/ROADS

LEGEND

- A — 300mm nom.
- ■ — Refer Alternative A for backfill requirements at new pavement
- ⊗ — Saw cut at existing pavement
- Gravel (min CBR15) or 75mm crusher run backfill
- Lean mix concrete backfill (1:15 mix)
- 10mm Cement mortar bed, 1:3 mix

NOTES:

1. Backfill compaction: Approved fill/approved bedding/compacted backfill/CBR15 Gravel 90% Compacted gravel (300 layer) under road pavement 95% Compacted fill – at footpaths/private property 90% max densities determined by Standard Compaction tests to AS 1285.5.5.1
2. Refer to DTMR Std. Dwg. SD1316 for installation of of precast culverts.
3. Refer to DTMR Std. Dwg. SD1243 for installation of precast headwalls.
4. Tape all joints with 75 wide Denso (600) Tape or equivalent.
5. All dimensions are in millimetres unless shown otherwise

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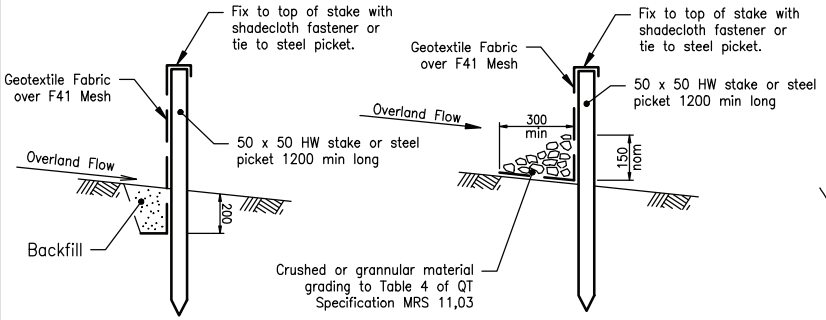
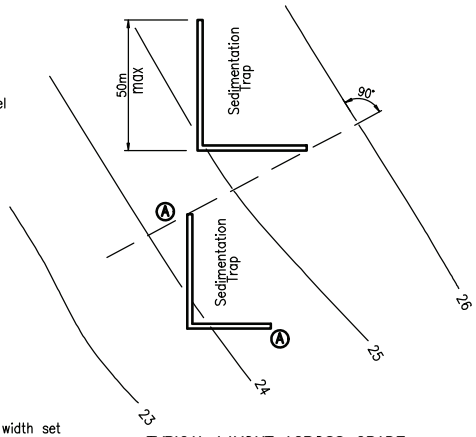
STANDARD DRAWINGS

EXCAVATION, BEDDING AND BACKFILLING PRECAST BOX CULVERTS

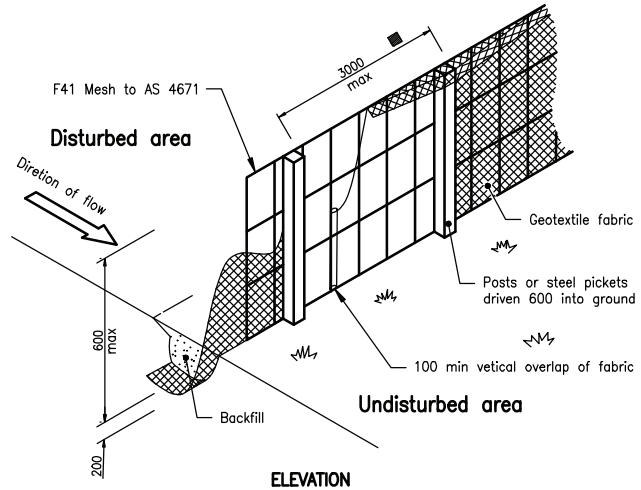
DS-031



ALTERNATIVE 1 **ALTERNATIVE 2**

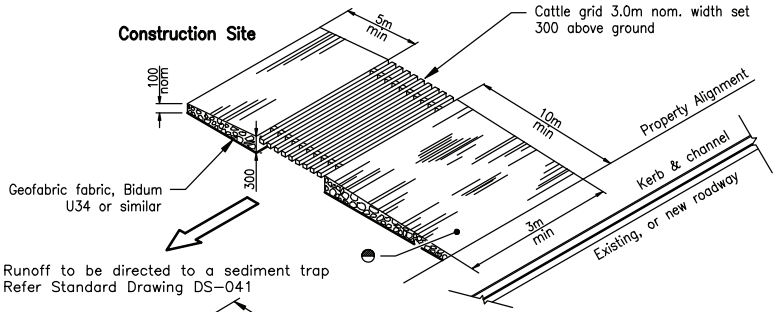


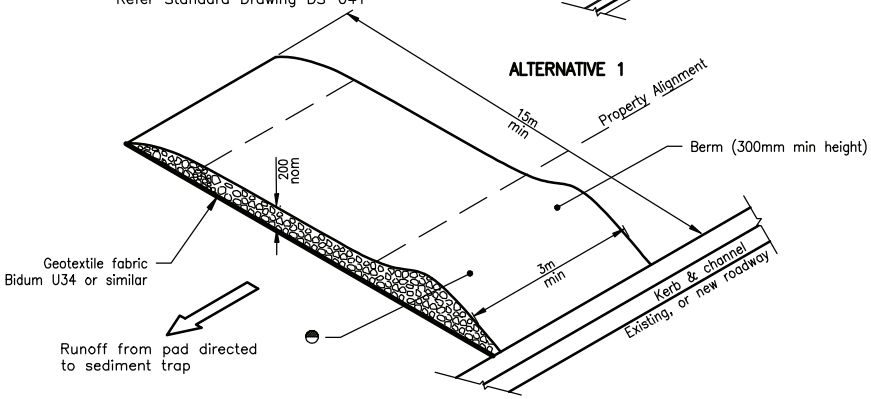
TYPICAL LAYOUT ACROSS GRADE
points A at same elevation



ELEVATION

SEDIMENT FENCE





ALTERNATIVE 2
TEMPORARY CONSTRUCTION ENTRY/EXIT SEDIMENT TRAP

LEGEND

- Unbound pavement material (gravel) to Grading B Table 9 of QT Specification MRS11.05 exclude material finer than AS sieve 2.36
- Without F41 mesh 2000 max C/C

NOTES:

GENERAL

1. All erosion and sediment controls to be in accordance with "Best Practice Erosion and Sediment Control", International Erosion and Sediment Control Association (IECA), Australasia Chapter, 2008 and to the satisfaction of the superintendent,
2. Temporary drainage control. Flow should be diverted around the work site where possible.
3. All drainage, erosion and sediment controls to be installed and be operational before commencing up-slope earthworks.
4. All control measures to be inspected at least weekly and after significant runoff producing storms.
5. Control measures may be removed when on-site erosion is controlled and 70% permanent soil coverage is obtained over all upstream disturbed land.
6. In areas where runoff turbidity is to be controlled, exposed surfaces to be either mulched, covered with erosion control blankets or turfed if earthworks are expected to be delayed for more than 14 days.
7. Straw bale sediment traps are a secondary option which generally should not be used if other options are available.

SEDIMENT FENCE

8. Not to be located in areas of concentrated flow.
9. Normally located along the contour with a maximum catchment area 0.6 ha per 100m length of fence.
10. Woven fabrics are preferred, non-woven fabrics may be used on small work sites, i.e. operational period less than 6 months or on sites where significant sediment runoff is not expected.
11. Where fences need to be located across the contour the layout shall conform to 'Typical Layout Across Grade'.
12. Fences are required 2m min from toe of cut or fill batters, where not practical one fence can be at the toe with a second fence 1m min away. Fence should not be located parallel with toe if concentration of flow will occur behind the fence.
13. Temp Construction Entry/Exit Sediment Trap.
14. Adjacent stormwater runoff to be diverted away from entry/exit.
15. Wheel – wash or spray unit may be required during wet weather.
16. Safety issues must be considered at all times, incorporate traffic control devices to the satisfaction of the superintendent.
17. All dimensions are in millimetres unless shown otherwise.

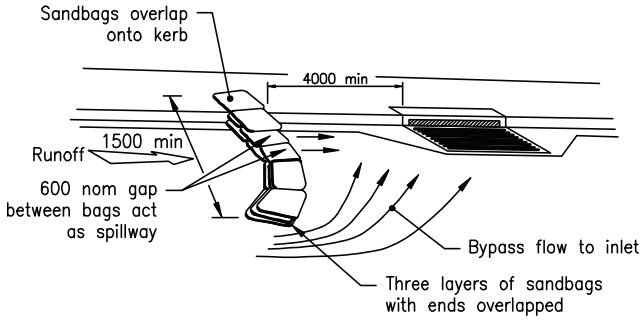
Rv.	DATE	REVISIONS
E	06/16	Review
D	06/14	Review
C	03/14	Amended Drawing Number
B	11/12	Note 1a Added
A	10/12	ORIGINAL ISSUE

INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALASIA
STANDARD DRAWINGS

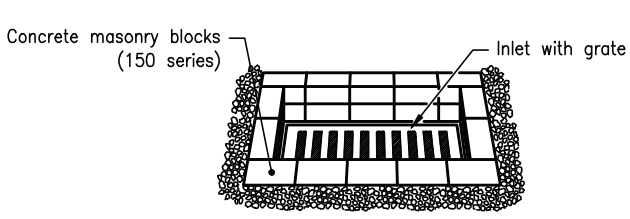
SEDIMENT CONTROL DEVICES
SEDIMENT FENCE, ENTRY/EXIT SEDIMENT TRAP

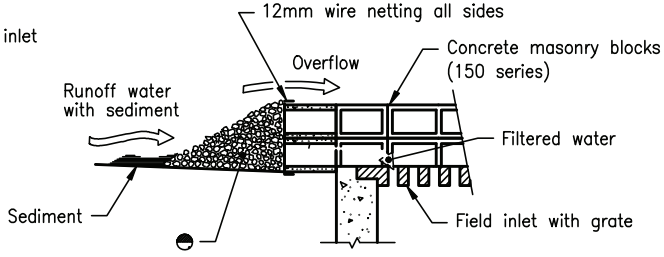
DS-040

Rv. E D C B A

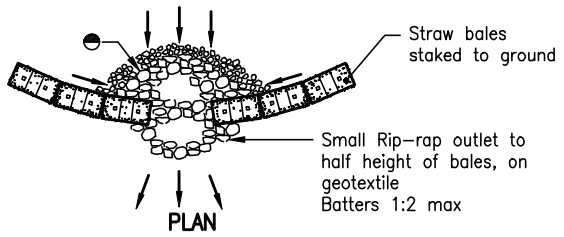


ON GRADE KERB INLET SEDIMENT TRAP

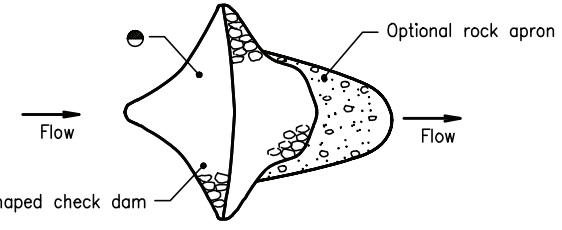


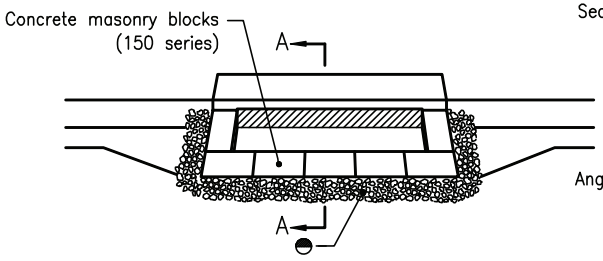


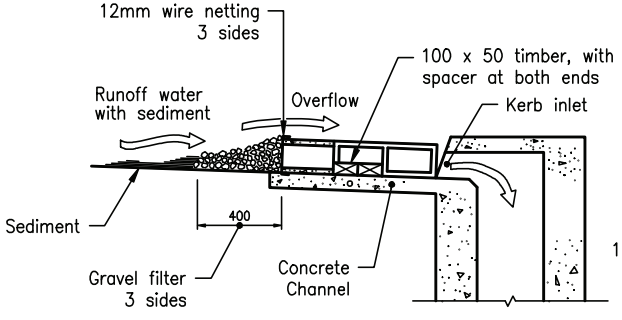
FIELD INLET SEDIMENT TRAP



STRAW BALE AND STONE TRAP SEDIMENT CONTROL – CONCENTRATED FLOW



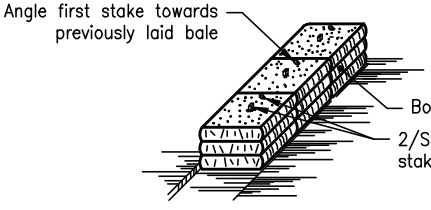




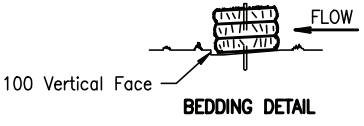
SECTION A–A

SAG INLET SEDIMENT TRAP

A stabilised bypass 'overland flow path' should exist adjacent to inlet in genuine sags.

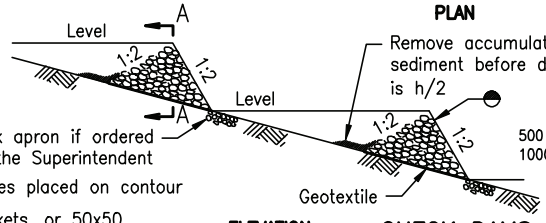


ANCHORING DETAIL

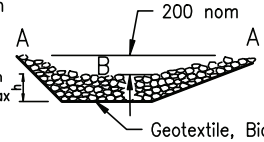


BEDDING DETAIL

STRAW BALE BANK SEDIMENT CONTROL



ELEVATION



SECTION A–A

CHECK DAMS FLOW CONTROL

LEGEND

- Gravel filter, refer Grading B Table 9 of QT Specitifation MRS 11.05 excluded material finer then AS sieve 2.36

NOTES

1. All erosion and sediment controls to be in accordance with "Best Practice Erosion and Sediment Control", International Erosion and Sediment Control Association (IECA), Australasia Chapter, 2008 and to the satisfaction of the superintendent.
2. Field Inlet
   a. A stabilised bypass overland flow path should exist adjacent to the field inlet.
   b. Water level control perimeter banks may be required.
   c. Blocks to be restrained by a horizontal timber rail at block joint height fixed to timber stakes at corners.
3. Check Dams
   a. Catchment area limited to 4 ha.
   b. Use in minor open drains only, (velocity control), sediment collection is a secondary purpose.
4. Straw Bale Banks
   a. Bales shall be placed at the toe of a slope or on the contour, in a row with ends tightly abutting the adjacent bales
   b. Each bale shall be embedded in the soil a minimum of 100mm on the downstream side and placed so the bindings are horizontal.
   c. Bales shall be securely anchored in place with either two stakes or steel pickets driven through the bale. The first stake in each bale shall be driven toward the previously laid bale at an angle to force the bales together.
   d. Inspections shall be frequent and repair or replacement shall be made promptly as needed. Replace at least 3 monthly.
5. Safety issues must be considered at all times, incorporate traffic control devices to the satisfaction of the Superintendent.
6. All dimensions are in millimetres unless shown otherwise.

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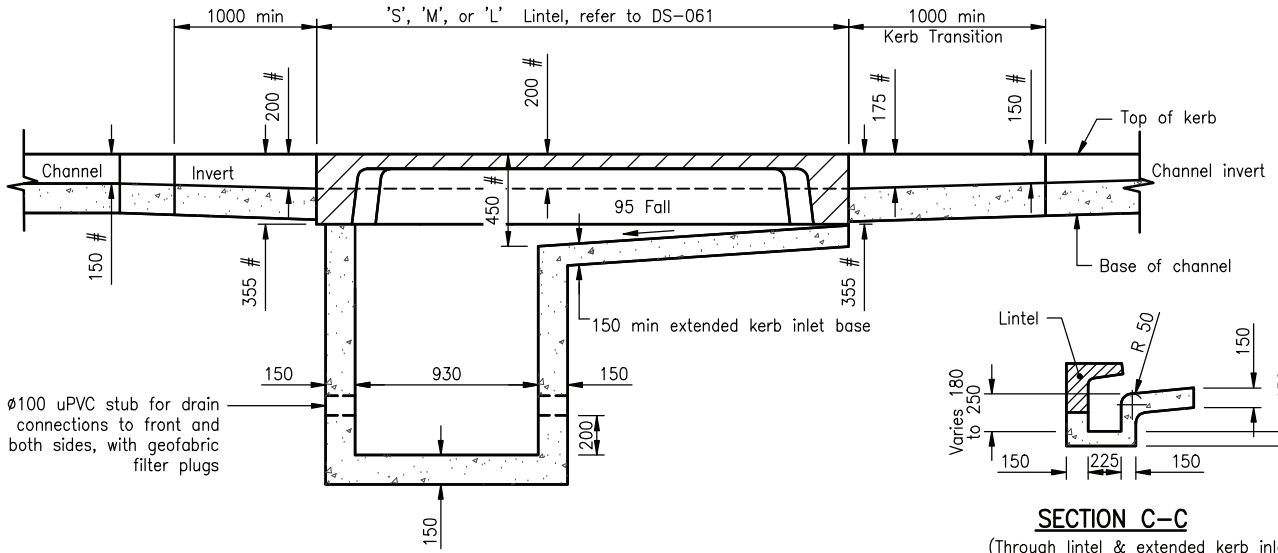
BEFORE USE, the user shall confirm that the drawing has been adopted by the appropriate Council.

Rv.	DATE	REVISIONS
E	06/16	Review
D	06/14	Review
C	03/14	Amended Drawing Number
B	11/12	Note 1 Added
A	10/12	ORIGINAL ISSUE

INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALASIA
STANDARD DRAWINGS

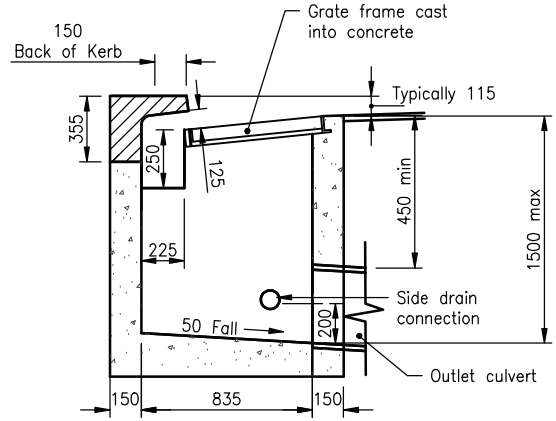
SEDIMENT CONTROL DEVICES
KERB AND FIELD INLET –
CHECK DAMS & STRAW BALES

DS–041

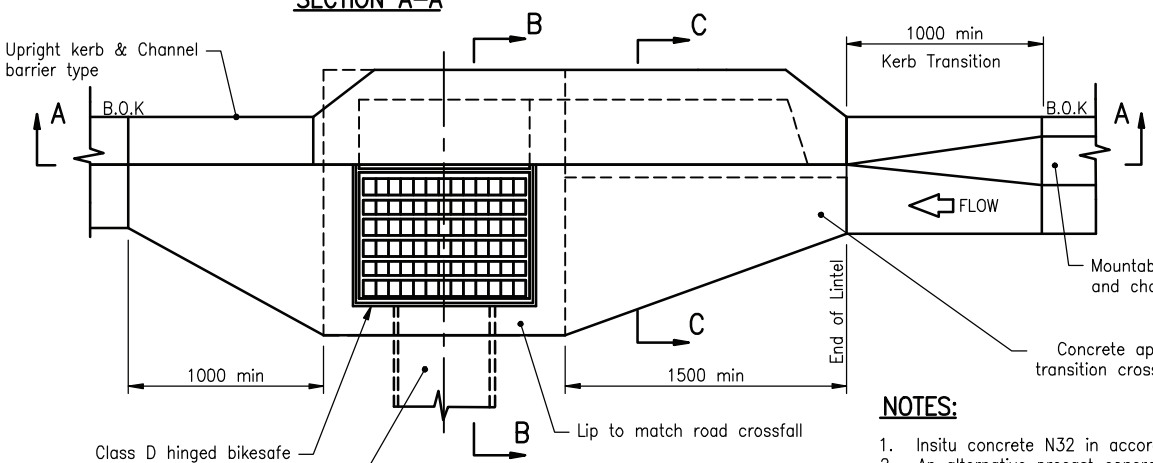


SECTION A–A

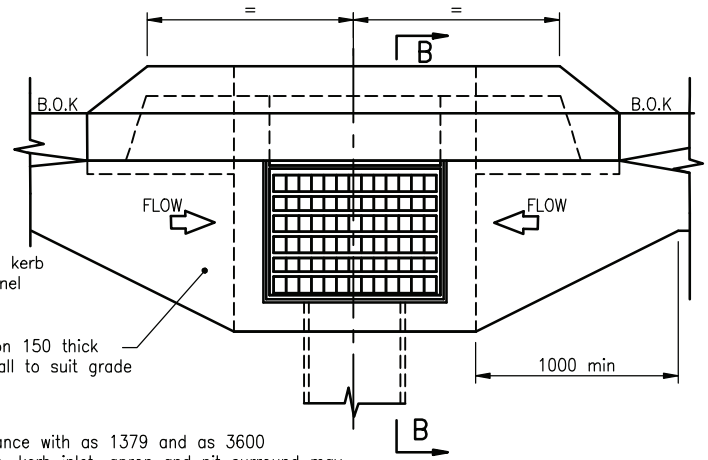
SECTION C–C
(Through lintel & extended kerb inlet)



SECTION B – B



PLAN
INLET ON GRADE



PLAN
INLET IN SAG

NOTES:

1. Insitu concrete N32 in accordance with as 1379 and as 3600
2. An alternative precast concrete, kerb inlet, apron and pit surround may be provided subject to the approval from the relevant Council. Precast concrete to be N32 in accordance with AS 1379 and AS 3600.
3. Refer to project drawings for setout point detail
4. All dimensions are in millimetres unless shown otherwise

LEGEND

Setout dimensions

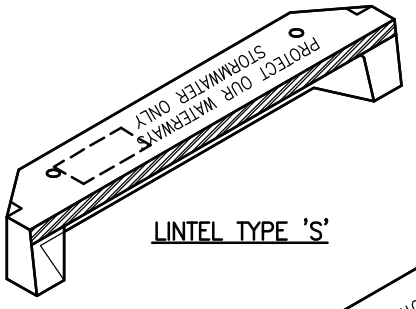
These drawings have been developed in consultation between the participating Councils.
BEFORE USE, the user shall confirm that the drawing has been adopted by the appropriate Council.

Rv.	DATE	REVISIONS
D	06/16	Review
C	06/14	Review
B	03/14	Amended Drawing Number
A	10/12	ORIGINAL ISSUE

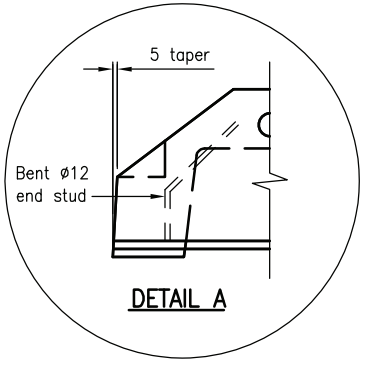
INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALASIA
STANDARD DRAWINGS

DRAINAGE PITS
KERB INLET – KERB IN LINE
GENERAL ARRANGEMENT

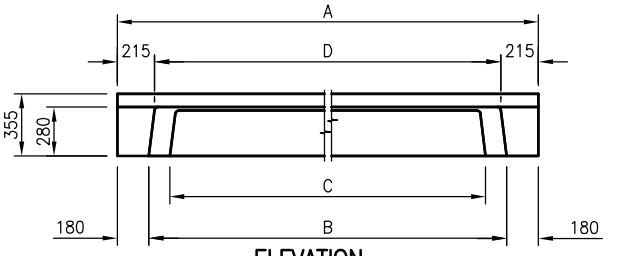
DS-060



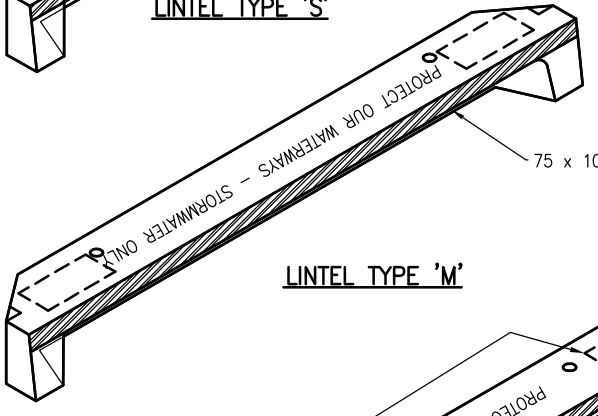
LINTEL TYPE 'S'



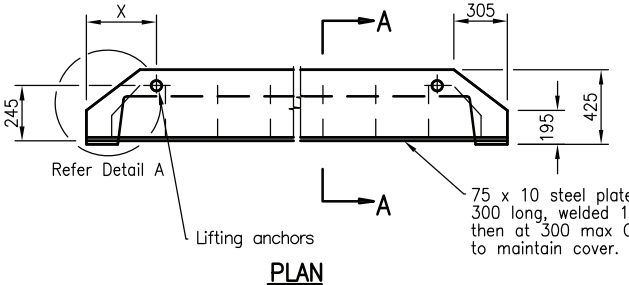
DETAIL A



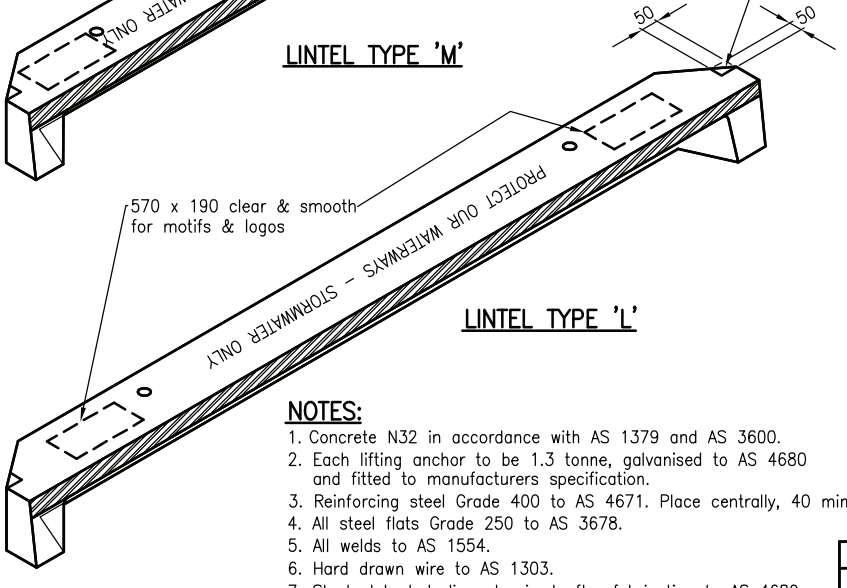
ELEVATION



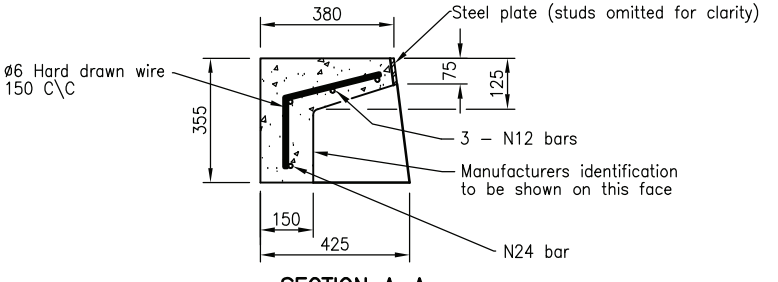
LINTEL TYPE 'M'



PLAN



LINTEL TYPE 'L'



SECTION A–A

NOTES:

1. Concrete N32 in accordance with AS 1379 and AS 3600.
2. Each lifting anchor to be 1.3 tonne, galvanised to AS 4680 and fitted to manufacturers specification.
3. Reinforcing steel Grade 400 to AS 4671. Place centrally, 40 min end cover.
4. All steel flats Grade 250 to AS 3678.
5. All welds to AS 1554.
6. Hard drawn wire to AS 1303.
7. Steel plate hot dip galvanised after fabrication to AS 4680.
8. Lintel text 40mm high letters imprinted 5mm into concrete. Words face footpath.
9. All dimensions are in millimetres unless shown otherwise.

LINTEL	A	B	C	D	X	MASS (kg)
S	2400	2040	1800	1970	400	445
M	3600	3240	3000	3170	690	550
L	4800	4440	4200	4370	1000	725

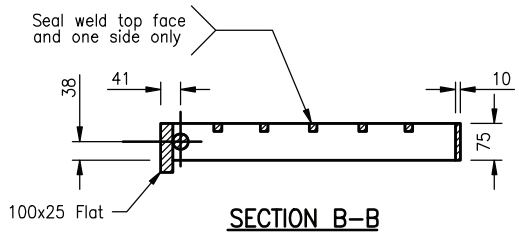
Rv.	DATE	REVISIONS
B	03/14	Amended Drawing Number
A	10/12	ORIGINAL ISSUE

INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALIA
QUEENSLAND DIVISION INC.
STANDARD DRAWINGS

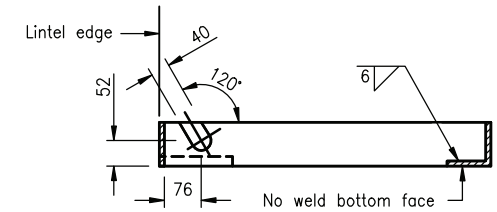
DRAINAGE PITS
KERB INLET
PRECAST LINTEL DETAILS

DS–061

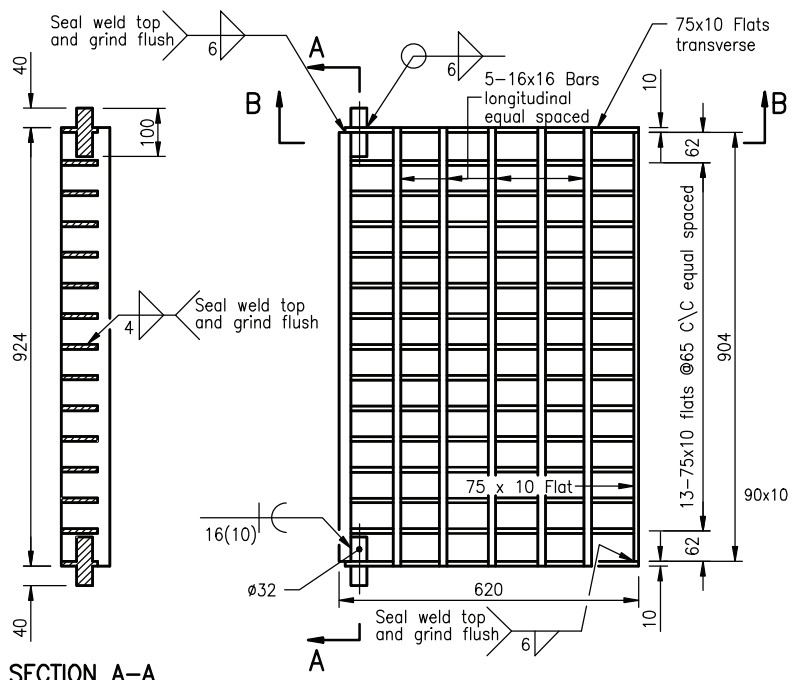
Rv. B A



SECTION B–B

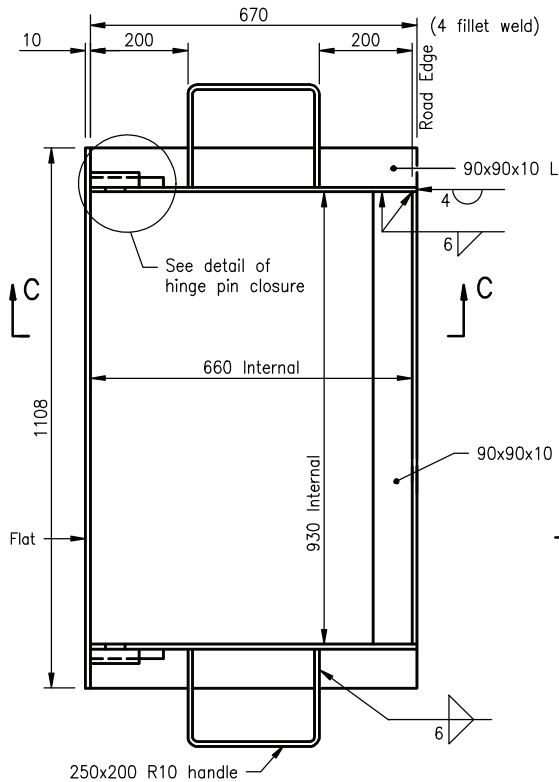


SECTION C–C

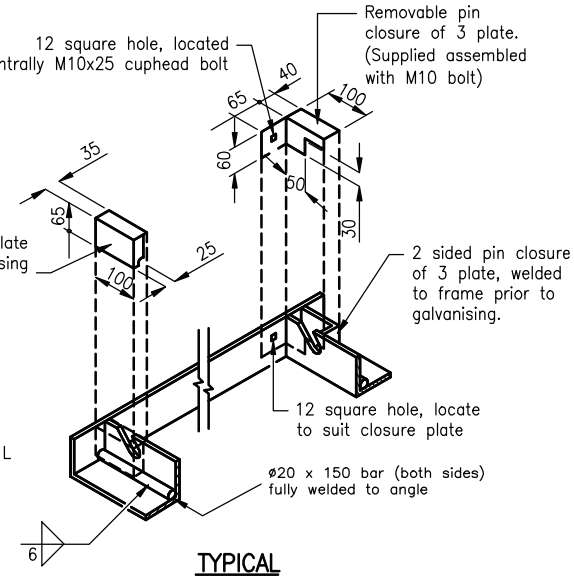


SECTION A–A

PLAN OF GRATE



PLAN OF FRAME



TYPICAL
DETAIL OF HINGE
PIN CLOSURES

A locking device shall be provided in accordance with clause 3.2.1.4 of AS 3996.

NOTES:

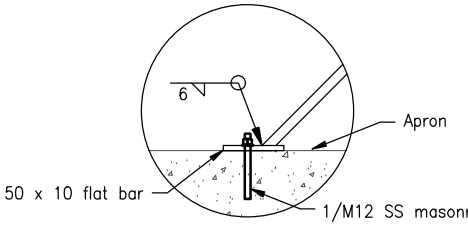
1. Mass of grate = 85 kg.
2. Mass of frame = 39 kg.
3. All steel flats Grade 250 to AS 3678.
4. All steel bars and angles Grade 250 to AS 3679.
5. Grate, Frame and Hinge to be hot dip galvanised after fabrication to AS 1650.
6. All bolt hexagonal heads to AS 1111, Nuts to AS 1112, Washers to AS 1237 and Galv. to AS 1214.
7. All welds to AS 1554. Welding symbols to AS 1101.3.
8. Refer Std Dwg DS–060 and DS–063 for kerb inlet details
   Refer Std Dwg DS–061 for precast lintel details.
9. Grate and Frame to be Class D bicycle safe to AS 3996.
10. Alternative fabricated steel grate and frame may be used when approved by relevant Council
11. All dimensions are in millimetres unless shown otherwise

Rv.	DATE	REVISIONS
C	06/16	Review
C	06/14	Review
B	03/14	Amended Drawing Number
A	10/12	ORIGINAL ISSUE

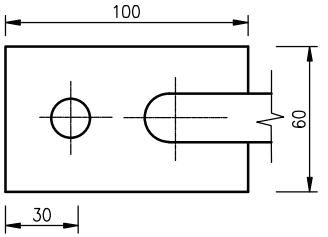
INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALASIA
STANDARD DRAWINGS

DRAINAGE PITS
KERB INLET
GRATE AND FRAME

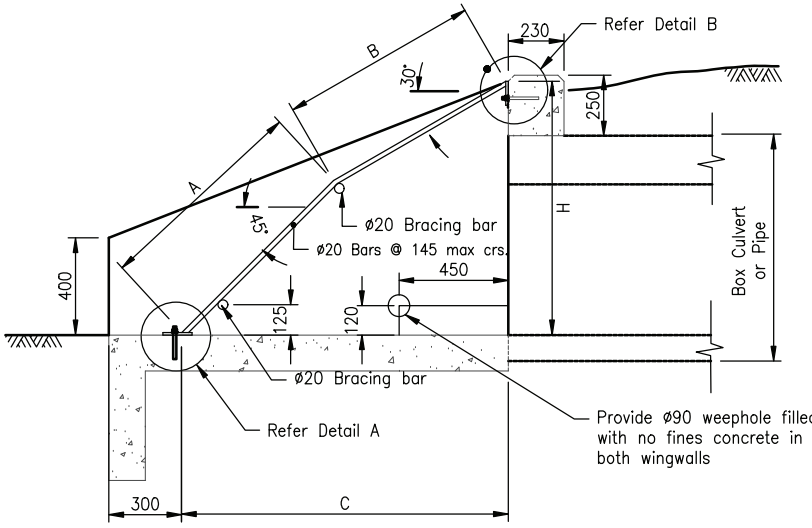
DS–062



DETAIL A

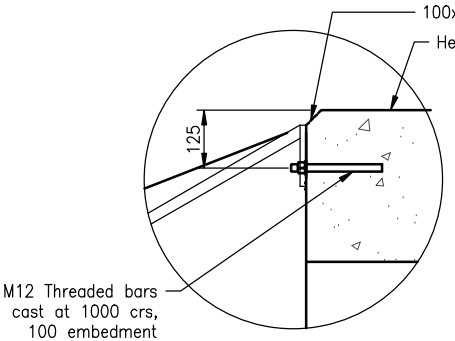


BOTTOM PLATE DETAIL

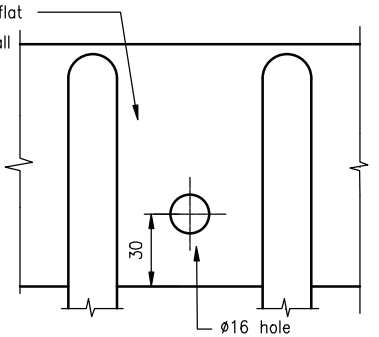


SECTION A–A

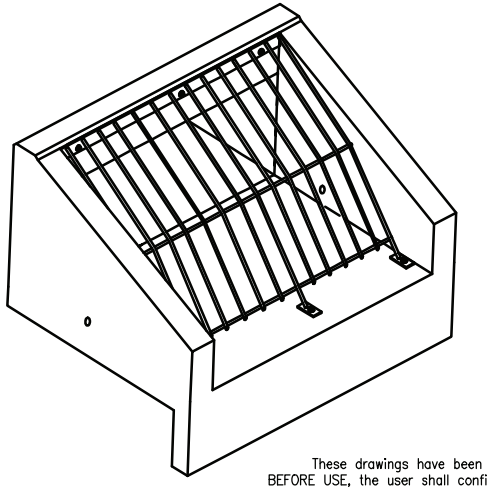
Reinforcement omitted for clarity



DETAIL B



TOP PLATE DETAIL

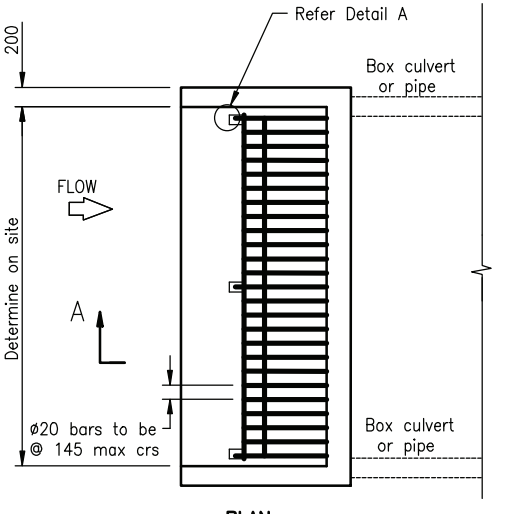


NOTES:

1. For Wingwall and Headwall details and reinforcement, refer DTMR Std Dwg SD1303
2. For Apron details and reinforcement, refer DTMR Std Dwg SD1318 (Type 3 Apron)
3. Concrete to be Class N32/20 AS1379–3600.
4. All cover to reinforcement to be 50mm minimum.
5. Cover in aggressive environments refer DTMR Std Dwg SD1303.
6. All sections to be grade 300 and all bar to be grade 400.
7. All welds to conform to AS1554 and be 6mm continuous fillet welds unless otherwise noted.
8. All steelwork to be hot dip galvanised after fabrication to AS4680.
9. All nuts, bolts and washers to be stainless steel grade 316. with isolation washers.
10. Refer to DTMR Standards for safe distances to carriageways.
11. All dimensions are in millimetres unless shown otherwise.

TABLE 1

CULVERT HEIGHT	A	B	C	SCREEN HEIGHT
375	500	613	884	660
450	575	671	988	742
600	675	841	1206	898
750	800	977	1411	1054
900	900	1181	1659	1227
1200	1150	1478	2093	1552



PLAN

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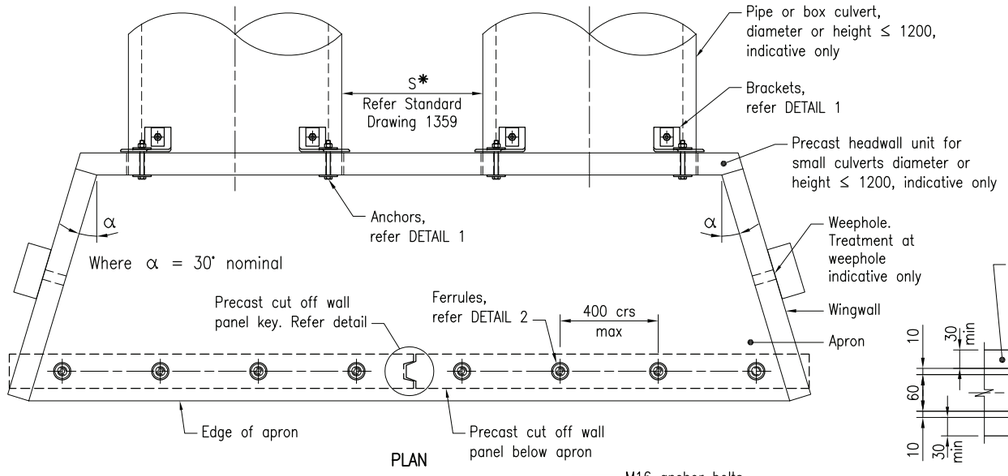
Rv.	DATE	REVISIONS
D	06/16	Review
C	06/14	Review
B	03/14	Amended Drawing Number
A	10/12	ORIGINAL ISSUE

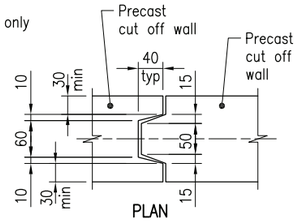
INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALASIA
STANDARD DRAWINGS

DRAINAGE DETAILS
CULVERT INLET SCREEN

DS–082



PLAN



PLAN

KEY DETAIL FOR PRECAST CUT OFF WALL PANEL

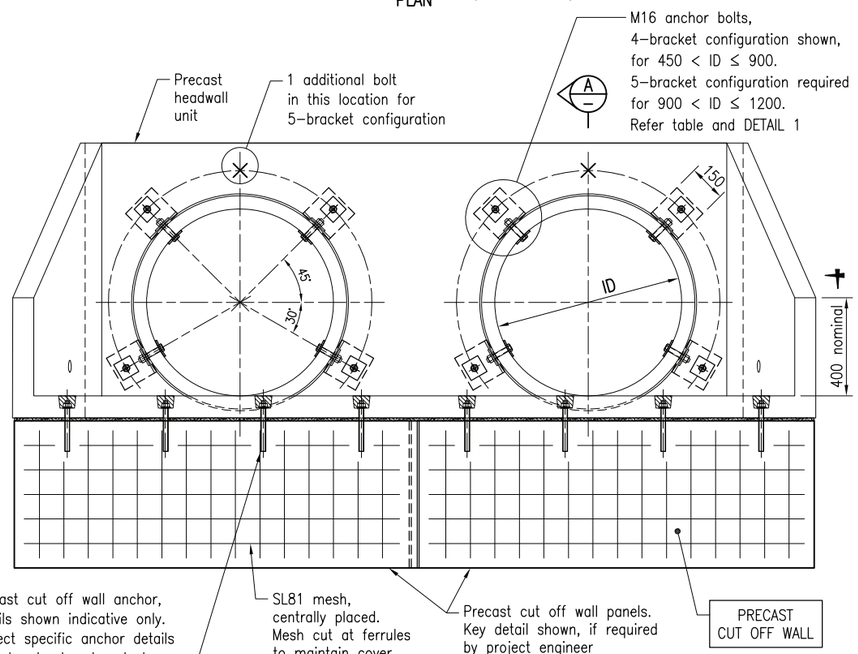
SCOPE OF PRECAST HEADWALL STANDARD DRAWING 1243

The scope of this standard drawing is to provide standard details for precast headwall connection for pipe or box culverts.
It is the responsibility of the project design engineer to provide project specific drawings for the use of precast headwall units supplied by registered precast supplier, to suit the project situation and to RPEQ certify the project specific drawings. The precast headwall unit dimensions shall be checked to ensure fit for purpose.
This standard drawing is applicable for single cell and multi-cell headwalls.

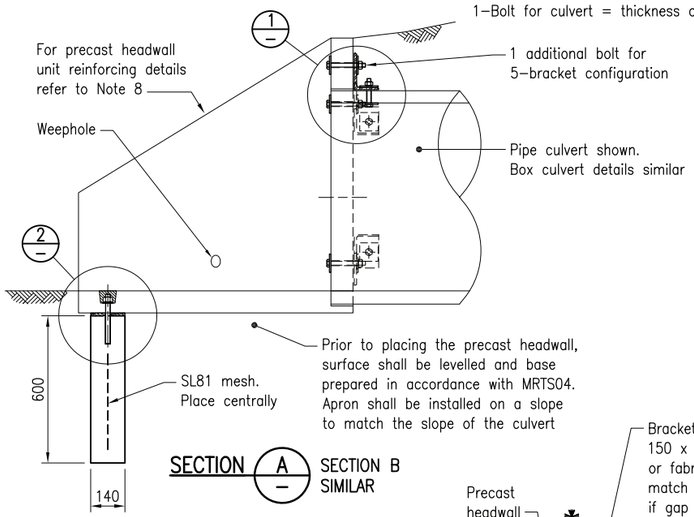
ANCHOR BOLT DETAILS

	Culvert Size Pipe ID or H of Box	No OFF Brackets per culvert ✱	
Pipe	450 < ID ≤ 900	4 per pipe	
	900 < ID ≤ 1200	5 per pipe	
Box culvert	450 < H ≤ 600	Multicell culvert : Outer units = 3 Inner units = 2	Single cell = 4
	600 < H ≤ 900	Multicell culvert : Outer units = 5 Inner units = 3	Single cell = 7
	900 < H ≤ 1200		

✱ Each bracket requires 2 bolts, length as follows :
1–Bolt for headwall = thickness of headwall t_h + 60
1–Bolt for culvert = thickness of culvert t_c + 60

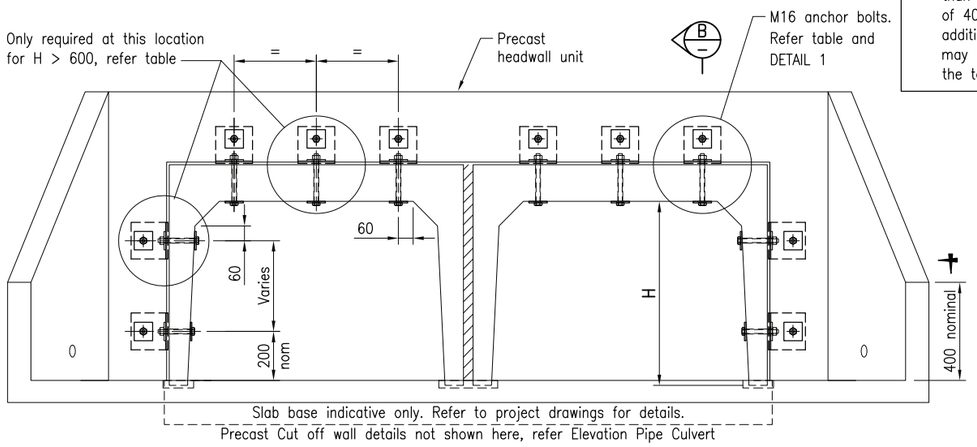


ELEVATION – PIPE CULVERT (A)



SECTION A SECTION B SIMILAR

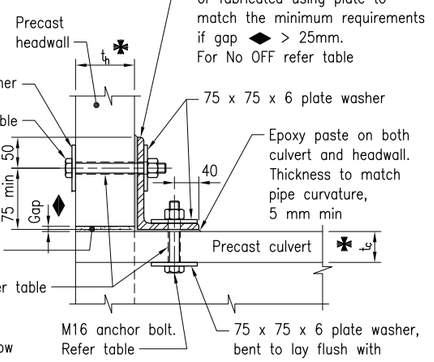
✝ Where the precast wingwall end dimension is higher than the preferred dimension of 400, in this situation additional erosion protection may be required to protect the toe of the embankment



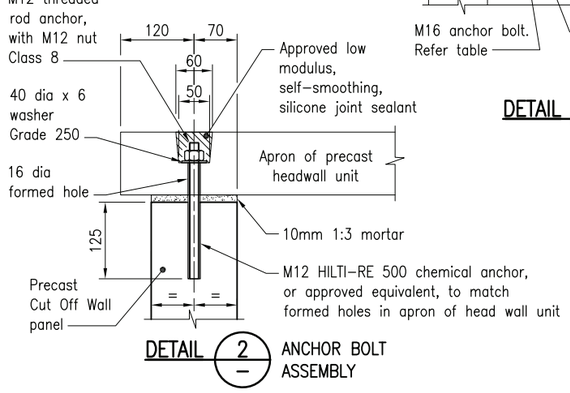
ELEVATION – BOX CULVERT (B)

GENERAL ARRANGEMENT

Detail is similar in upstream and downstream sides



DETAIL 1 ANCHOR BOLT ASSEMBLY



DETAIL 2 ANCHOR BOLT ASSEMBLY

NOTES for PIPE and BOX CULVERTS diameter ≤ 1200:

1. PIPE and BOX CULVERTS shall be in accordance with MRTS03.
   Precast headwalls shall be manufactured in accordance with MRTS03 and MRTS72.
   Precast headwall unit and headwall connection to this standard drawing shall be designed in accordance with Technical Note 27.
   The standard details shown in this drawing are for exposure class B2 to AS 5100.
   Refer Note 7 for additional requirements for projects in exposure class C1 and C2.
2. PRECAST HEADWALL CONNECTIONS detailed on this standard drawing are applicable for pipe and box culvert of diameter or height ≤ 1200.
   Cast insitu concrete headwall connections and cut off walls as detailed on Drawings 2 and 3 may be an acceptable alternative for the details on this drawing, as assessed by the Project Engineer, to meet project constraints such as limited concrete supply.
   For smaller culverts diameter or height up to 450, the use of this precast headwall connection detail can be omitted dependent upon site conditions and risk of separation of headwall, as assessed by the Project Engineer. Factors such as low flow in small culverts, ease of maintenance in the event of headwall separation, can be considered in the assessment to determine the requirement for the precast headwall connection details.
3. CONCRETE shall be in accordance with MRTS70.
   PRECAST CUT OFF WALL PANELS shall be manufactured in accordance with MRTS72.
   Design life 100 years. Minimum concrete strength shall be S50/20.
   Minimum exposure classification B2 to AS 5100.
   Minimum cover to reinforcement shall be 40 with rigid formwork and subjected to intense compaction. An approved super–workable concrete mix may be used in lieu of intense vibration. All exposed edges shall have 20 x 20 chamfers.
   Refer Note 7 for additional requirements for higher exposure classifications.
4. STEELWORK shall be fabricated to MRTS78, for exposure class B2.
   Steel angle Grade 300 to AS/NZS 3679.1.
   Threaded bar, bolts and screws Class 4.6 to AS 1111.1.
   Nuts Class 5 to AS 1112.1. Washers Class 5 to AS 1237.1.
   Steel plate Grade 250 minimum to AS/NZS 3678.
   All anchors, bolts and nuts shall be hot dip galvanised to AS 1214.
   All other steelwork shall be hot dip galvanised to AS/NZS 4680.
5. REINFORCING STEEL shall be in accordance with Standard Drawing 1044, and compliant with MRTS71 and AS/NZS 4671.
   Reinforcing mesh Grade D500L. All reinforcing steel to be ACRS certified.
   Reinforcing Steel welding shall be in accordance with Standard Drawing 1044.
6. PRECAST HEADWALL UNIT AND CUT OFF WALL PANELS shall be designed and RPEQ certified by the precaster's designer according to the project specific requirements.
   Minimum details to be shown in the precast supplier provided project specific drawings are:
   - All dimensions of precast headwall unit including wingwall and apron lengths and reinforcement details;
   - Design loads and design standards including Technical Note 27;
   - Details of formed holes/ferrules for the threaded bar anchors for connection between precast headwall unit and precast cutoff wall;
   - Design minimum exposure classification;
   - Concrete notes including concrete class, aggregate size, cover to reinforcement.

   These precast supplier provided project specific drawings shall be included in the project scheme drawings prepared by the project designer.
7. Additional requirements for exposure class C1 and C2:
   Minimum concrete strength and cover to reinforcement shall be to AS 5100.
   Anchor bolt assemblies shall be of stainless steel bolts, threaded bar, angle, plate, and washers to Grade 316, and nuts to Grade 304, in accordance with MRTS78A, and its referred standards.
8. PROJECT–SPECIFIC INFORMATION TO BE SHOWN ON THE PROJECT DRAWINGS:
   - Precast headwall connection details;
   - Precast cut off wall details;
   - Details of all anchors at culvert apron and cut off wall.
9. Before drilling precast units, the position of the reinforcements shall be identified and any drilling shall avoid cutting the reinforcement.
10. DIMENSIONS are in millimetres unless shown otherwise.

ASSOCIATED DEPARTMENTAL DOCUMENTS:
Technical Note 27 Guidelines for Design of Precast Culvert and Pipe Headwalls
NDRRA Design Guidelines; Road Drainage Manual

REFERENCED DOCUMENTS:
Departmental Standard Drawing 1044 Reinforcing Steel – Lap Lengths
Departmental Specifications:
MRTS03 Drainage, Retaining Structures and Protective Treatments;
MRTS70 Concrete; MRTS72 Manufacture of Concrete Elements;
MRTS78 Fabrication of Structural Steelwork;
MRTS78A Fabrication of Structural Stainless Steelwork

Department of Transport and Main Roads

PRECAST CULVERT HEADWALLS

HEADWALL CONNECTIONS FOR CULVERTS DIAMETER OR HEIGHT ≤ 1200

DRAWING 1 OF 3

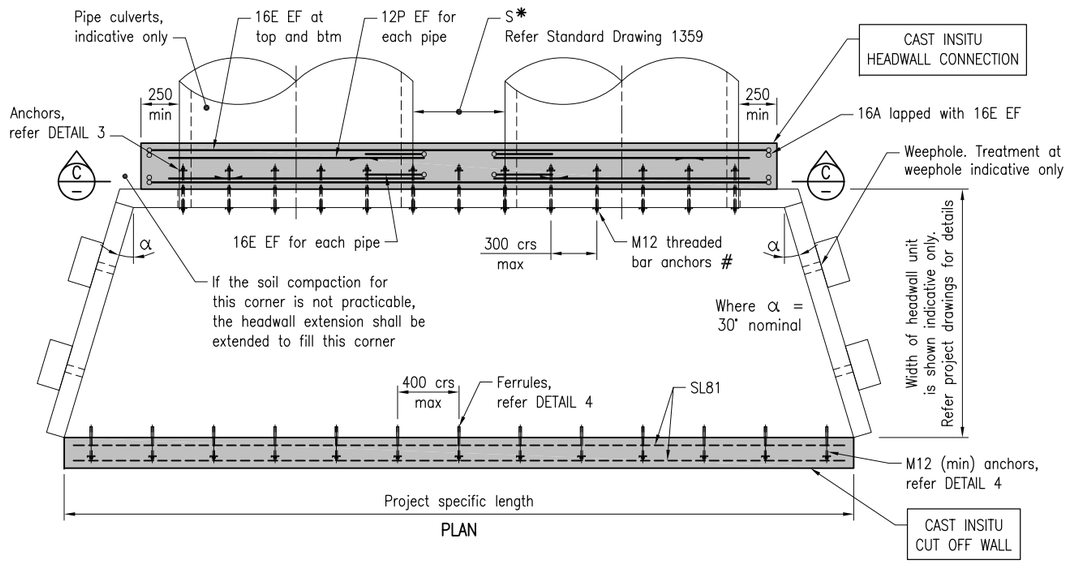
Queensland Government

A3 | Not to Scale

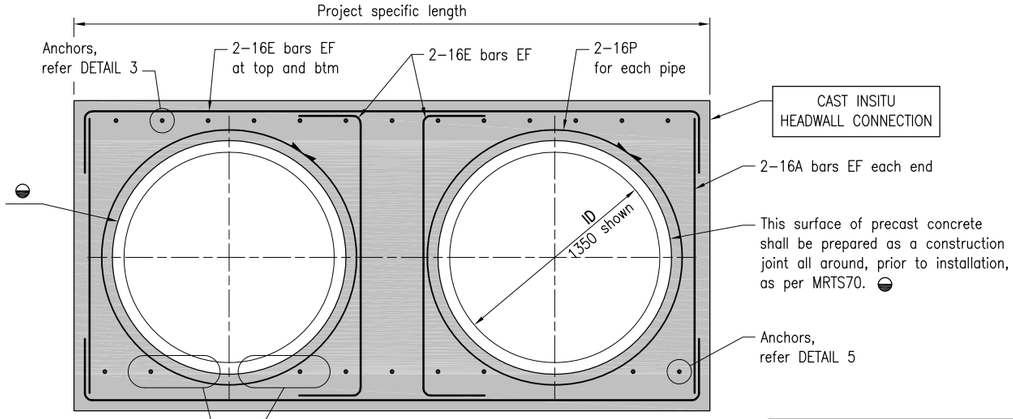
Standard Drawing No 1243

Date 3/2020

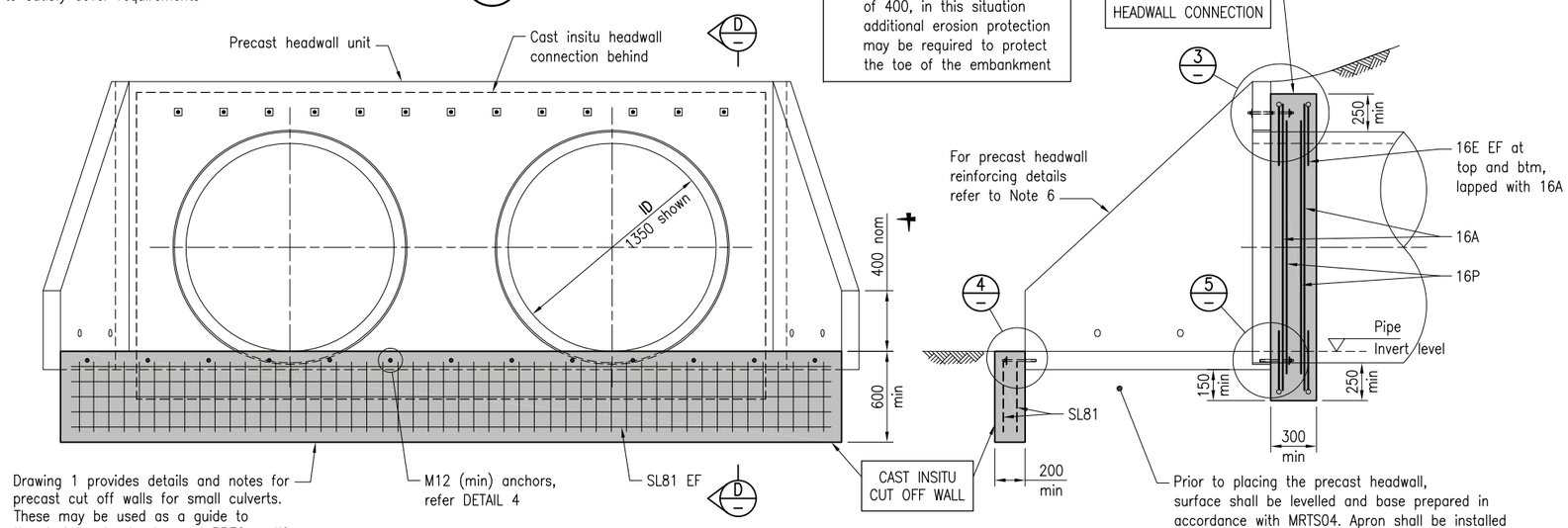
A | B | C



PLAN



SECTION C



ELEVATION

GENERAL ARRANGEMENT

Detail is similar in upstream and downstream sides

Where the precast wingwall end dimension is higher than the preferred dimension of 400, in this situation additional erosion protection may be required to protect the toe of the embankment

Prior to placing the precast headwall, surface shall be levelled and base prepared in accordance with MRTS04. Apron shall be installed on a slope to match the slope of the culvert

SECTION D

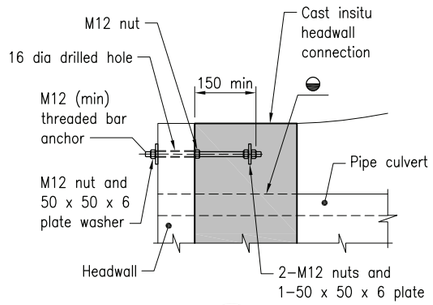
SCOPE OF PRECAST HEADWALL STANDARD DRAWING 1243

The scope of this standard drawing is to provide standard details for culvert headwall connections for pipe culverts.
It is the responsibility of the precast headwall supplier and the project design engineer to provide project specific drawings, based on these standard details, to suit the project situation and to RPEQ certify the project specific drawings.
This standard drawing is applicable for single cell and multi–cell headwalls

HEADWALL ANCHORS

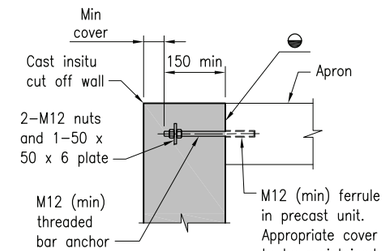
Internal pipe diameter ID	Minimum No OFF # anchors
1350	8
1500	8
1650	12
1800	12
1950	12
2100	12
2250	12
2400	12
2550	12

This minimum No OFF anchors shall be provided at the top and bottom of the headwall, for each pipe.
Before drilling precast units, the position of the reinforcements shall be identified and any drilling shall avoid cutting the reinforcement.



DETAIL 3 – ANCHOR BOLT ASSEMBLY

Reinforcement omitted from these details for clarity



DETAIL 4 – ANCHOR BOLT ASSEMBLY

DETAIL 5 – SIMILAR

NOTES for PIPE CULVERTS diameter > 1200:

1. PIPE CULVERTS shall be in accordance with MRTS03.
   The details on this standard drawing are for cast–in–situ headwall connection and cut off walls to precast headwall units for pipe diameter > 1200.
   Precast headwall unit and headwall connection shall be designed in accordance with Technical Note 27.
   The standard details shown in this drawing are for exposure class B2 to AS 5100.
   Refer Note 7 for additional requirements for projects in exposure class C1 and C2.
2. PRECAST HEADWALLS shall be manufactured in accordance with MRTS03 and MRTS72.
3. CONCRETE shall be in accordance with MRTS70.
   Requirements for cast insitu concrete for headwall connections and cut off walls are shown in the table below.

Item	Design requirements
Design life	100 years
Minimum exposure classification	B2 to AS 5100
Minimum concrete class	S40/20
Cover to reinforcement	60 cover to AS 5100

4. STEELWORK shall be fabricated to MRTS78, for exposure class B2.
   Ferrules shall be TMR approved.
   Threaded bar, bolts and screws to Class 4.6 to AS 1111.1.
   Nuts class 5 to AS 1112.1. Washers class 5 to AS 1237.1.
   Steel plate Grade 250 minimum to AS/NZS 3678.
   All ferrules, anchors, bolts and nuts shall be hot dip galvanised to AS 1214.
   All other steelwork to be hot dip galvanised to AS/NZS 4680 unless shown otherwise.
5. REINFORCING STEEL shall be in accordance with Standard Drawings 1043 and 1044, and compliant with MRTS71 and AS/NZS 4671.
   All reinforcing steel to be ACRS certified.
   Reinforcing Steel welding shall be in accordance with Standard Drawing 1044.
   Deformed bars Grade D500N. Reinforcing mesh Grade D500L.
6. PRECAST HEADWALL UNIT shall be designed and RPEQ certified by the precaster's designer according to the project specific requirements. Minimum details to be shown in the precast supplier provided project specific drawings are:
   – All dimensions of precast headwall unit including wingwall and apron lengths and reinforcement details.
   – Design loads and design standards including Technical Note 27.
   – Details of formed holes/ferrules for the threaded bar anchors for connection between precast headwall unit and cast insitu headwall connection/cut off wall.
   – Design minimum exposure classification.
   – Concrete notes including concrete class, aggregate size, cover to reinforcement.
7. Additional requirements for exposure class C1 and C2:
   Minimum concrete strength and cover to reinforcement shall be to AS 5100.
   Anchor bolt assemblies shall be of stainless steel bolts, threaded bar, plate, and washers to Grade 316, and nuts to Grade 304, in accordance with MRTS78A, and its referred standards.
8. PROJECT–SPECIFIC INFORMATION TO BE SHOWN ON THE PROJECT DRAWINGS:
   – Cast insitu headwall connection dimensions.
   – Cast insitu cut off wall dimensions.
   – Details of threaded bar anchors for cast insitu headwall connection and for cut off wall.
9. DIMENSIONS are in millimetres unless shown otherwise.

ASSOCIATED DEPARTMENTAL DOCUMENTS:
Technical Note 27 Guidelines for Design of Precast Culvert and Pipe Headwalls
NDRRA Design Guidelines;
Road Drainage Manual

REFERENCED DOCUMENTS:
Departmental Standard Drawings
1043 Reinforcing Steel – Standard Bar Shapes
1044 Reinforcing Steel – Lap Lengths
Departmental Specifications:
MRTS03 Drainage, Retaining Structures and Protective Treatments
MRTS70 Concrete
MRTS71 Reinforcing Steel
MRTS72 Manufacture of Concrete Elements
MRTS78 Fabrication of Structural Steelwork
MRTS78A Fabrication of Structural Stainless Steelwork

Department of Transport and Main Roads

PRECAST CULVERT HEADWALLS

HEADWALL CONNECTIONS FOR PIPE CULVERTS DIAMETER > 1200

DRAWING 2 OF 3

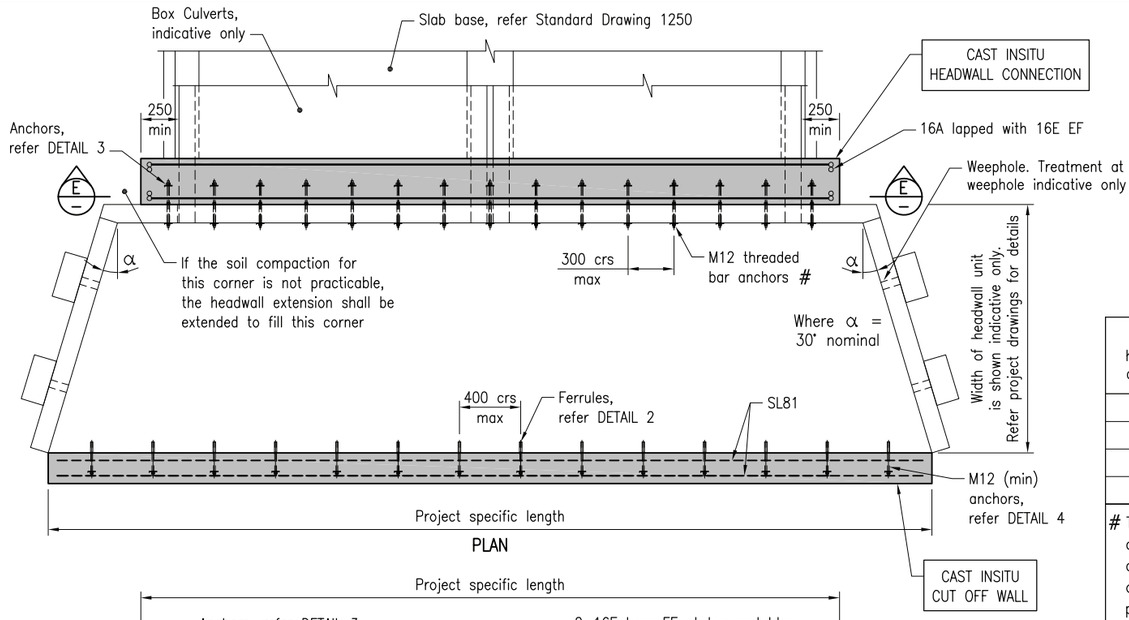
Queensland Government

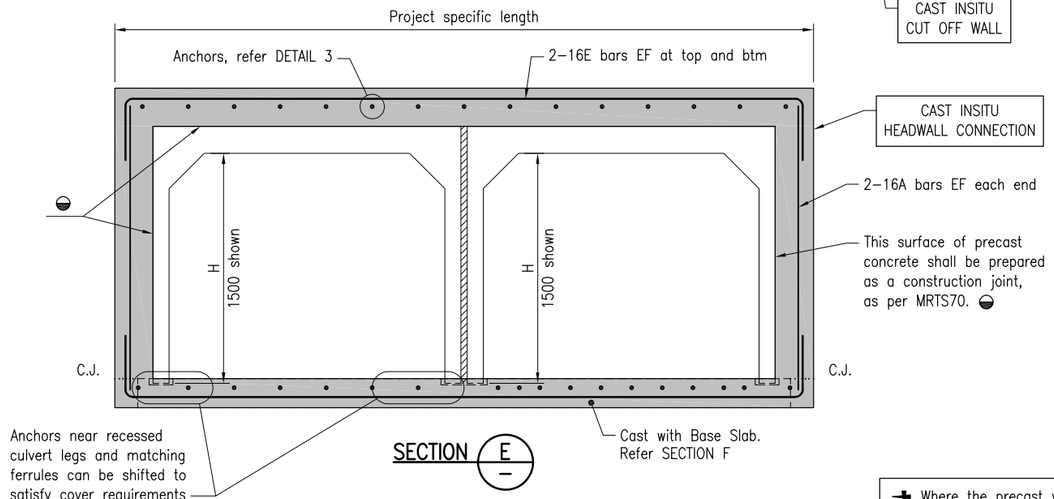
A3 | Not to Scale

Standard Drawing No 1243

Date 3/2020

A | B | C

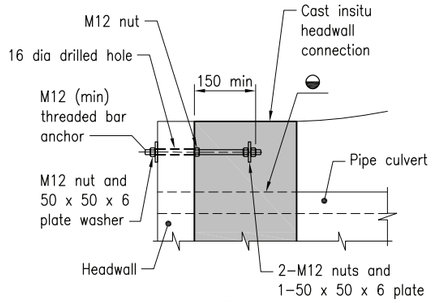




HEADWALL ANCHORS

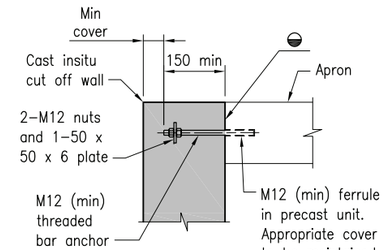
Internal height of culvert H	Minimum No OFF # anchors
1500	6
1800	8
2100	8
2400	12

This minimum No OFF anchors shall be provided at the top and bottom of the headwall, for each pipe.
Before drilling precast units, the position of the reinforcements shall be identified and any drilling shall avoid cutting the reinforcement.



DETAIL 3 ANCHOR BOLT ASSEMBLY

Reinforcement omitted from these details for clarity



DETAIL 4 ANCHOR BOLT ASSEMBLY

DETAIL 5 SIMILAR

SCOPE OF PRECAST HEADWALL STANDARD DRAWING 1243

The scope of this standard drawing is to provide standard details for culvert headwall extensions for box culverts.
It is the responsibility of the precast headwall supplier and the project design engineer to provide project specific drawings, based on these standard details, to suit the project situation and to RPEQ certify the project specific drawings.
This standard drawing is applicable for single cell and multi–cell headwalls

NOTES for BOX CULVERTS height > 1200:

1. BOX CULVERTS shall be in accordance with MRTS03.
   The details on this standard drawing are for cast–in–situ headwall connection and cut off walls to precast headwall units for box culvert height > 1200.
   Precast headwall unit and headwall connection shall be designed in accordance with Technical Note 27.
   The standard details shown in this drawing are for exposure class B2 to AS 5100.
   Refer Note 7 for additional requirements for projects in exposure class C1 and C2.
2. PRECAST HEADWALLS shall be manufactured in accordance with MRTS72.
3. CONCRETE shall be in accordance with MRTS70.
   Requirements for cast insitu concrete for headwall connections and cut off walls are shown in the table below.

Item	Design requirements
Design life	100 years
Minimum exposure classification	B2 to AS 5100
Minimum concrete class	S40/20
Cover to reinforcement	60 cover to AS 5100

4. STEELWORK shall be fabricated to MRTS78, for exposure class B2.
   Ferrules shall be TMR approved.
   Threaded bar, bolts and screws to Class 4.6 to AS 1111.1.
   Nuts class 5 to AS 1112.1. Washers class 5 to AS 1237.1.
   Steel plate Grade 250 minimum to AS/NZS 3678.
   All ferrules, anchors, bolts and nuts shall be hot dip galvanised to AS 1214.
   All other steelwork to be hot dip galvanised to AS/NZS 4680 unless shown otherwise.
5. REINFORCING STEEL shall be in accordance with Standard Drawings 1043 and 1044, and compliant with MRTS71 and AS/NZS 4671.
   All reinforcing steel to be ACRS certified.
   Reinforcing Steel welding shall be in accordance with Standard Drawing 1044.
   Deformed bars Grade D500N. Reinforcing mesh Grade D500L.
6. PRECAST HEADWALL UNIT shall be designed and RPEQ certified by the precaster's designer according to the project specific requirements. Minimum details to be shown in the precast supplier provided project specific drawings are:
   – All dimensions of precast headwall unit including wingwall and apron lengths and reinforcement details.
   – Design loads and design standards including Technical Note 27.
   – Details of formed holes/ferrules for the threaded bar anchors for connection between precast headwall unit and cast insitu headwall connection/cut off wall.
   – Design minimum exposure classification.
   – Concrete notes including concrete class, aggregate size, cover to reinforcement.
7. Additional requirements for exposure class C1 and C2:
   Minimum concrete strength and cover to reinforcement shall be to AS 5100.
   Anchor bolt assemblies shall be of stainless steel bolts, threaded bar, plate, and washers to Grade 316, and nuts to Grade 304, in accordance with MRTS78A, and its referred standards.
8. PROJECT–SPECIFIC INFORMATION TO BE SHOWN ON THE PROJECT DRAWINGS:
   – Cast insitu headwall connection dimensions.
   – Cast insitu cut off wall dimensions.
   – Details of threaded bar anchors for cast insitu headwall connection and for cut off wall.
9. DIMENSIONS are in millimetres unless shown otherwise.

ASSOCIATED DEPARTMENTAL DOCUMENTS:
Technical Note 27 Guidelines for Design of Precast Culvert and Pipe Headwalls
NDRRA Design Guidelines;
Road Drainage Manual

REFERENCED DOCUMENTS:
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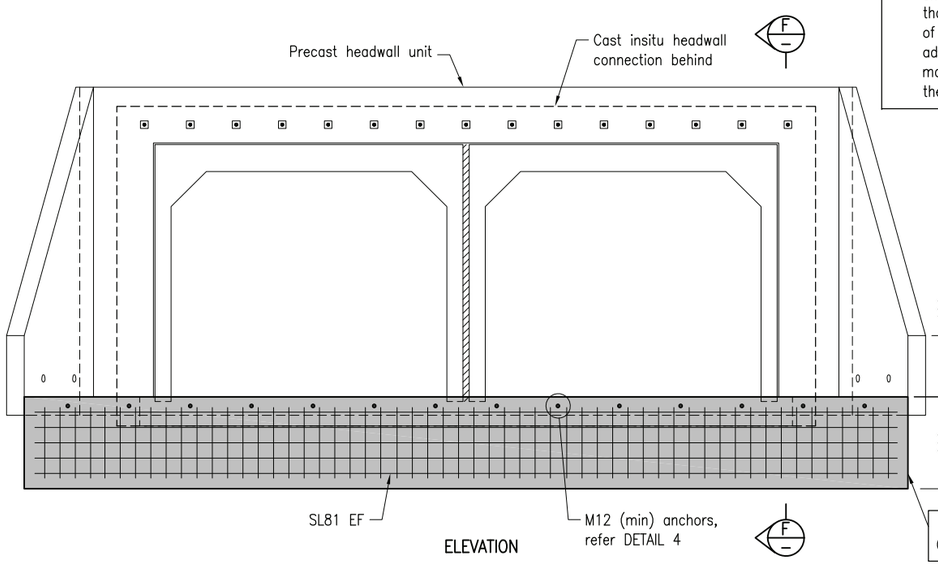
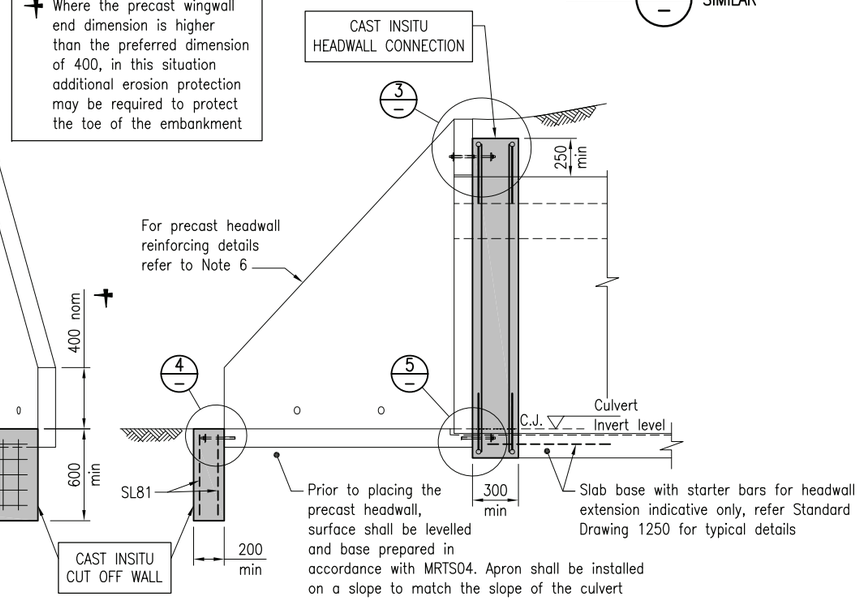
MRTS78 Fabrication of Structural Steelwork
MRTS78A Fabrication of Structural Stainless Steelwork



GENERAL ARRANGEMENT
Detail is similar in upstream and downstream sides

Where the precast wingwall end dimension is higher than the preferred dimension of 400, in this situation additional erosion protection may be required to protect the toe of the embankment



Department of Transport and Main Roads

PRECAST CULVERT HEADWALLS

HEADWALL CONNECTIONS FOR BOX CULVERTS HEIGHT > 1200

DRAWING 3 OF 3

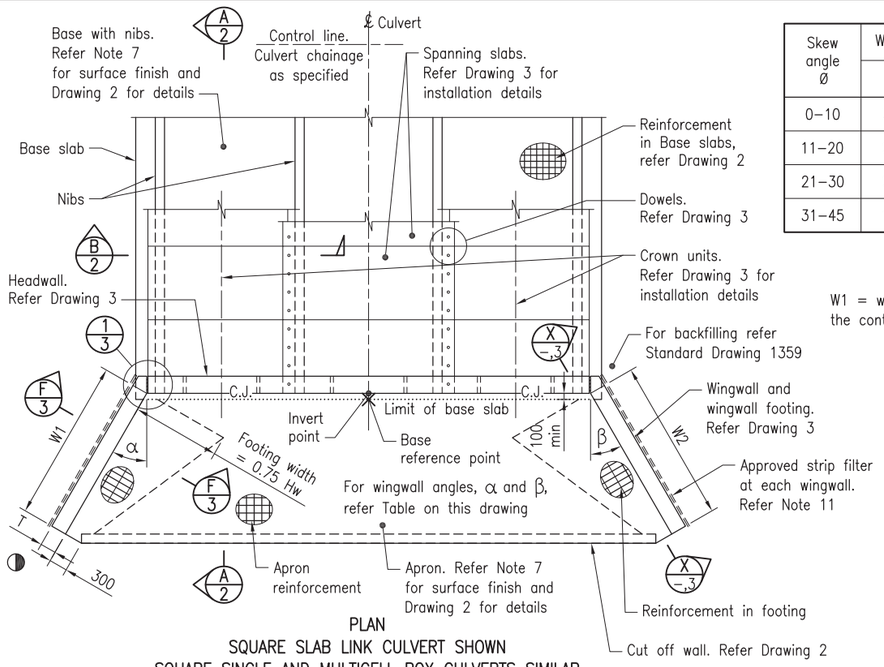
Queensland Government

A3 | Not to Scale

Standard Drawing No 1243

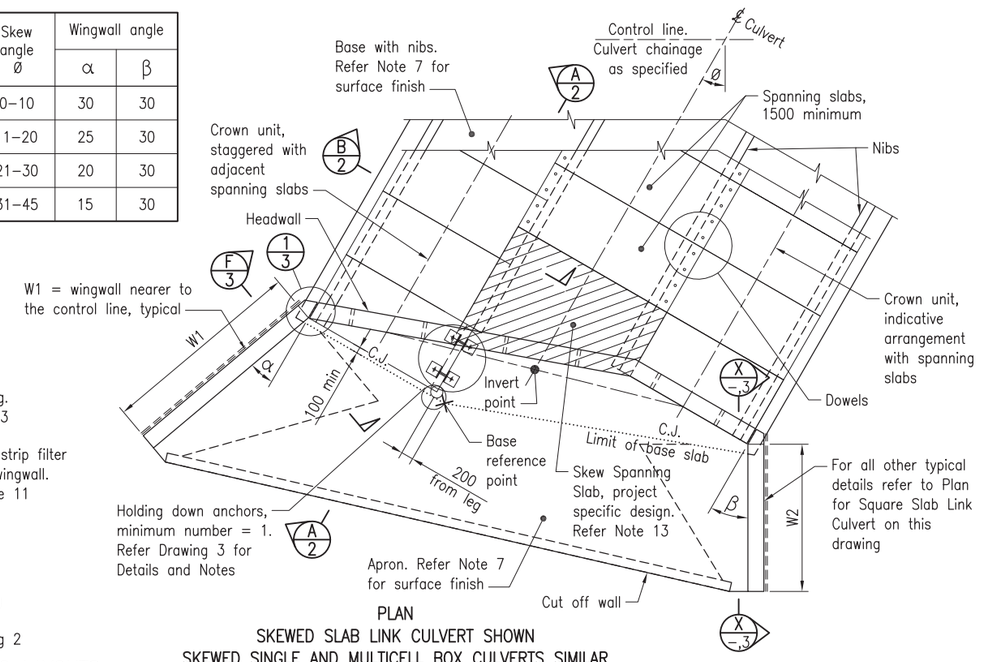
Date 3/2020

A | B | C



PLAN
SQUARE SLAB LINK CULVERT SHOWN
SQUARE SINGLE AND MULTICELL BOX CULVERTS SIMILAR

Skew angle Ø	Wingwall angle	
	α	β
0–10	30	30
11–20	25	30
21–30	20	30
31–45	15	30

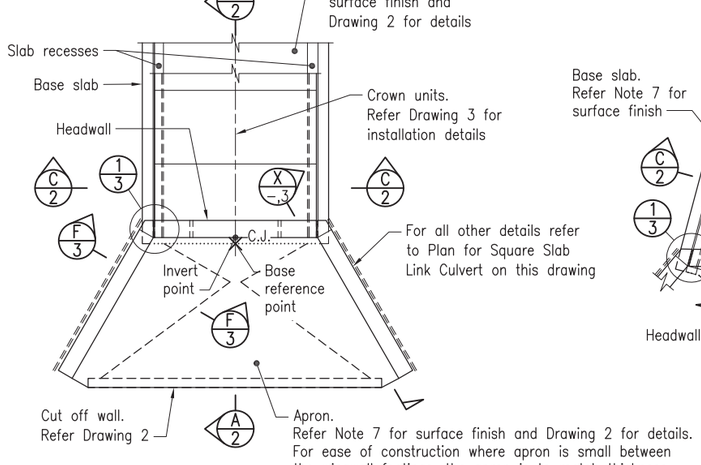


PLAN
SKEWED SLAB LINK CULVERT SHOWN
SKEWED SINGLE AND MULTICELL BOX CULVERTS SIMILAR

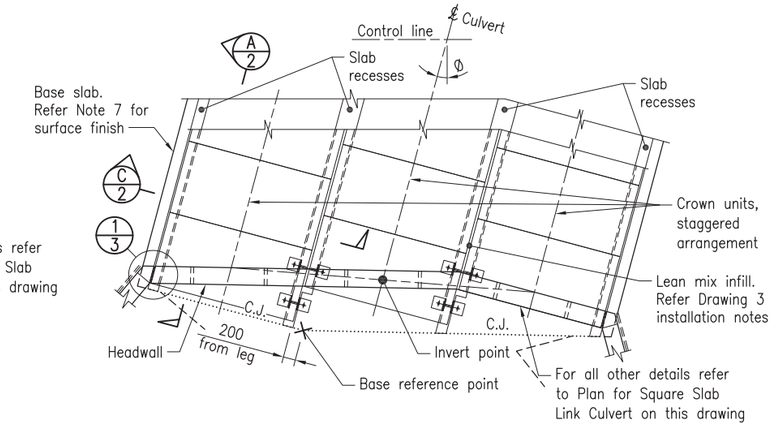
TYPICAL FRAMING LAYOUTS FOR BASE SLAB WITH NIBS

† where Hw = H + tc + 10 + ts + 275
height of opening H;
thickness of culvert tc;
thickness of slab ts.
Refer table on Drawing 3

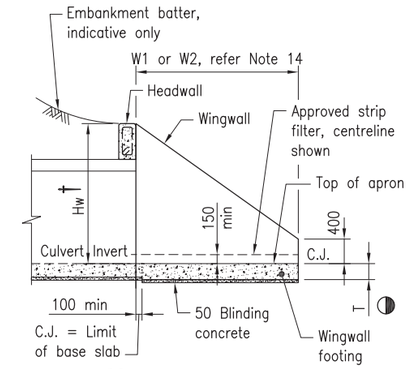
◑ T is a constant thickness for wingwalls and footings. Refer table on Drawing 3



PLAN
SQUARE SINGLE BOX CULVERT SHOWN
SQUARE MULTIPLE CELL BOX AND SLAB LINK CULVERTS SIMILAR

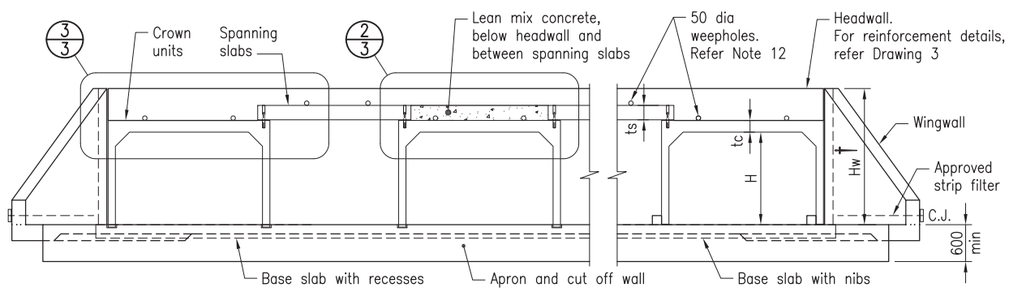


PLAN
SKEWED MULTIPLE CELL BOX CULVERT SHOWN
SKEWED SINGLE BOX AND SLAB LINK CULVERTS SIMILAR



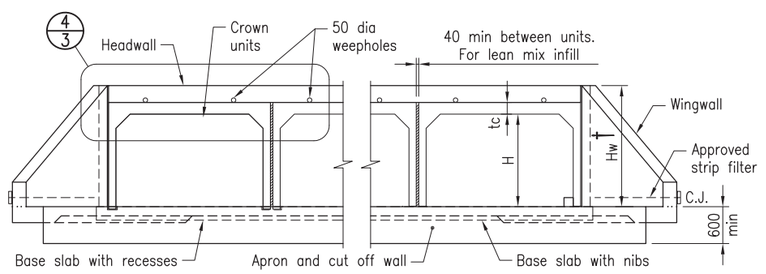
SECTION X – TYPICAL ELEVATION AT WINGWALL – CONCRETE DETAILS

TYPICAL FRAMING LAYOUTS FOR BASE SLAB WITH RECESSES



TYPICAL ELEVATION – BASE WITH RECESSES
TYPICAL ELEVATION – SPANNING SLAB DETAILS
TYPICAL ELEVATION – BASE WITH NIBS

GENERAL ARRANGEMENT – SLAB LINK BOX CULVERT



TYPICAL ELEVATION

GENERAL ARRANGEMENT – MULTIPLE CELL R C BOX CULVERT

The purpose of this Standard Drawing is to provide typical standard details that shall be used within the limitations specified in the drawing and in accordance with the following:

1. The adaptability of the standard details shall be assessed by the project designer in respect of specific project geometric, appropriate foundation and scour conditions.
2. In reactive soils: this standard drawing is only applicable for reactive soils with linear shrinkage up to 8%. Specialist geotechnical design advice shall be sought otherwise.
3. If the insitu bearing capacity is inadequate, the following options may be explored subject to review and acceptance by E&T Structures and Geotechnical sections:
   a. Insitu ground improvement, and/or
   b. Redesign of the base slab.

   Any redesign works shall be RPEQ certified by appropriate engineering disciplines for compliance.
4. When there is uncertainty regarding the application of the standard details on this drawing for a specific project, advice shall be sought from E&T Structures.

GENERAL NOTES:

1. SCOPE: This drawing is to detail cast insitu base slab, aprons, headwalls and wingwalls for precast RC Box Culverts and Slab Link Box Culverts where H (height of opening) > 600.
   This drawing supersedes Standard Drawings 1303, 1316, 1317, 1318 and 1320.
   This drawing does not provide details of fish passage requirements. Where project specific environmental assessment determines that waterway barrier works are required, additional details shall be developed and included in the project drawings.
2. BOX CULVERTS shall be constructed in accordance with MRTS03.
3. DESIGN TRAFFIC LOADING: HLP400, M1600, A160 and W80 are in accordance with AS 5100.2.
   Maximum height of fill over the culvert shall be 2000.
   Maximum design pressure (E_d) under the culvert slab bases is provided in the Base slab Details table on drawing 2.
4. DOWELLED CONTRACTION JOINTS shall be provided where (a) the length and/or (b) the width of the base slab exceed 20m. When contraction joints are required across the width, they shall be located at 1/4 span points of crown units and are to be continued across the aprons and cut off walls. 24 hours minimum shall be allowed between pours.
5. APRON AND BASE SLAB MINIMUM REINFORCEMENT for shrinkage and temperature effects are designed considering the full restraint condition to AS 5100. For the slab on ground condition, only the top half of the slab thickness is considered for calculation of this reinforcement.
6. WINGWALLS for skewed culverts with angle greater than 45 require a special design.
7. CONCRETE shall be in accordance with MRTS70.
   Design life 100 years.
   Exposure classification and cover to reinforcement shall be in accordance with AS 5100. Minimum concrete strength and cover to reinforcement shall be as shown in table below.

Exposure classification	minimum B2	C1	C2
Minimum concrete strength	S40/20	S50/20	S55/20
Minimum Cover UNO	60	70	80

   Triple–blend concrete in accordance with MRTS70 is required for Exposure classifications C1 and C2.
   Blinding concrete N20/20.
   Surface roughening of the aprons, and traversable areas of slabs between nibs or recesses if required, shall be broom finish using a broom not less than 400 wide to achieve an average texture depth of 0.8. The direction of brushing shall be perpendicular to the direction of flow.
   All exposed edges shall have 19 x 19 chamfers, unless nominated otherwise.
8. PRECAST CONCRETE CULVERTS shall be designed and manufactured in accordance with MRTS24.
9. STEELWORK shall be fabricated to the requirements of MRTS78.
   Flat bar and angle shall be Grade 300 to AS/NZS 3679.1. Bolts and screws Class 4.6 to AS 1111.1. Nuts Class 5 to AS 1112.1. Washers Class 5 to AS 1237.1.
   After fabrication all bolts and nuts shall be hot dip galvanised to AS 1214, and all other steelwork to AS/NZS 4680.

General Notes are continued on Drawing 2.

Department of Transport and Main Roads

R C BOX CULVERTS AND SLAB LINK BOX CULVERTS

CULVERTS HEIGHT > 600
DRAWING 1 OF 3

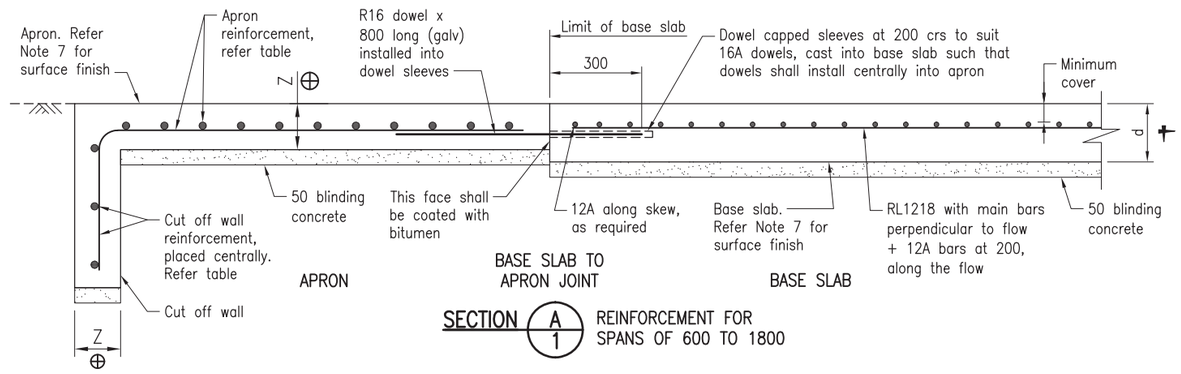
GENERAL ARRANGEMENT AND NOTES

Queensland Government

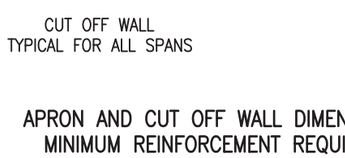
A3
Not to Scale

Standard Drawing No
1250
Date 3/2021

A B C D E



SECTION A 1 REINFORCEMENT FOR SPANS OF 600 TO 1800



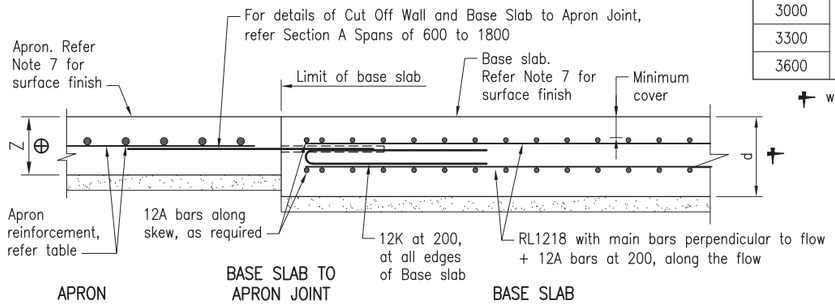
CUT OFF WALL
TYPICAL FOR ALL SPANS

APRON AND CUT OFF WALL DIMENSIONS AND MINIMUM REINFORCEMENT REQUIREMENTS

Exposure classification	Apron and Cut off wall #	
	Thickness Z ⊕	Reinforcement
B2	150	N12 at 150 both ways
C1	175	N12 at 150 both ways
C2	190	N12 at 125 both ways

⊕ where Z is a constant thickness for aprons and cut off walls.

\# Refer Note 5 of Drawing 1



SECTION A 1 REINFORCEMENT FOR SPANS OF 2100 OR GREATER

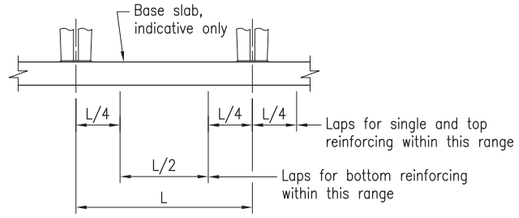
BASE SLAB DETAILS

Up to Span	Maximum design pressure (E_d) kPa		Base slab thickness d ✝ for Exposure classification			Depth of embedment of 12E nib bar
	H < 1500	H ≥ 1500	B2	C1	C2	
750	190	180	180	190	200	120
900			180	190	200	
1200			180	190	200	
1500			190	200	210	
1800			190	200	210	
2100	180	170	210	220	230	150
2400			245	255	265	
2700			255	265	275	
3000			260	270	280	200
3300			265	275	285	
3600			275	285	295	

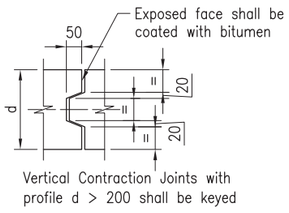
✝ where d is a constant thickness for base slab

GENERAL NOTES, continued from Drawing 1:

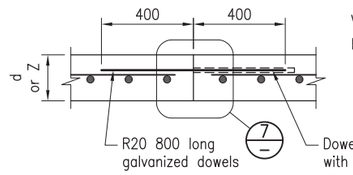
10. REINFORCING STEEL shall be read in conjunction with Standard Drawings 1043 and 1044, shall be in accordance with MRTS71 and AS/NZS 4671, and ACRS certified. Deformed bars Grade D500N. Round bars Grade R250N. Mesh Grade D500L. Reinforcement shall be hot dip galvanised to AS/NZS 4680 where shown. Reinforcing Steel welding shall be in accordance with Standard Drawing 1044.
11. WINGWALL DRAINAGE shall be provided behind wingwalls to prevent hydrostatic pressure being applied to the wingwall. A strip filter shall be used at each wingwall to drain out at the low end of the wingwall as shown.
12. WEEPHOLES shall be provided horizontally at headwalls, a minimum of 2 weepholes for each culvert crown or link slab, located such that reinforcement cover requirements are met, and a 300 x 300 x 150 no fines concrete block or approved equivalent shall be provided at each weephole as a drainage filter.
13. Refer Standard Drawing 1359 for details of earthworks to culverts.
14. PROJECT–SPECIFIC INFORMATION to be shown on the drawings:
    Exposure classification; Culvert chainage; Skew angle; Base and apron setout, surface roughening, extents and details; Skew spanning slab details (if required); Headwall and wingwall extents (W1, W2, α, β) and details; Requirements for fish passage.
15. DIMENSIONS are in millimetres.
    ASSOCIATED and REFERENCED DEPARTMENTAL DOCUMENTS:
    Design Criteria for Bridges and Other Structures; Road Drainage Manual (RDM)
    Standard Drawing 1359 Culverts – Installation, Bedding and Filling/Backfilling
    MRTS03 Drainage, Retaining Structures and Protective Treatments
    MRTS24 Manufacture of Precast Concrete Culverts
    MRTS70 Concrete; MRTS71 Reinforcing Steel; MRTS78 Structural Steelwork



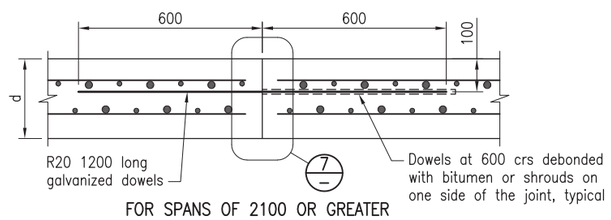
REINFORCING BAR LAP LOCATIONS – ALL BASE SLABS



DETAIL 7 –



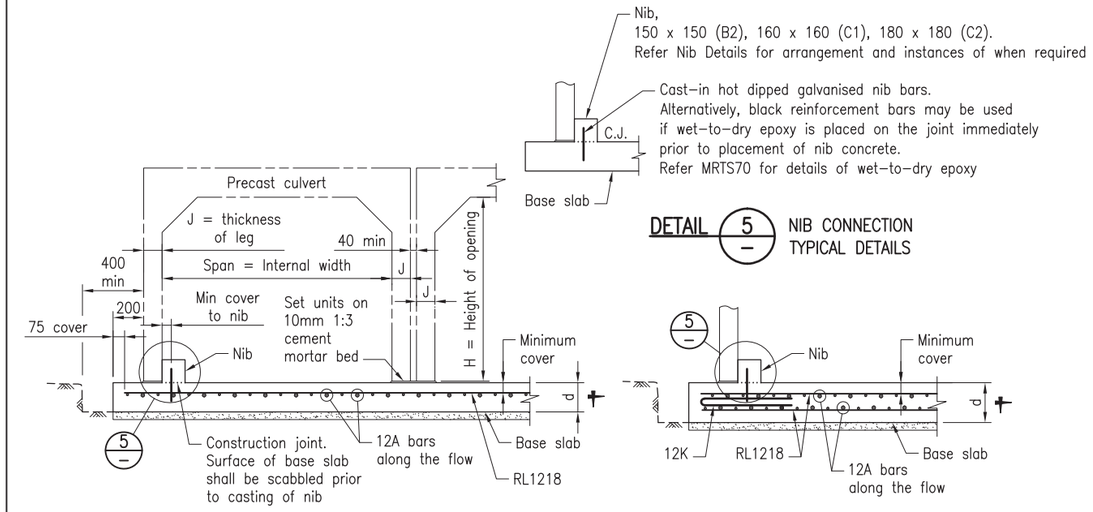
FOR SPANS OF 600 TO 1800 AND FOR ALL APRONS



FOR SPANS OF 2100 OR GREATER

TYPICAL DOWELLED CONTRACTION JOINT FOR ALL BASE SLABS AND APRONS

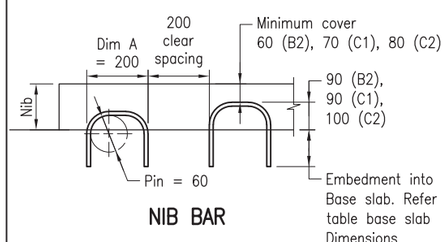
Installed with direction of flow. Refer Note 4 on Drawing 1



DETAIL 5 – NIB CONNECTION TYPICAL DETAILS

SECTION B 1 WITH NIB FOR SPANS OF 600 TO 1800

SECTION B 1 WITH NIB FOR SPANS OF 2100 OR GREATER

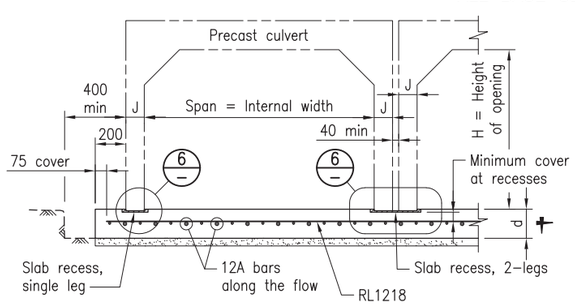


NIB BAR

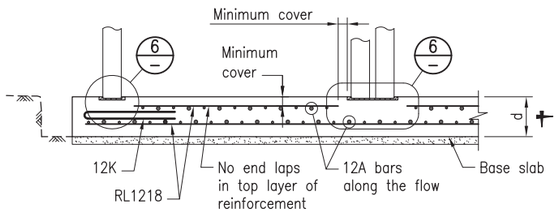
Arrangements:	for RCBC H > 600	– nibs supporting external legs of external cells
	for SLBC H > 600 to 900	– nibs supporting external legs of external cells
	for SLBC H > 900	– nibs supporting both legs of external cells
Installation:	for H < 1500	– nibs cast before placement of units
	for H ≥ 1500	– nibs cast after placement of units

NIB DETAILS

TYPICAL BASE SLAB WITH NIBS

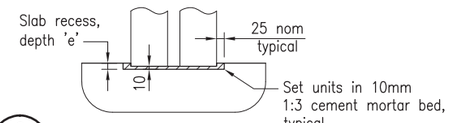


SECTION C 1 WITH RECESSES FOR SPANS OF 600 TO 1800



SECTION C 1 WITH RECESSES FOR SPANS OF 2100 OR GREATER

Recess depths 'e' for H are as follows :
where H > 600 to 750, 'e' = 20
H > 750 to 1200, 'e' = 30
H > 1200, 'e' = 40



DETAIL 6 – SLAB RECESS DETAILS

TYPICAL BASE SLAB WITH RECESSES

NOTES:

1. Refer Drawing 1 and this drawing for all General Notes.
2. Refer Drawing 1 for typical General Arrangements for large RCBC and SLBC culverts.
3. Refer Drawing 3 for details and notes for installation of precast units in large RCBC and SLBC culverts.
4. Refer Drawing 3 for Headwall and Wingwall details for large RCBC and SLBC culverts.

Department of Transport and Main Roads

R C BOX CULVERTS AND SLAB LINK BOX CULVERTS

CULVERTS HEIGHT > 600
DRAWING 2 OF 3
CONSTRUCTION OF
BASE SLABS AND APRONS

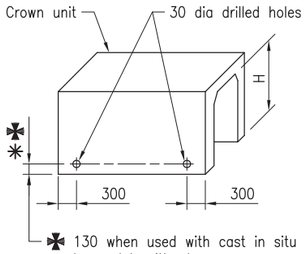
Queensland Government

A3 | Not to Scale

Standard Drawing No 1250

Date 3/2021

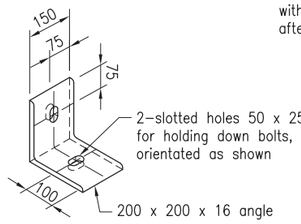
A | B | C | D | E



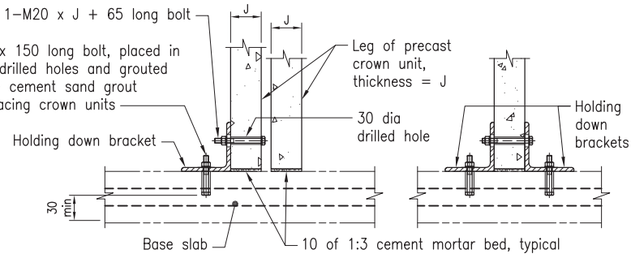
✱ 130 when used with cast in situ base slab without recesses
✳ For use with cast in situ base slab WITH recesses, 150 when H < 1500, 170 when H ≥ 1500

SKEWED CULVERTS ONLY

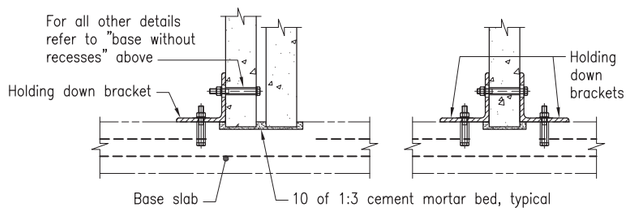
DRILLED HOLES IN CROWN UNITS FOR HOLDING DOWN ANCHORS



HOLDING DOWN BRACKET
Isometric view

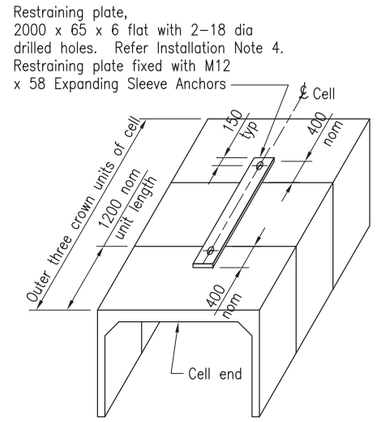


TYPICAL DETAILS FOR BASE WITHOUT RECESSES



TYPICAL DETAILS FOR BASE WITH RECESSES

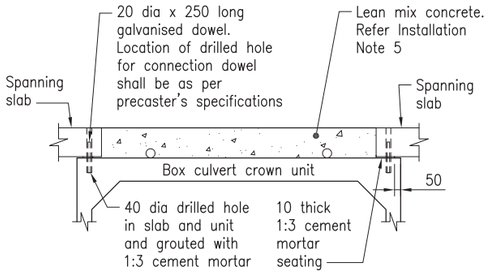
HOLDING DOWN ANCHORS



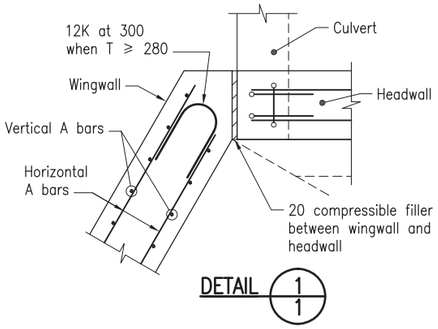
RESTRAINING PLATE
FOR USE WITH SLAB LINK BOX CULVERT 1200 LONG CROWN UNITS ONLY

NOTES FOR INSTALLATION OF PRECAST UNITS:

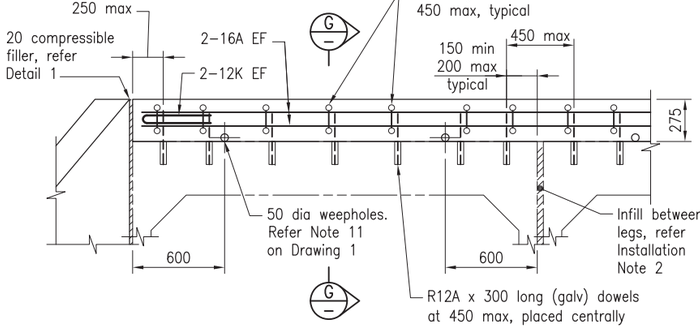
1. PRECAST CONCRETE CULVERTS shall be supplied and installed in accordance with MRTS03 and MRTS24.
   Doweled connections shall be in accordance with this drawing.
2. INFILL between legs of multiple cell culverts shall be achieved by placing concrete plugs of 250 minimum length at both ends of the structure and infill the remaining gap with 1:10 lean mix having maximum aggregate size of 10mm packed dry.
   Do not use fluid grout as hydrostatic head will damage culvert legs.
3. HOLDING DOWN ANCHORS shall be installed where the leg(s) of the crown unit extend more than 300 beyond the outside face of the headwall.
   Nibs are not required for these crown units. Where nibs are required, they are to extend for the full length of all other units.
   Refer details on this drawing for holding down anchor placement and installation.
4. CROWN UNIT RESTRAINING PLATES are required on the outer 3 of all internal cells when Slab Link Box Culvert > 5 cells when crown units ≥ 1800 high, and 1200 long, are used.
   Expanding Sleeve Anchors shall be selected and installed in accordance with manufacturer's specifications.
5. LEAN MIX CONCRETE shall be placed between spanning slabs on crown unit cells.
   Lean mix concrete infill is not required on the outermost crown units.



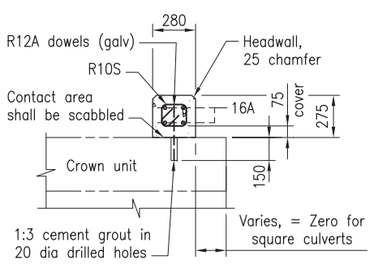
DETAIL 5 — SPANNING SLAB SUPPORT AND LEAN MIX CONCRETE FILL DETAILS



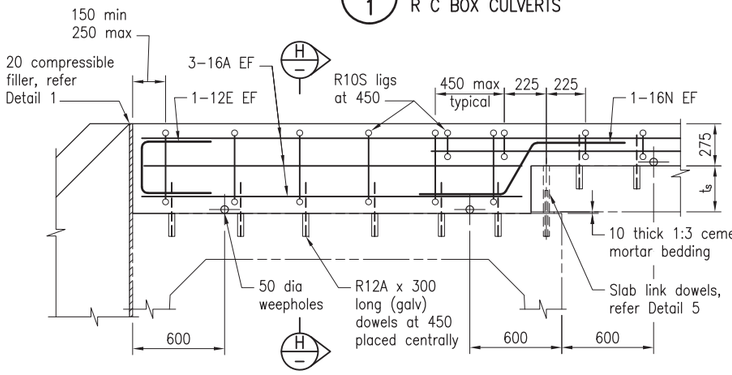
DETAIL 1



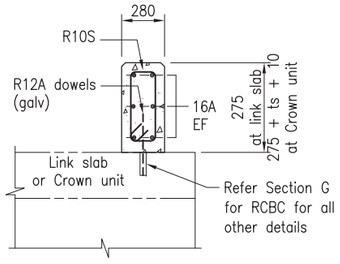
DETAIL 3 — HEADWALL FOR R C BOX CULVERTS



SECTION G — HEADWALL DETAILS



DETAIL 4 — HEADWALL FOR SLAB LINK CULVERTS



SECTION H — HEADWALL DETAILS

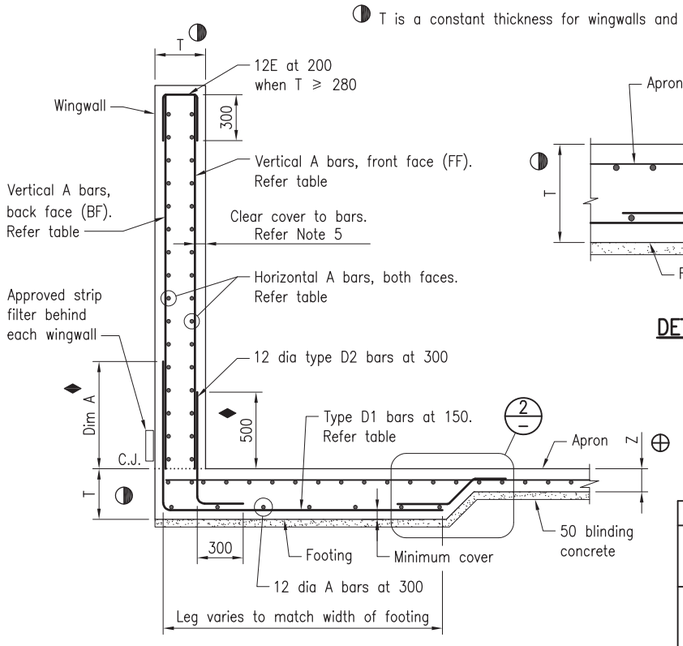
WINGWALL DIMENSIONS AND MINIMUM REINFORCEMENT REQUIREMENTS

up to Hw †	T ◑ for Exposure classification			Vertical A bars BF		Vertical A bars FF		Horizontal A bars FF and BF						D1 bars	
	B2	C1	C2	Dia	Spacing	Dia	Spacing	B2		C1		C2		Dia	Dim A
								Dia	Spacing	Dia	Spacing	Dia	Spacing		
1000	220	240	260	12	150	12	300	12	150	12	125	12	100	12	500
1500	220	240	260						150		125				
2000	260	270	280						125		100				
2500	330	340	350						100	16	150	16	125		
3000	380	390	400	16				16	150		125			16	700
3700	410	420	430			16		16	150	20	175	20	175		
4350	440	450	460	20				20	175				150	20	800

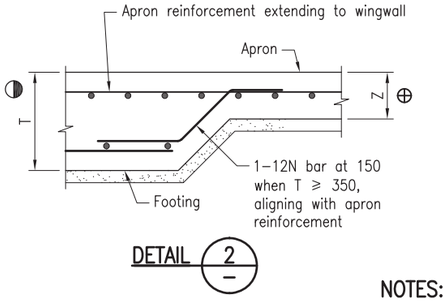
† where Hw = H + tc + 10 + ts + 275
height of opening H; thickness of culvert tc; thickness of slab ts.

◆ where type D1 and D2 bars exceed the wall height at the wingwall ends, curtail the bars to match the wall height, ensuring cover requirements are met

◑ T is a constant thickness for wingwalls and footings



SECTION F — WINGWALL AND FOOTING REINFORCEMENT DETAILS



DETAIL 2

NOTES:

1. Refer Drawings 1 and 2 for all General Notes.
2. Refer Drawing 1 for typical General Arrangements for large RCBC and SLBC culverts.
2. Refer Drawing 2 for typical details of base slabs for large box culverts.

Department of Transport and Main Roads

R C BOX CULVERTS AND SLAB LINK BOX CULVERTS

CULVERTS HEIGHT > 600
DRAWING 3 OF 3
INSTALLATION OF PRECAST UNITS AND CONSTRUCTION OF HEADWALLS & WINGWALLS

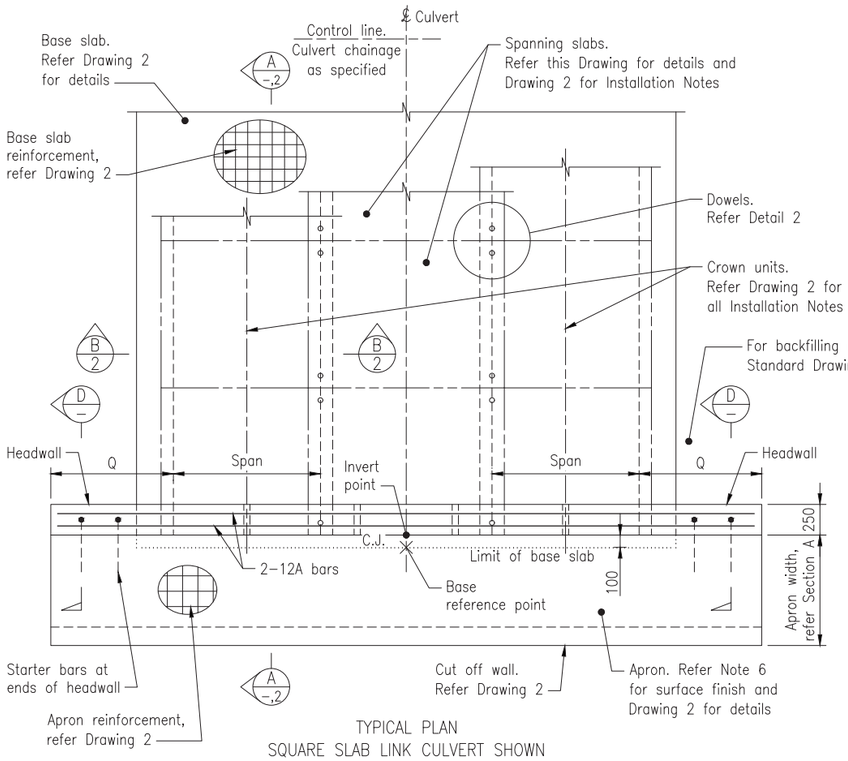
Queensland Government

A3 | Not to Scale

Standard Drawing No 1250

Date 3/2021

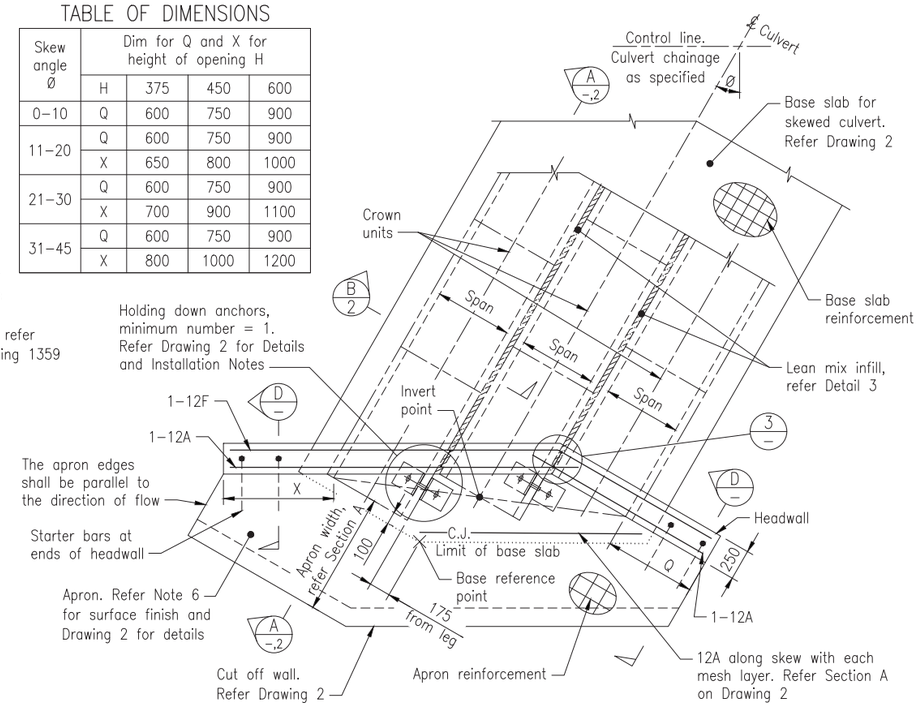
A | B | C | D | E



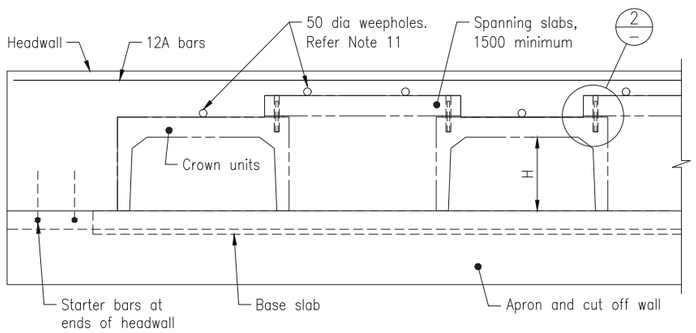
TYPICAL PLAN
SQUARE SLAB LINK CULVERT SHOWN
SQUARE SINGLE AND MULTICELL BOX CULVERTS SIMILAR

TABLE OF DIMENSIONS

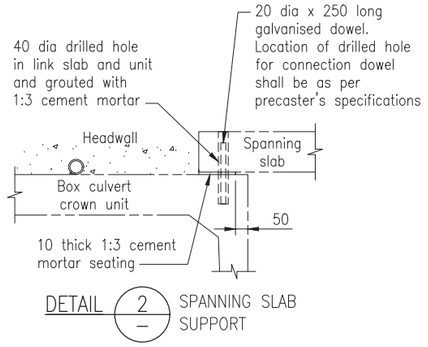
Skew angle Ø	Dim for Q and X for height of opening H			
	H	375	450	600
0–10	Q	600	750	900
11–20	Q	600	750	900
	X	650	800	1000
21–30	Q	600	750	900
	X	700	900	1100
31–45	Q	600	750	900
	X	800	1000	1200



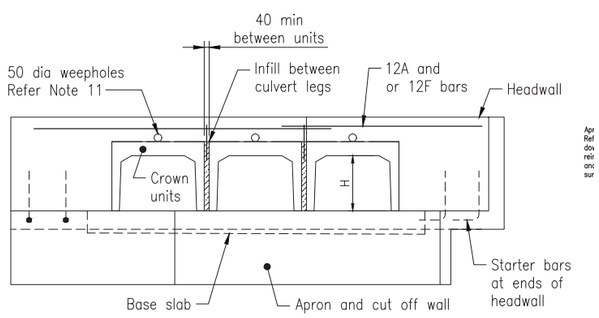
TYPICAL PLAN – HIGH SKEW DRAWN
MULTICELL BOX CULVERT SHOWN
SKEWED SINGLE AND SLAB LINK BOX CULVERTS SIMILAR



TYPICAL ELEVATION – SPANNING SLAB DETAILS



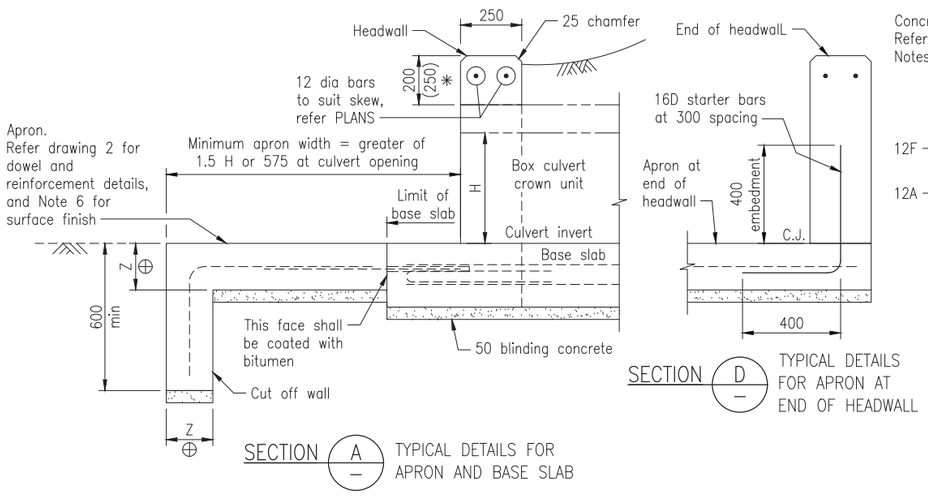
DETAIL 2 – SPANNING SLAB SUPPORT



TYPICAL ELEVATION – MULTICELL DETAILS

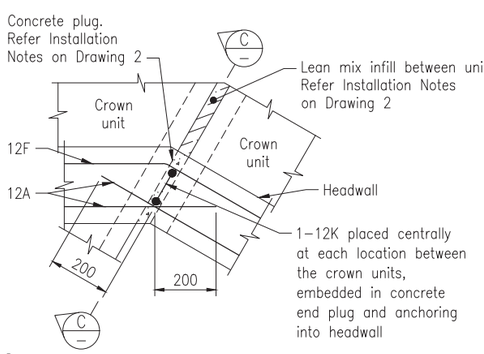
GENERAL ARRANGEMENT – SLAB LINK BOX CULVERT

GENERAL ARRANGEMENT – MULTIPLE CELL RC BOX CULVERT

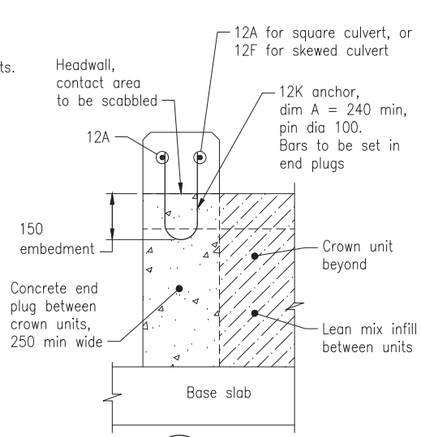


SECTION A – TYPICAL DETAILS FOR APRON AND BASE SLAB

SECTION D – TYPICAL DETAILS FOR APRON AT END OF HEADWALL



DETAIL 3



SECTION C – CONNECTION DETAILS

The purpose of this Standard Drawing is to provide typical standard details that shall be used within the limitations specified in the drawing and in accordance with the following:

1. The adaptability of the standard details shall be assessed by the project designer in respect of specific project geometric, appropriate foundation and scour conditions.
2. In reactive soils: this standard drawing is only applicable for reactive soils with linear shrinkage up to 8%. Specialist geotechnical design advice shall be sought otherwise.
3. If the insitu bearing capacity is inadequate, the following options may be explored subject to review and acceptance by E&T Structures and Geotechnical sections:
   a. Insitu ground improvement, and/or
   b. Redesign of the base slab.

   Any redesign works shall be RPEQ certified by appropriate engineering disciplines for compliance.
4. When there is uncertainty regarding the application of the standard details on this drawing for a specific project, advice shall be sought from E&T Structures.

GENERAL NOTES:

1. SCOPE: This drawing is to detail cast insitu base slab, aprons and headwalls for precast R C Box Culverts and Slab Link Box Culverts where H (height of opening) = 375 to 600. This drawing supersedes Standard Drawings 1174 and 1317. This drawing does not provide details of fish passage requirements. Where project specific environmental assessment determines that waterway barrier works are required, additional details shall be developed and included in the project drawings.
2. BOX CULVERTS shall be constructed in accordance with MRTS03.
3. DESIGN TRAFFIC LOADING: HLP400, M1600, A160 and W80 are in accordance with AS 5100.2.
   Maximum height of fill over the culvert shall be 2000.
   Maximum design pressure (E_d) under the culvert slab bases are provided in the Base Slab Details and Dimensions table on drawing 2.
4. DOWELLED CONTRACTION JOINTS shall be provided where (a) the length and/or (b) the width of the base slab exceed 20m. When contraction joints are required across the width, they shall be located at 1/4 span points of crown units and are to be continued across the aprons. 24 hours minimum shall be allowed between pours.
5. APRON AND BASE SLAB MINIMUM REINFORCEMENT for shrinkage and temperature effects are designed considering the full restraint condition to AS 5100. For the slab on ground condition, only the top half of the slab thickness is considered for calculation of this reinforcement.
6. CONCRETE shall be in accordance with MRTS70.
   Design life 100 years.
   Exposure classification and cover to reinforcement shall be in accordance with AS 5100. Minimum concrete strength and cover to reinforcement shall be as shown in table below.

Exposure classification	minimum B2	C1 *	C2 *
Minimum concrete strength	S40/20	S50/20	S55/20
Minimum Cover UNO	60	70	80

   * Dimensions within brackets ( ) are for classification C1 and C2.

   Triple–blend concrete in accordance with MRTS70 is required for Exposure classifications C1 and C2.
   Blinding concrete N20/20.
   Surface roughening of the aprons shall be broom finish using a broom not less than 400 wide to achieve an average texture depth of 0.8. The direction of brushing shall be perpendicular to the direction of flow.
   All exposed edges shall have 19 x 19 chamfers, unless nominated otherwise.
7. PRECAST CONCRETE CULVERTS shall be designed and manufactured in accordance with MRTS24.
8. STEELWORK shall be fabricated to the requirements of MRTS78.
   Angle Grade 300 to AS/NZS 3679.1. Bolts and screws Class 4.6 to AS 1111.1.
   Nuts Class 5 to AS 1112.1. Washers Class 5 to AS 1237.1.
   After fabrication all bolts and nuts shall be hot dip galvanised to AS 1214, and all other steelwork to AS/NZS 4680.

General Notes are continued on Drawing 2.

Department of Transport and Main Roads

R C BOX CULVERTS AND
SLAB LINK BOX CULVERTS

CULVERTS HEIGHT = 375 TO 600
DRAWING 1 OF 2

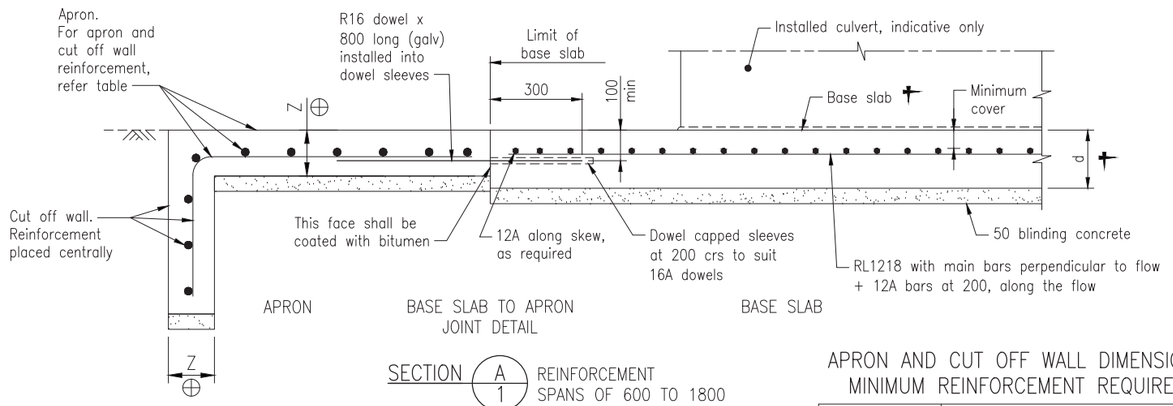
GENERAL ARRANGEMENT AND NOTES

Queensland Government

A3
Not to Scale

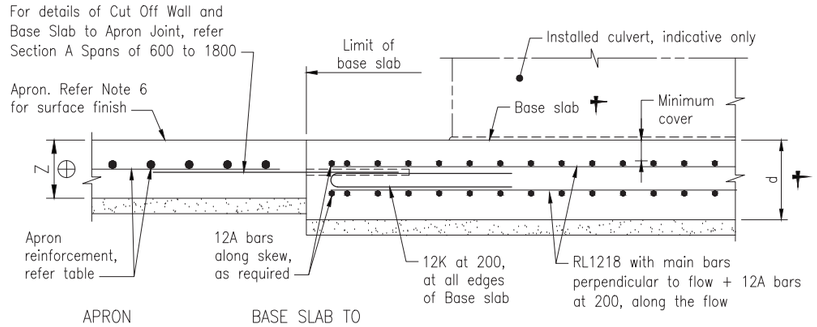
Standard Drawing No
1260
Date 3/2022

A B C D E

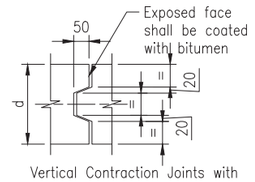


CUT OFF WALL
TYPICAL FOR ALL SPANS

SECTION A 1 REINFORCEMENT SPANS OF 600 TO 1800



SECTION A 1 REINFORCEMENT FOR SPANS OF 2100



Vertical Contraction Joints with profile d > 200 shall be keyed

APRON AND CUT OFF WALL DIMENSIONS AND MINIMUM REINFORCEMENT REQUIREMENTS

Exposure classification	Apron and Cut off wall #	
	Thickness Z ⊕	Reinforcement
B2	150	N12 at 150 both ways
C1	175	N12 at 150 both ways
C2	190	N12 at 125 both ways

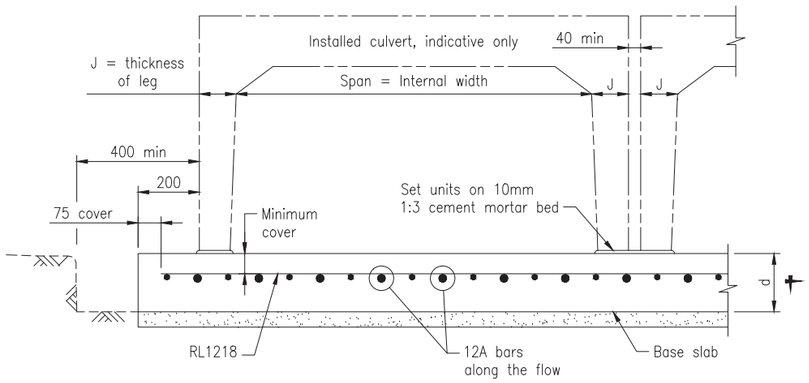
⊕ where Z is a constant thickness for aprons and cut off walls.

\# Refer Note 5 of Drawing 1

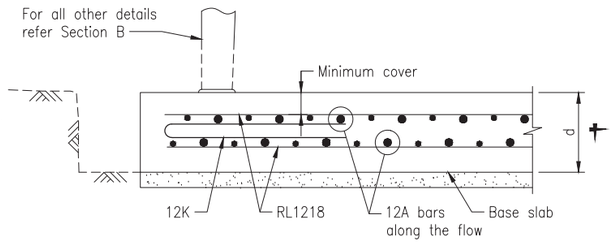
BASE SLAB DETAILS

Up to Span	Maximum design pressure (E_d) kPa	Base slab thickness d ✚ for Exposure classification		
		B2	C1	C2
600	190	180	190	200
750				
900				
1200		180	190	200
1500		190	200	210
1800		190	200	210
2100		210	220	230

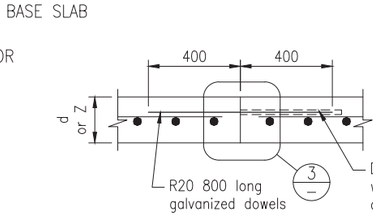
✚ where d is a constant thickness for base slab



SECTION B 1 SPANS OF 600 TO 1800

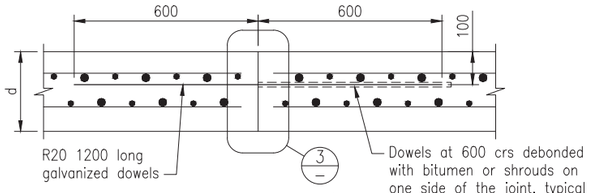


SECTION B 1 SPANS OF 2100



DETAIL 3

FOR SPANS OF 600 TO 1800 AND FOR ALL APRONS

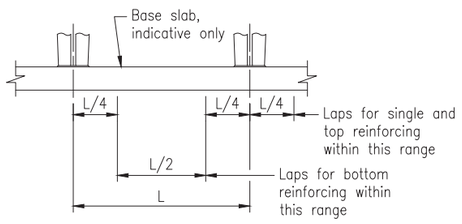


FOR SPANS OF 2100

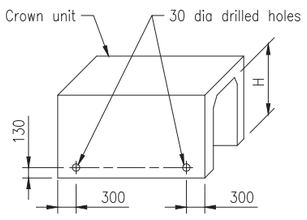
TYPICAL DOWELLED CONTRACTION JOINT – ALL BASE SLABS AND APRONS

Installed with direction of flow. Refer Note 4 on Drawing 1

TYPICAL BASE SLAB FOR SMALL BOX CULVERTS

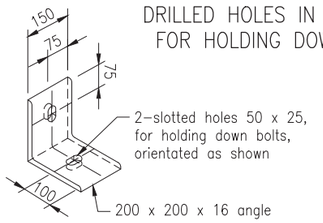


REINFORCING BAR LAP LOCATIONS – ALL BASE SLABS

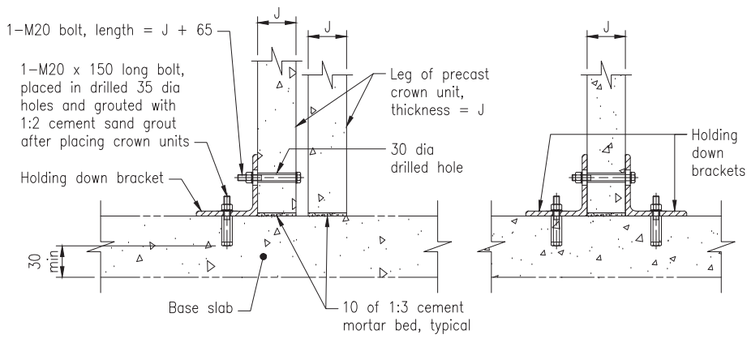


SKEWED CULVERTS ONLY

DRILLED HOLES IN CROWN UNITS FOR HOLDING DOWN ANCHORS



HOLDING DOWN BRACKET
Isometric view



TYPICAL ASSEMBLY DETAILS
HOLDING DOWN ANCHORS

TYPICAL INSTALLATION OF PRECAST UNITS

NOTES FOR INSTALLATION OF PRECAST UNITS:

1. PRECAST CONCRETE CULVERTS shall be supplied and installed in accordance with MRTS03 and MRTS24.
   Doweled connections shall be in accordance with this drawing.
2. INFILL between legs of multiple cell culverts shall be achieved by placing concrete plugs of 250 minimum length at both ends of the structure and infill the remaining gap with 1:10 lean mix having maximum aggregate size of 10mm packed dry.
3. Do not use fluid grout as hydrostatic head will damage culvert legs.
4. HOLDING DOWN ANCHORS shall be installed where the leg(s) of the crown unit extend more than 300 beyond the outside face of the headwall.
   Refer details on this drawing for holding down anchor placement and installation.
5. LEAN MIX CONCRETE shall be placed between spanning slabs on crown unit cells.
   Lean mix concrete infill is not required on the outermost crown units.

GENERAL NOTES, continued from Drawing 1:

9. INFILL between legs of multiple cell culverts shall be achieved by placing concrete plugs of 250 minimum length at both ends of the culvert, using same grade of concrete as headwall, and infill the remaining gap with 1:10 lean mix having maximum aggregate size of 10mm packed dry.
   Do not use fluid grout as hydrostatic head will damage culvert legs.
10. REINFORCING STEEL shall be read in conjunction with Standard Drawings 1043 and 1044, shall be in accordance with MRTS71 and AS/NZS 4671, and ACRS certified. Deformed bars Grade D500N. Round bars Grade R250N. Mesh Grade D500L.
    Reinforcement shall be hot dip galvanised to AS/NZS 4680 where shown.
    Reinforcing Steel welding shall be in accordance with Standard Drawing 1044.
11. WEEPHOLES shall be provided in the headwalls horizontally as follows:
    Minimum of 1 weephole for each culvert crown unit, placed centrally where spans ≥ 1200; location of weepholes shall be determined such that reinforcement cover requirements are met; and, approved drainage filter shall be provided at each weephole.
13. Refer Standard Drawing 1359 for details of earthworks to culverts.
14. PROJECT–SPECIFIC INFORMATION to be shown on the drawings:
    Exposure classification; Culvert chainage; Skew angle; Base and apron setout, extents and details; Skew spanning slab details (if required); Headwall extents and details; Requirements for fish passage.
15. DIMENSIONS are in millimetres.
    ASSOCIATED and REFERENCED DEPARTMENTAL DOCUMENTS:
    Design Criteria for Bridges and Other Structures; Road Drainage Manual (RDM)
    Standard Drawing 1359 Culverts – Installation, Bedding and Filling/Backfilling
    MRTS03 Drainage, Retaining Structures and Protective Treatments
    MRTS24 Manufacture of Precast Concrete Culverts
    MRTS70 Concrete; MRTS71 Reinforcing Steel; MRTS78 Structural Steelwork

Department of Transport and Main Roads

R C BOX CULVERTS AND SLAB LINK BOX CULVERTS

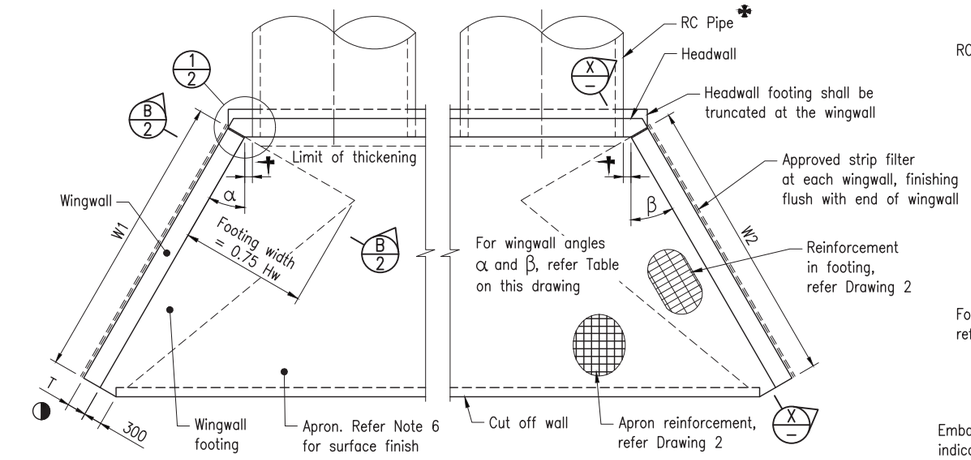
CULVERTS HEIGHT = 375 TO 600
DRAWING 2 OF 2
BASE SLAB AND APRON DETAILS AND INSTALLATION OF PRECAST UNITS

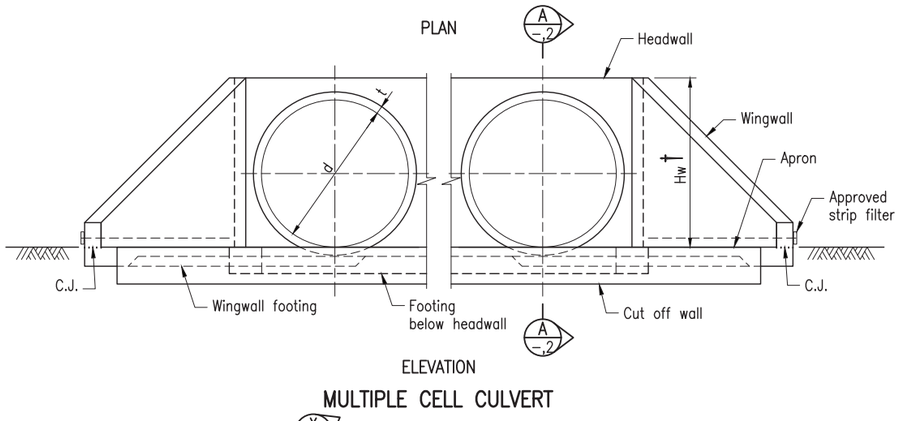
Queensland Government

A3
Not to Scale

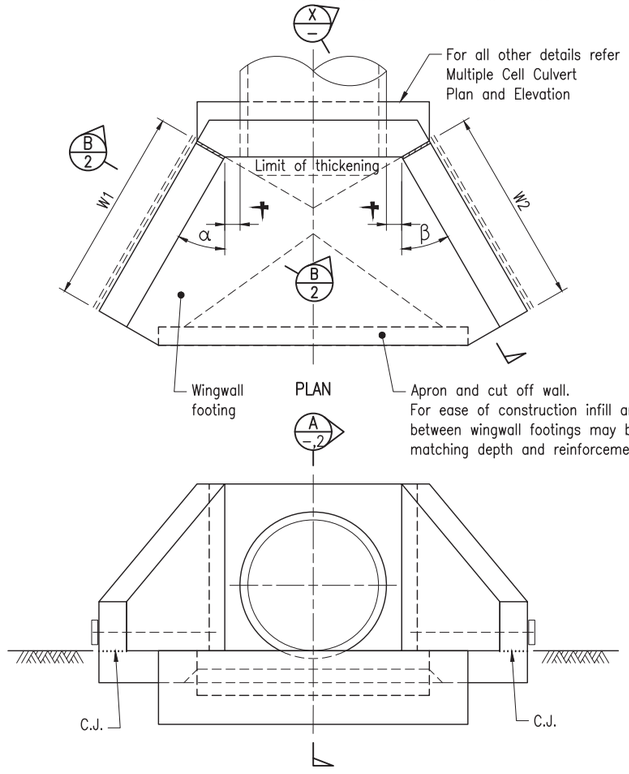
Standard Drawing No
1260
Date 3/2022

A B C D E

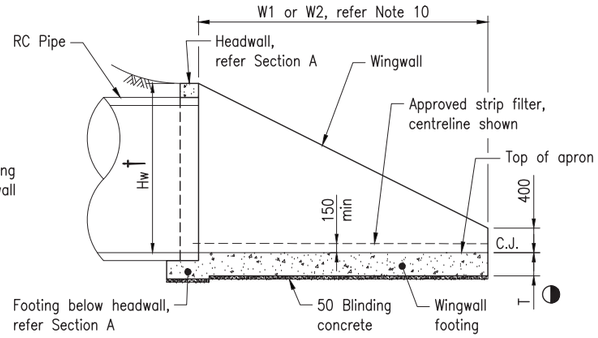




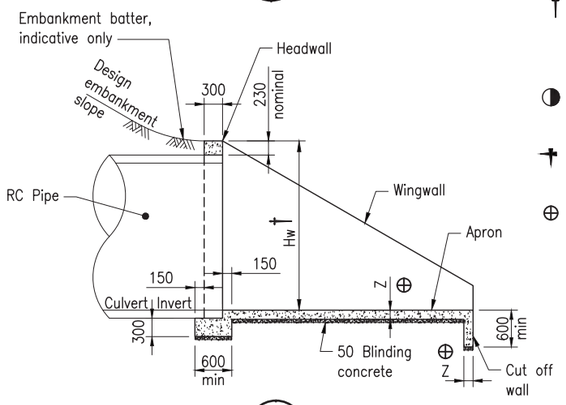
MULTIPLE CELL CULVERT



SINGLE CELL CULVERT



SECTION X – X ELEVATION AT WINGWALL – CONCRETE DETAILS



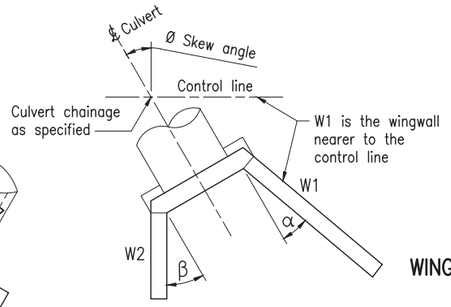
SECTION A – A HEADWALL AND APRON – CONCRETE DETAILS

† Hw = Internal pipe diameter (d) + pipe thickness (t) + 230 min. Refer table on Drawing 2

◑ T is a constant thickness for wingwalls and footings. Refer table on Drawing 2

✝ Exposure classification B2 = 100
Exposure classification C1 and C2 = 125

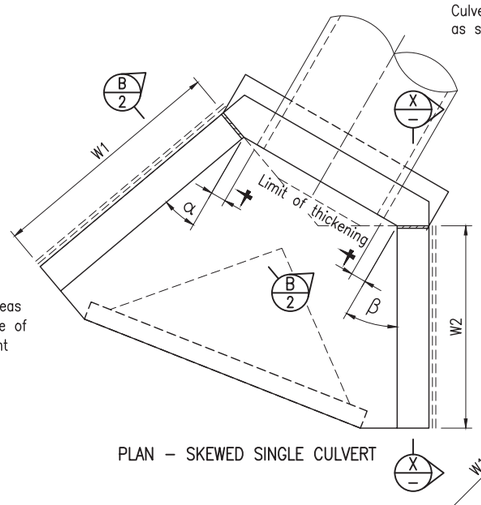
⊕ Z is a constant thickness for aprons and cut off walls. Refer table on Drawing 2



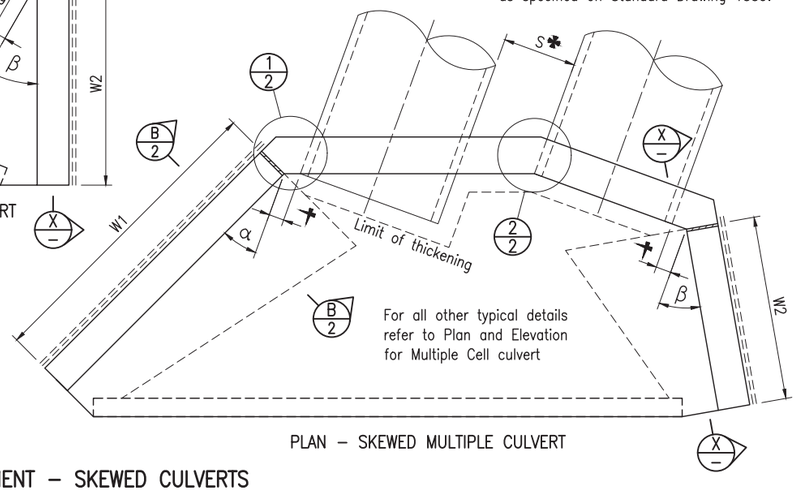
Skew angle Ø	Wingwall angle	
	α	β
0 – 10	30	30
11 – 20	25	30
21 – 30	20	30
31 – 45	15	30

WINGWALL ANGLES

✤ Spacing for multiple pipes "S" is as specified on Standard Drawing 1359.



PLAN – SKEWED SINGLE CULVERT



PLAN – SKEWED MULTIPLE CULVERT

GENERAL ARRANGEMENT – SKEWED CULVERTS

The purpose of this Standard Drawing is to provide typical standard details that shall be used within the limitations specified in the drawing and in accordance with the following:

1. The adaptability of the standard details shall be assessed by the project designer in respect of specific project geometric, appropriate foundation and scour conditions.
2. If the insitu bearing capacity is inadequate, insitu ground improvement may be explored subject to review and acceptance by E&T Structures and Geotechnical sections.
3. When there is uncertainty regarding the application of the standard details on this drawing for a specific project, advice shall be sought from E&T Structures.
4. The details specific to the project shall be shown on the project specific drawings.

NOTES:

1. PIPE CULVERT END STRUCTURES shall be in accordance with MRTS03.
   The purpose of this drawing is to provide typical details for wingwalls, headwall and apron for culverts with pipe diameter 750 to 2400.
   Refer Standard Drawing 1305 for typical details of headwall and apron for culverts with pipe diameter 375 to 675.
   Refer Standard Drawing 1359 for details of culvert installation and earthworks.
   This standard drawing does not provide details of fish passage requirements. Where project specific environmental assessment determines that waterway barrier works are required, additional details shall be developed and included in the project drawings.
2. Maximum design pressure (E_d) under the culvert apron is 75 kPa.
3. PIPE DIAMETERS greater than 2400 require a special design.
4. Where CULVERT APRONS are longer than 20m, the project specific design shall be developed with a transverse contraction joint, with direction of flow, at every 20m length. Typical contraction joint details provided in this standard drawing are to be used.
5. WINGWALLS for skewed culverts with angle greater than 45 require a special design.
6. CONCRETE shall be in accordance with MRTS70.
   Design life 100 years.
   Exposure classification and cover to reinforcement shall be in accordance with AS 5100. Minimum concrete strength and cover to reinforcement shall be as shown in table below.

Exposure classification	minimum B2	C1	C2
Minimum concrete strength	S40/20	S50/20	S55/20
Minimum Cover UNO	60	70	80

   Blinding concrete N20/20.
   Surface roughening of the aprons shall be broom finish using a broom not less than 400 wide to achieve an average texture depth of 0.8. The direction of brushing shall be perpendicular to the direction of flow.
7. REINFORCING STEEL shall be read in conjunction with Standard Drawings 1043 and 1044, and shall be in accordance with MRTS71 and AS/NZS 4671.
   Deformed bars Grade D500N. Round bars Grade R250N. Mesh Grade D500L.
   Reinforcement shall be hot dip galvanised to AS/NZS 4680 where shown.
8. TACK WELDING to reinforcement for location purposes to AS/NZS 1554.3.
   Welding consumables to be controlled hydrogen type: G49X to AS/NZS ISO 14341–B or T49X to AS/NZS ISO 17632–B.
9. WINGWALL DRAINAGE shall be provided behind wingwalls to prevent hydrostatic pressure being applied to the wingwall. A strip filter shall be used at each wingwall to drain out at the low end of the wingwall as shown.
10. PROJECT–SPECIFIC INFORMATION to be shown on the drawings:
    Exposure classification; Culvert chainage; Skew angle; Apron setout and extents; Headwall and wingwall extents (W1, W2, α, β); Requirements for fish passage.
11. DIMENSIONS are in millimetres.

ASSOCIATED DEPARTMENTAL DOCUMENTS:

Design Criteria for Bridges and Other Structures; Road Drainage Manual (RDM)

REFERENCED DOCUMENTS:

Departmental Standard Drawings:

1043 Reinforcing Steel – Standard Bar Shapes
1044 Reinforcing Steel – Lap Lengths
1305 Pipe Culverts – Headwall and Apron for Pipe Diameter 375 to 675
1359 Culverts – Installation, Bedding and Filling/Backfilling Against/Over Culverts

Departmental Specifications:

MRTS03 Drainage, Retaining Structures and Protective Treatments
MRTS70 Concrete; MRTS71 Reinforcing Steel

Department of Transport and Main Roads

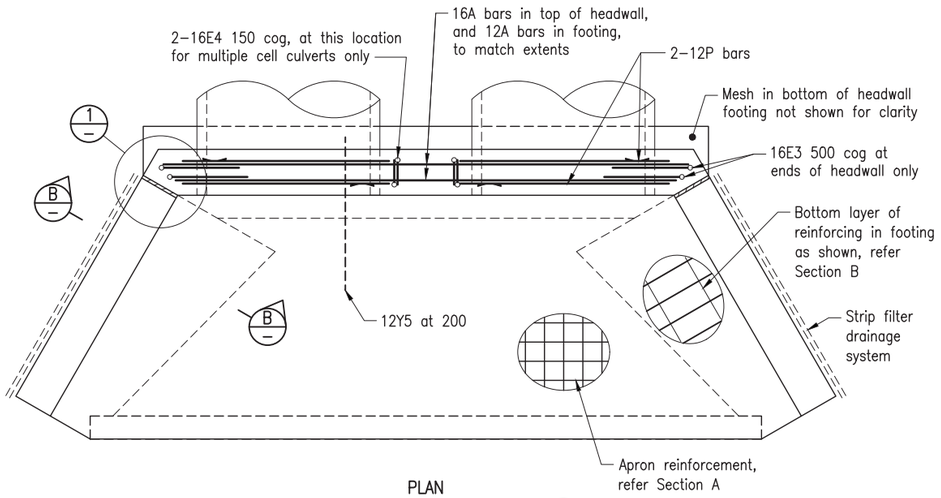
PIPE CULVERTS

WINGWALLS, HEADWALL AND APRON FOR PIPE DIAMETER 750 TO 2400 DRAWING 1 OF 2

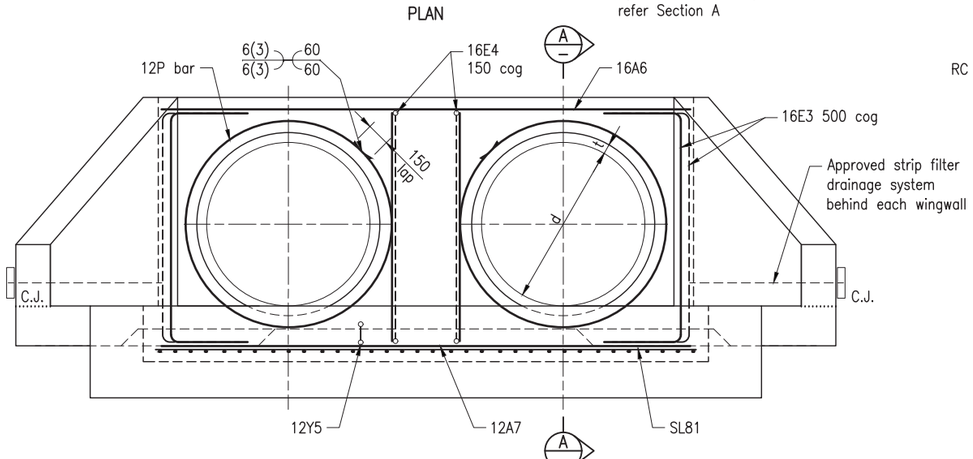
A3
Not to Scale

Standard Drawing No
1304
Date 7/2021

J K L M N O

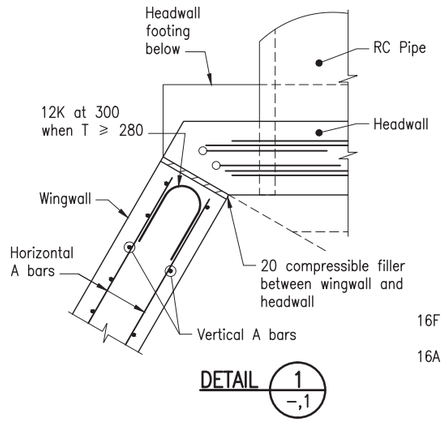


PLAN

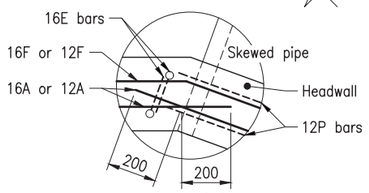


ELEVATION

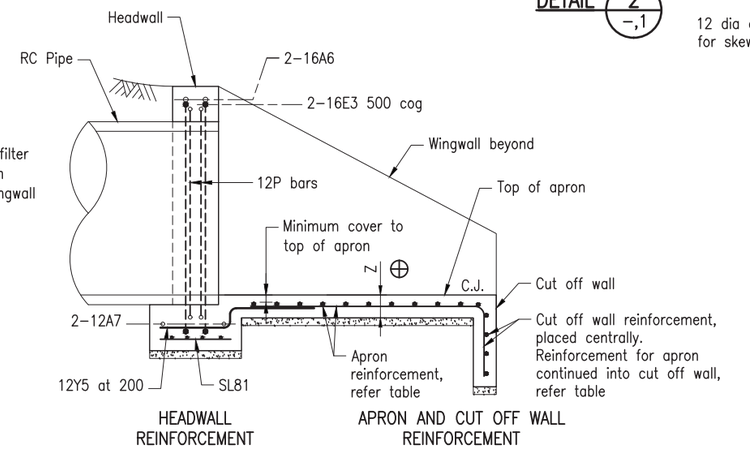
HEADWALL REINFORCEMENT – SQUARE CULVERT



DETAIL 1 –,1



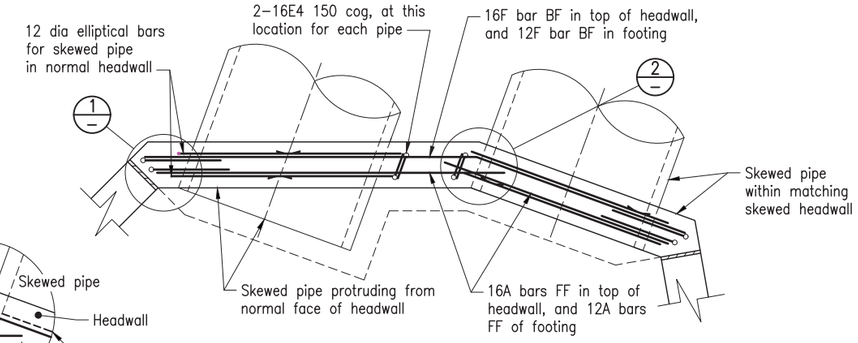
DETAIL 2 –,1



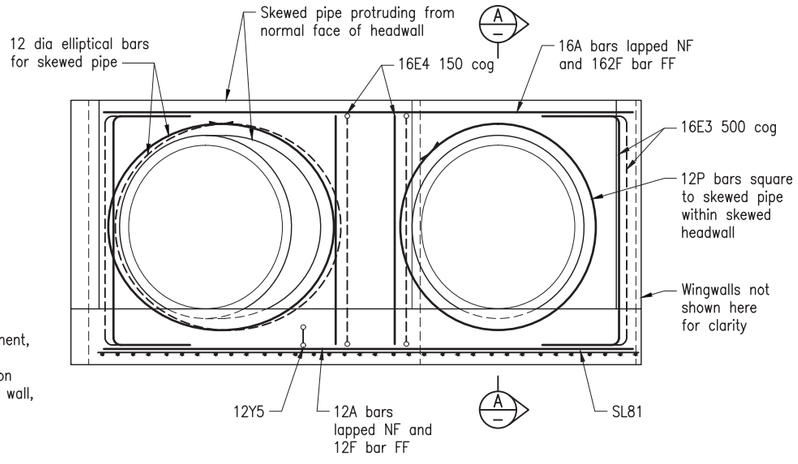
HEADWALL REINFORCEMENT

APRON AND CUT OFF WALL REINFORCEMENT

SECTION A –,1

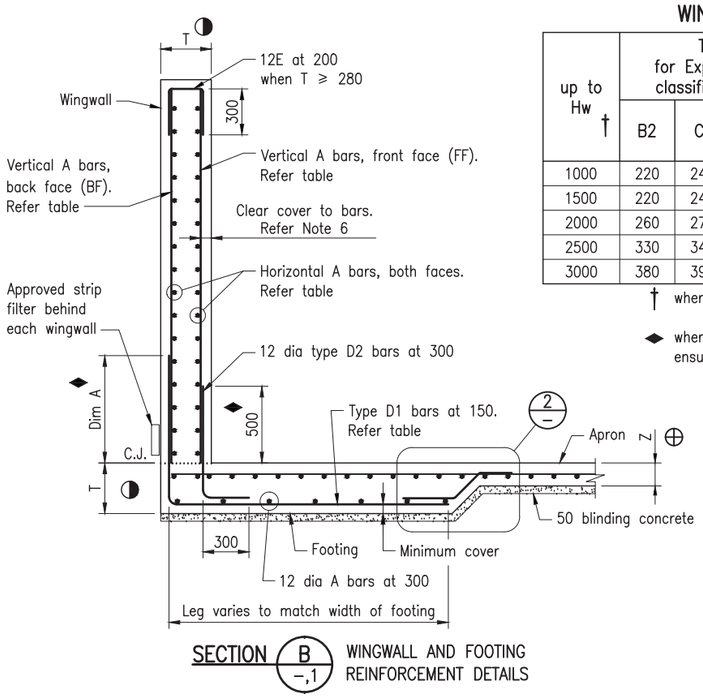


PART PLAN



PART ELEVATION

HEADWALL REINFORCEMENT – SKEWED MULTIPLE CULVERT



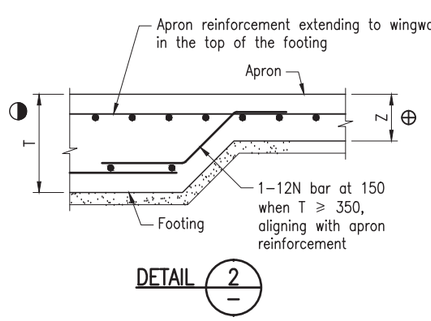
SECTION B –,1 WINGWALL AND FOOTING REINFORCEMENT DETAILS

WINGWALL DIMENSIONS AND MINIMUM REINFORCEMENT REQUIREMENTS

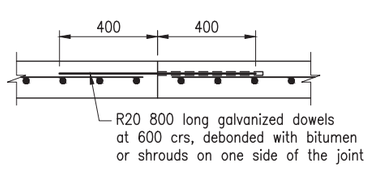
up to Hw †	T for Exposure classification			Vertical A bars BF		Vertical A bars FF		Horizontal A bars FF and BF						D1 bars	
	B2	C1	C2	Dia	Spacing	Dia	Spacing	B2		C1		C2		Dia	Dim A ◆
								Dia	Spacing	Dia	Spacing	Dia	Spacing		
1000	220	240	260	12	150	12	300	12	150	12	125	12	100	12	500
1500	220	240	260						150		125				
2000	260	270	280						125		100				
2500	330	340	350						100	16	150	16	125		
3000	380	390	400	16				16	150		125			16	700

† where Hw = Internal pipe diameter d + pipe thickness t + headwall thickness nominal 230 above pipes

◆ where type D1 and D2 bars exceed the wall height, curtail the bars to match the wall height, ensuring cover requirements are met



DETAIL 2 –



TYPICAL DOWELLED CONTRACTION JOINT

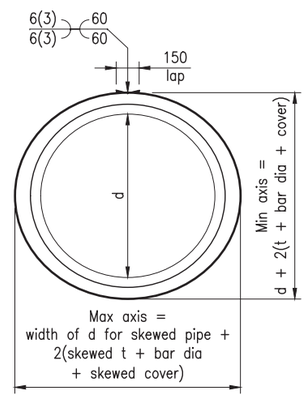
Installed with direction of flow, for aprons larger than 20m. Refer Note 4 on Drawing 1

APRON AND CUT OFF WALL THICKNESSES AND MINIMUM REINFORCEMENT REQUIREMENTS

Exposure classification	Apron and Cut off wall #	
	Thickness Z ⊕	Reinforcement
B2	150	N12 at 150 both ways
C1	175	N12 at 150 both ways
C2	190	N12 at 125 both ways

⊕ where Z is a constant thickness for aprons and cut off walls.

\# Apron minimum reinforcement for shrinkage and temperature effects is designed considering the full restraint condition to AS 5100. For the slab on ground condition, only the top half of the apron thickness is considered for calculation of this reinforcement.



12 DIA ELLIPTICAL BAR DETAIL

Department of Transport and Main Roads

PIPE CULVERTS

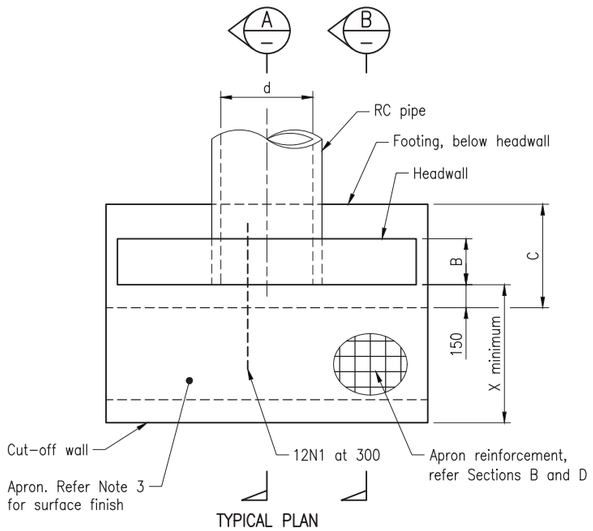
WINGWALLS, HEADWALL AND APRON FOR PIPE DIAMETER 750 TO 2400 DRAWING 2 OF 2

A3 | Not to Scale

Standard Drawing No 1304

Date 7/2021

J | K | L | M | N | 0

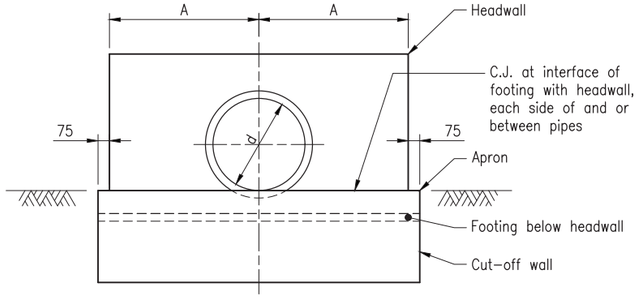


TYPICAL PLAN

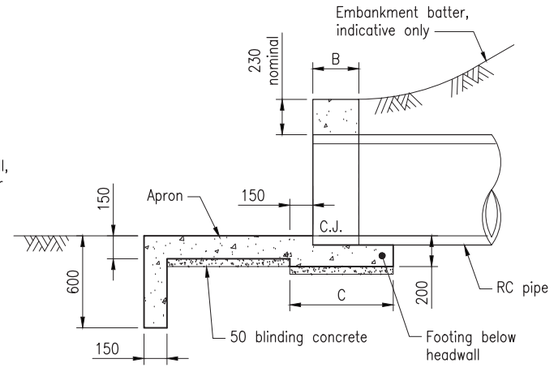
TABLE OF DIMENSIONS

Dim	Nominal internal diameter, d				
	375	450	525	600	675
A	600	725	850	975	1100
B	250	250	300	300	300
C	525	525	675	675	675
F	700	825	950	1100	1250
X	565	675	790	900	1015
S	Spacing for multiple pipes "S" is as specified on Standard Drawing 1359				

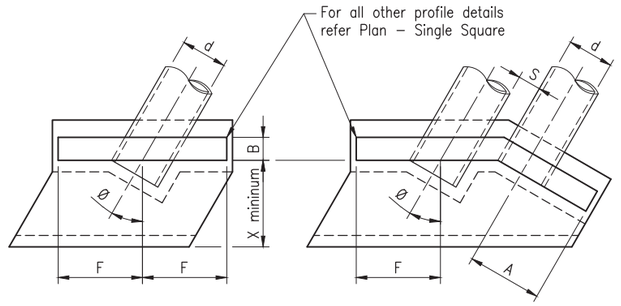
For culverts with more than two pipes, the typical headwall reinforcement shall be as per the details in the lower portion of this drawing



TYPICAL ELEVATION
– SQUARE SINGLE SHOWN
SKEWED AND MULTIPLE ARRANGEMENTS SIMILAR



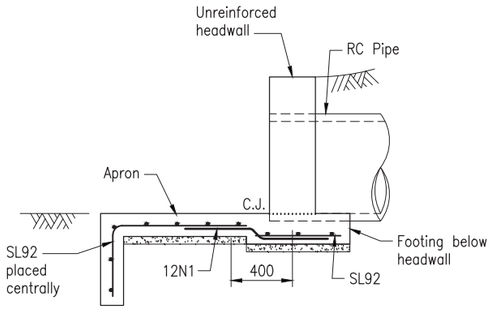
SECTION A – TYPICAL DETAILS ALL ARRANGEMENTS



PLAN – SKEWED SINGLE CULVERT

PLAN – MAXIMUM TWO PIPES SKEWED CULVERT

FOR MAXIMUM TWO PIPES



SECTION B

FOR MAXIMUM TWO PIPES

The purpose of this Standard Drawing is to provide typical standard details that shall be used within the limitations specified in the drawing and in accordance with the following:

1. The adaptability of the standard details shall be assessed by the project designer in respect of specific project geometric, appropriate foundation and scour conditions.
2. If the insitu bearing capacity is inadequate, insitu ground improvement may be explored subject to review and acceptance by E&T Structures and Geotechnical sections.
3. When there is uncertainty regarding the application of the standard details on this drawing for a specific project, advice shall be sought from E&T Structures.
4. The details specific to the project shall be shown on the project specific drawings.

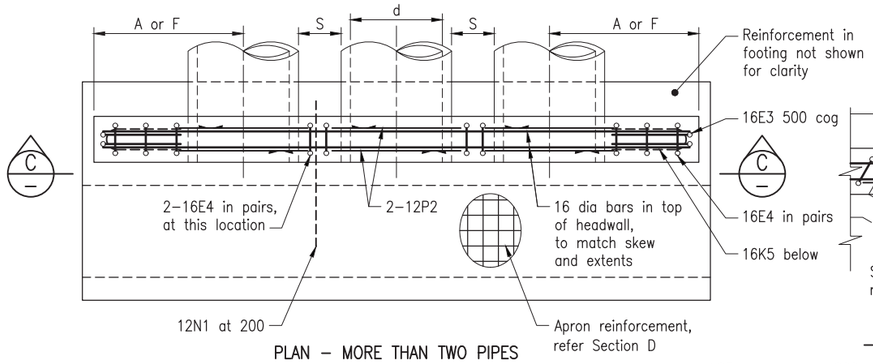
NOTES:

1. PIPE CULVERT END STRUCTURES shall be constructed in accordance with MRTS03.
   The purpose of this drawing is to provide typical details of headwalls and aprons for culverts with pipe diameter 375 to 675.
   Unreinforced headwall detail shall be used for maximum 2 pipe arrangement.
   For more than 2 pipe installation, reinforced headwall detail shall be used.
   Refer Standard Drawing 1304 for typical details of end structures for pipe culverts with diameter 750 to 2400.
   Refer Standard Drawing 1359 and MRTS03 for details of culvert installation and earthworks.
   This standard drawing does not provide details of fish passage requirements. Where project specific environmental assessment determines that waterway barrier works are required, additional details shall be developed and included in the project drawings.
2. Maximum design pressure (E_d) under the culvert apron is 75 kPa.
3. CONCRETE shall be in accordance with MRTS70.
   Unreinforced concrete headwall shall be N20/20.
   Reinforced concrete headwall, apron and footing shall be S40/20.
   Minimum exposure classification B2 to AS 5100.
   Minimum cover to reinforcement shall be 60 or 70 against blinding concrete.
   Blinding concrete shall be N20/20.
   Surface roughening of the aprons shall be broom finish using a broom not less than 400 wide to achieve an average texture depth of 0.8. The direction of brushing shall be perpendicular to the direction of flow.
4. REINFORCING STEEL shall be read in conjunction with Standard Drawings 1043 and 1044, and shall be in accordance with MRTS71 and AS/NZS 4671.
   Deformed bars Grade D500N. Mesh Grade D500L.
5. TACK WELDING to reinforcement for location purposes to AS/NZS 1554.3.
   Welding consumables shall be controlled hydrogen type:
   G49X to AS/NZS ISO 14341–B or T49X to AS/NZS ISO 17632–B.
6. PROJECT–SPECIFIC INFORMATION TO BE SHOWN ON THE DRAWINGS:
   Culvert chainage; Skew angle Ø; Apron setout and extents; Headwall extents; Steel schedule; Requirements for fish passage.
7. DIMENSIONS are in millimetres.

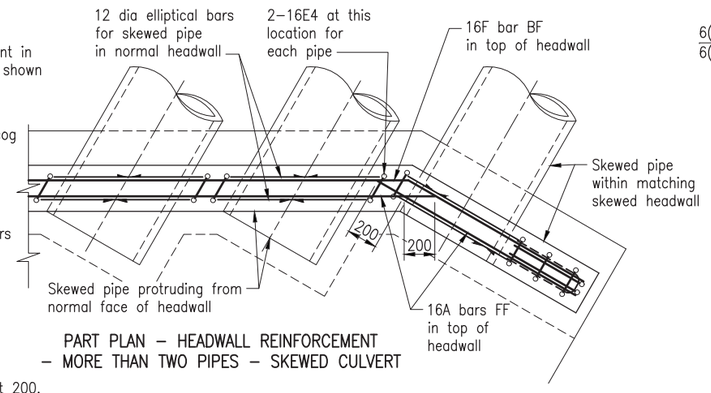
ASSOCIATED DEPARTMENTAL DOCUMENTS:
- Design Criteria for Bridges and Other Structures
- Road Drainage Manual (RDM)
- NDRRA Design Guidelines

REFERENCED DOCUMENTS:
Departmental Standard Drawings:
- 1044 Reinforcing Steel – Lap Lengths
- 1304 Pipe Culverts – Wingwalls, Headwall and Apron for Pipe Diameter 750 to 2400
- 1359 Culverts – Installation, Bedding and Filling/backfilling against/over Culverts

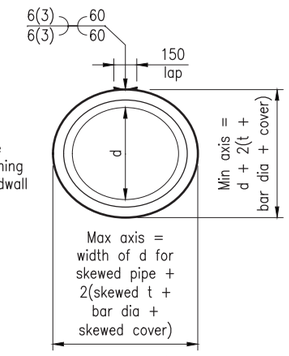
Departmental Specifications:
- MRTS03 Drainage, Retaining Structures and Protective Treatments
- MRTS70 Concrete
- MRTS71 Reinforcing Steel



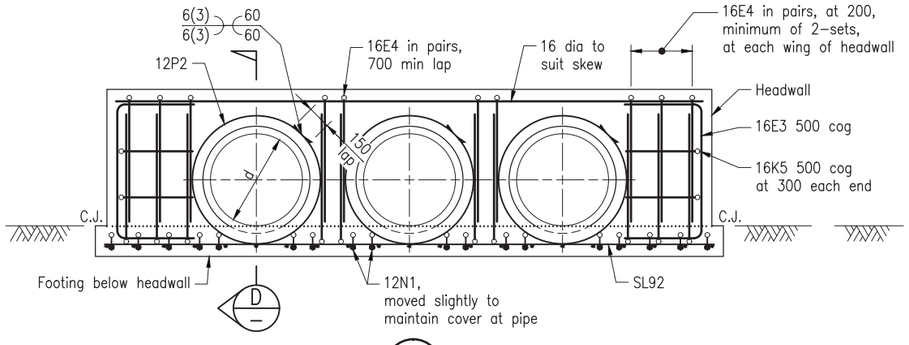
PLAN – MORE THAN TWO PIPES



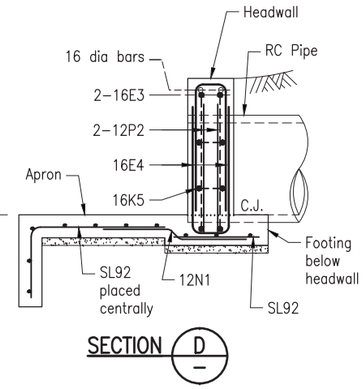
PART PLAN – HEADWALL REINFORCEMENT
– MORE THAN TWO PIPES – SKEWED CULVERT



12 DIA ELLIPTICAL BAR DETAIL

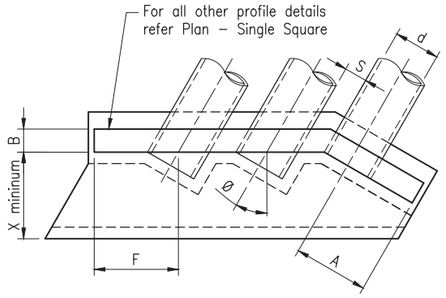


SECTION C – ELEVATION AT HEADWALL



SECTION D

MORE THAN TWO PIPES



PLAN – MORE THAN TWO PIPES SKEWED CULVERT

Department of Transport and Main Roads

PIPE CULVERTS

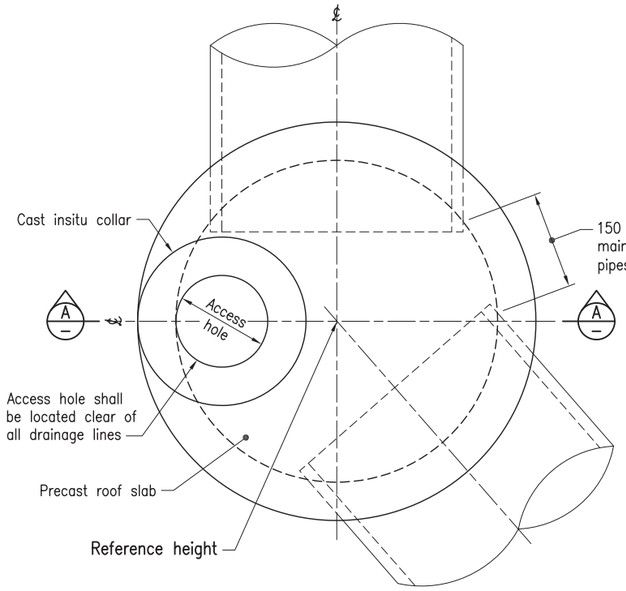
HEADWALL AND APRON FOR PIPE DIAMETER 375 to 675

A3 | Not to Scale

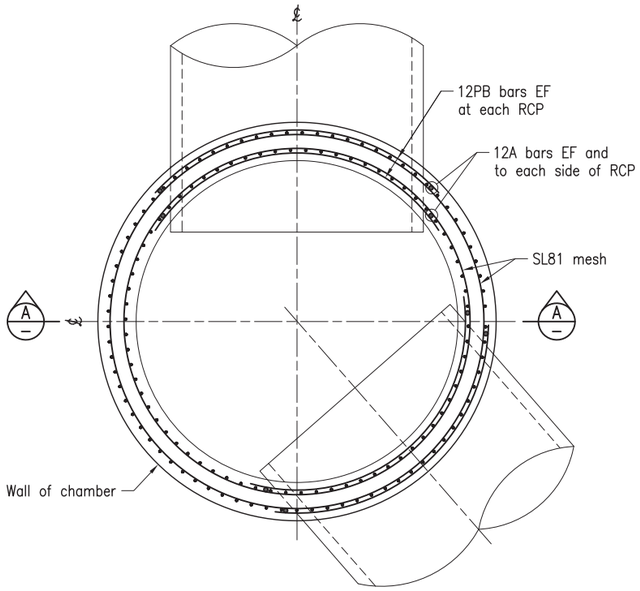
Standard Drawing No 1305

Date 7/2021

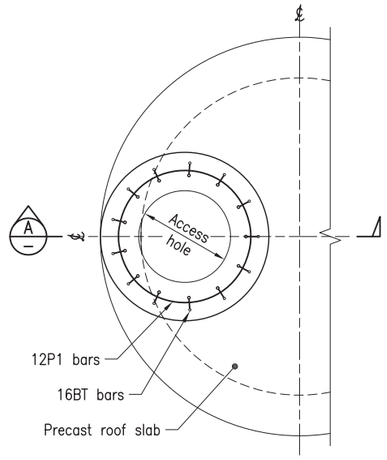
D | E | F | G



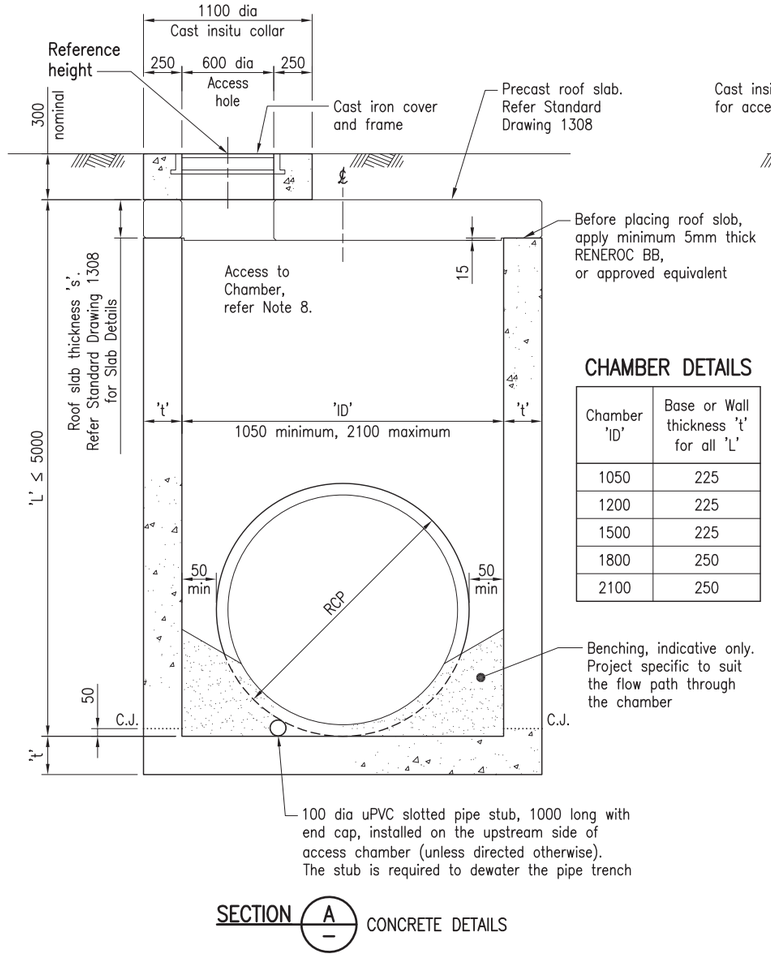
TYPICAL PLAN
ACCESS CHAMBER



PART PLAN – DETAILS OF
TYPICAL REINFORCEMENT FOR THE CHAMBER



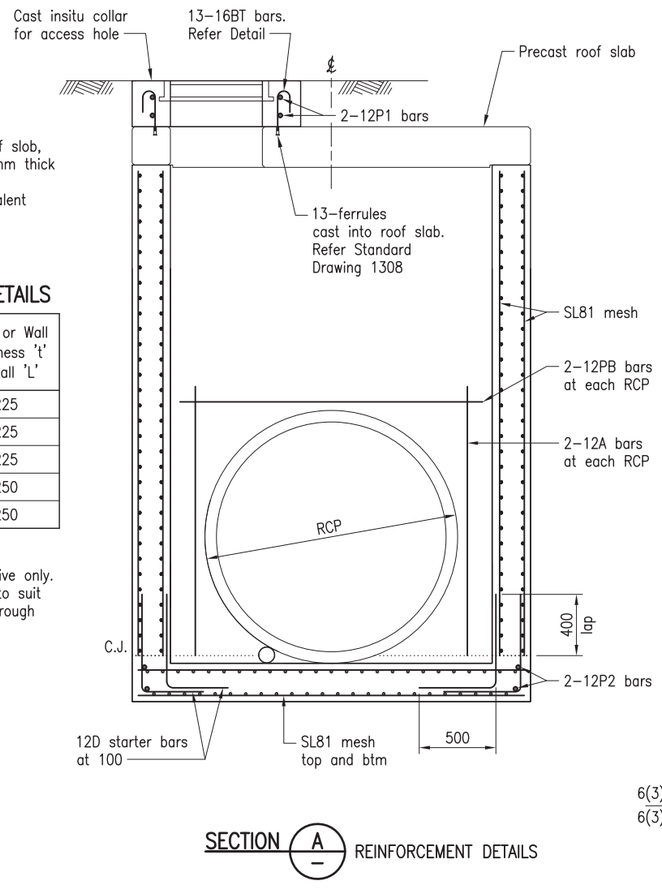
PART PLAN – DETAILS OF
TYPICAL REINFORCEMENT FOR
CAST INSITU COLLAR



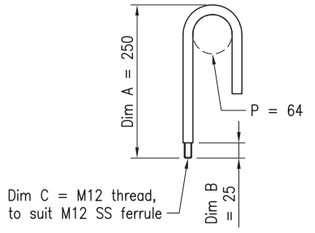
SECTION A – A CONCRETE DETAILS

CHAMBER DETAILS

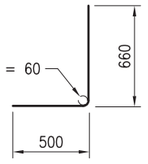
Chamber 'ID'	Base or Wall thickness 't' for all 'L'
1050	225
1200	225
1500	225
1800	250
2100	250



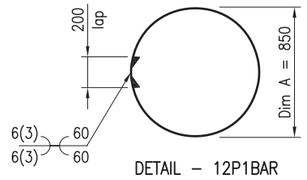
SECTION A – A REINFORCEMENT DETAILS



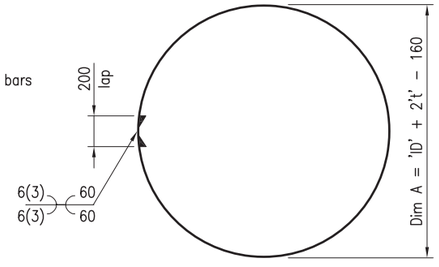
DETAIL – 16BT BAR



DETAIL – 12D STARTER BAR



DETAIL – 12P1BAR



DETAIL – 12P2 BAR

NOTES:

1. SCOPE: This Standard Drawing provides details of roadway type cast insitu access chamber of maximum depth 5000.
   Access chamber sizes greater than those shown on this drawing shall be a project specific design. Constructability and accessibility of deeper chambers shall be considered in the design. Refer Note 11 for additional design requirements for chambers deeper than 5000.
   Refer Standard Drawing 1308 for precast roof slab details.
2. ACCESS CHAMBERS shall be in accordance with MRTS03.
3. DESIGN LIFE: Chambers up to 5000 deep – 50 years for all components.
   Minimum allowable bearing pressure under the chamber shall be 60 kPa and shall be certified by a RPEQ Geotechnical engineer prior to casting the chamber.
   Refer Note 11 for other structures.
4. DESIGN OF CONCRETE COMPONENTS:
   – Traffic loads and traffic load surcharge shall be in accordance with AS 5100.
   – Load factors and load combinations shall be in accordance with AS 5100.
   – Structural design shall be in accordance with AS 3600.
5. COVERS AND FRAMES shall be Class D to AS 3996.
   Approved covers and frames shall be used.
6. CONCRETE shall be in accordance with MRTS70.
   Exposure classification and cover to reinforcement shall be in accordance with AS 3600. Minimum concrete strength and cover to reinforcement shall be as shown in the table below.

Exposure classification	minimum B2	C1	C2
Minimum concrete strength	S40/20	S50/20	S50/20
Minimum Cover	45	50	65

   Blinding concrete N20/20.
   All exposed edges shall have 15 x 15 chamfers unless shown otherwise.
7. REINFORCING STEEL shall be read in conjunction with Standard Drawings 1043 and 1044. Reinforcing steel shall be in accordance with MRTS71 and AS/NZS 4671.
   Deformed bars Grade D500N and mesh Grade D500L.
   All reinforcing steel shall be ACRS certified.
8. Access to within the chamber shall be in accordance with AS 1657.
9. TACK WELDING to reinforcement for location purposes to AS/NZS 1554.3.
   Welding consumables to be controlled hydrogen type: G49X to AS/NZS ISO 14341–B or T49X to AS/NZS ISO 17632–B.
10. PROJECT–SPECIFIC INFORMATION TO BE SHOWN IN THE DOCUMENTS:
    Reference Point; Height of chamber; Connecting pipe details; and Steel schedule
11. DESIGN REQUIREMENTS for chambers deeper than 5000:
    – Design life 100 years;
    – Minimum exposure classification B2 to AS 5100;
    – Minimum concrete strength S40/20;
    – Cover to reinforcement to AS 5100.
    Concrete components shall be designed for loading as specified in Note 4.
12. DIMENSIONS are in millimetres unless shown otherwise.

ASSOCIATED DEPARTMENTAL DOCUMENTS:

Design Criteria for Bridges and Other Structures
Road Drainage Manual

REFERENCED DOCUMENTS:

Departmental Standard Drawings:

1043 Reinforcing Steel – Standard Bar Shapes
1044 Reinforcing Steel – Lap Lengths
1308 Access Chamber – Precast Roof Slab

Departmental Specifications:

MRTS03 Drainage, Retaining Structures and Protective Treatments
MRTS70 Concrete
MRTS71 Reinforcing Steel

Department of Transport and Main Roads

ACCESS CHAMBER

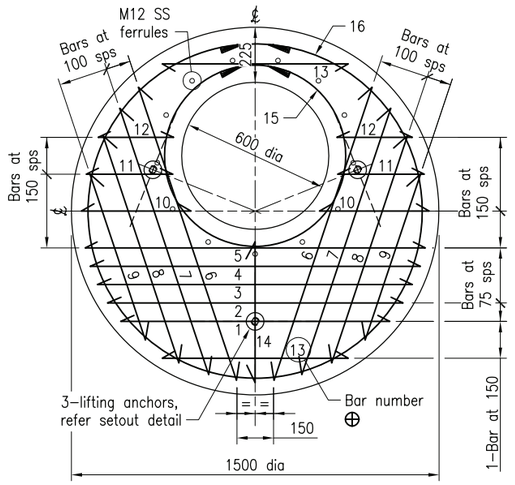
CAST INSITU DETAILS
FOR 1050 TO 2100 DIAMETER
ROADWAY TYPE ACCESS CHAMBER

Queensland Government

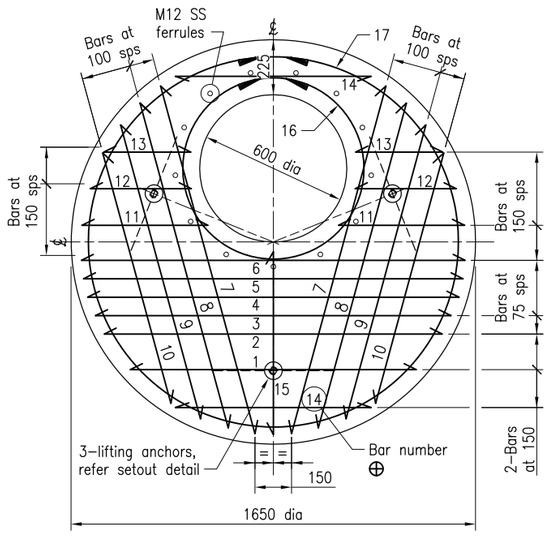
A3
Not to Scale

Standard Drawing No
1307
Date 3/2021

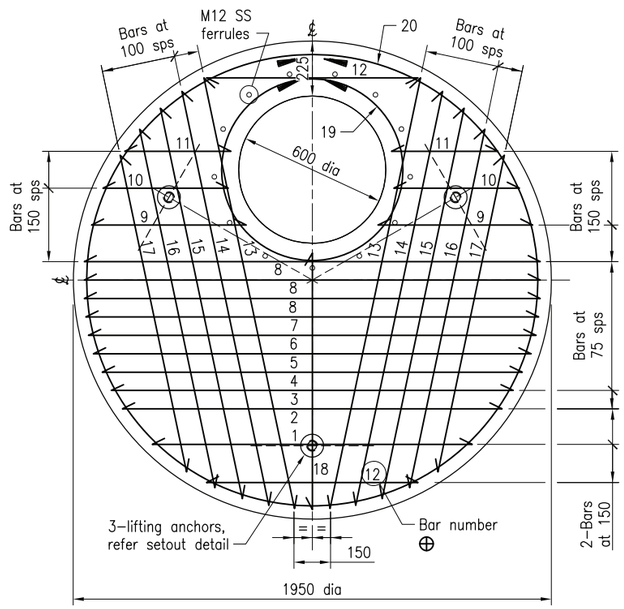
A B C D E



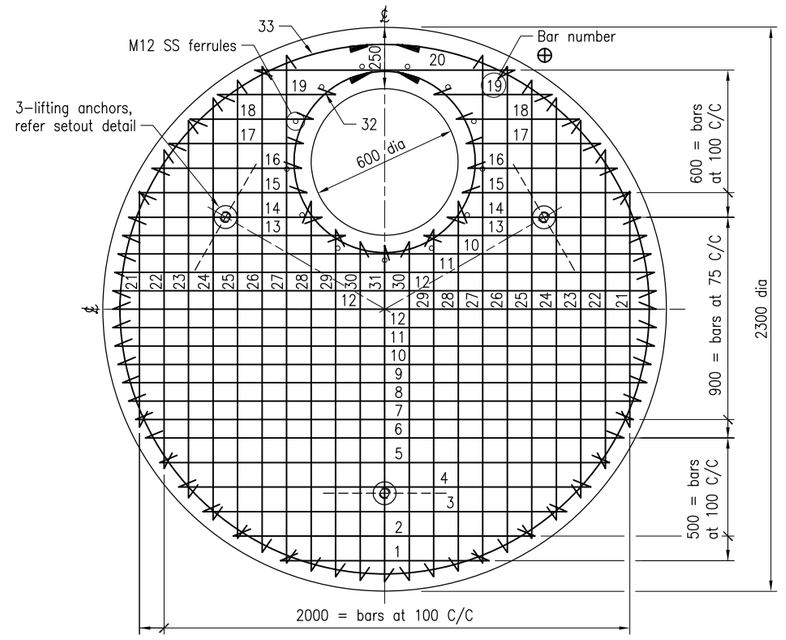
FOR 1050 ID ACCESS CHAMBER ✱



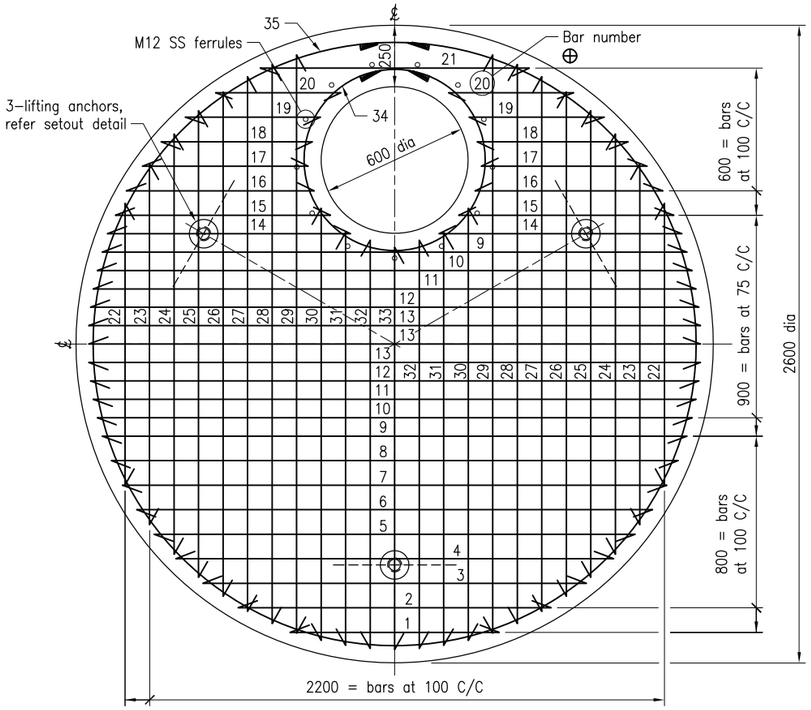
FOR 1200 ID ACCESS CHAMBER ✱



FOR 1500 ID ACCESS CHAMBER ✱



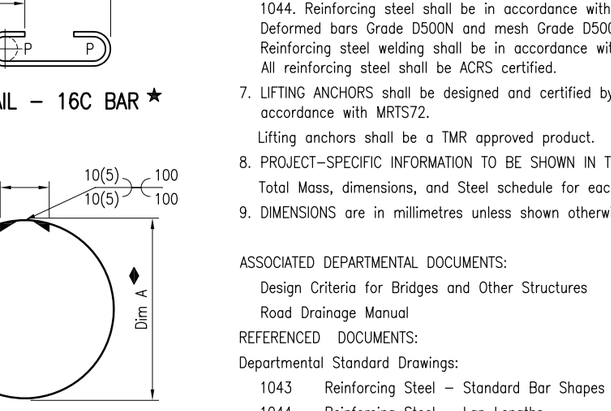
FOR 1800 ID ACCESS CHAMBER ✱



FOR 2100 ID ACCESS CHAMBER ✱

CHAMBER DETAILS

Chamber 'ID'	Roof Slab diameter	Roof Slab thickness 's'
1050	1500	175
1200	1650	175
1500	1950	200
1800	2300	250
2100	2600	250



Access chanber size	Angle α°	Dim to edge
1050	112	300
1200		
1500	120	400
1800		
2100		

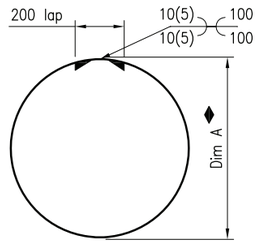
LIFTING ANCHORS SETOUT

✱ Bottom reinforcement as shown, for each ID.
Top reinforcement SL81 at cover, for all ID. Refer TYPICAL SECTION.

⊕ The bar marks shown are indicative only. Steel Schedule is project specific. Refer Note 8.

◆ Dim A as per Standard Drawing 1043. Refer Note 6

DETAIL – 16C BAR ★



DETAIL – 16P BAR

NOTES:

1. SCOPE: This Standard Drawing provides details of precast roof slab for use with cast insitu access chamber, size 1050 to 2100 diameter, in roadways, in accordance with MRTS03.
2. PRECAST COMPONENTS shall be manufactured in accordance with MRTS72.
3. DESIGN LIFE: 50 years.
4. ROOF DESIGN LOADS (all diameters):
   - Traffic loads and traffic load surcharge shall be in accordance with AS 5100.
   - Load factors and load combinations shall be in accordance with AS 5100.
   - Structural design shall be in accordance with AS 3600.
5. CONCRETE shall be in accordance with MRTS70.
   Concrete S50/20.
   Exposure classification B1 to AS3600.
   Cover to reinforcement shall be 30, unless shown otherwise, with rigid framework and intense vibration.
   In lieu of intense vibration, approved super workable concrete may be used.
   All exposed edges shall have 19 x 19 chamfers unless shown otherwise.
6. REINFORCING STEEL shall be read in conjunction with Standard Drawings 1043 and 1044. Reinforcing steel shall be in accordance with MRTS71 and AS/NZS 4671. Deformed bars Grade D500N and mesh Grade D500L.
   Reinforcing steel welding shall be in accordance with Standard Drawing 1044.
   All reinforcing steel shall be ACRS certified.
7. LIFTING ANCHORS shall be designed and certified by an RPEQ and installed all in accordance with MRTS72.
   Lifting anchors shall be a TMR approved product.
8. PROJECT–SPECIFIC INFORMATION TO BE SHOWN IN THE DOCUMENTS:
   Total Mass, dimensions, and Steel schedule for each roof slab
9. DIMENSIONS are in millimetres unless shown otherwise.

ASSOCIATED DEPARTMENTAL DOCUMENTS:

Design Criteria for Bridges and Other Structures

Road Drainage Manual

REFERENCED DOCUMENTS:

Departmental Standard Drawings:

1043 Reinforcing Steel – Standard Bar Shapes

1044 Reinforcing Steel – Lap Lengths

1307 Access Chamber – Roadway Type Cast Insitu 1050 to 2100 Diameter Chamber

Departmental Specifications:

MRTS03 Drainage, Retaining Structures and Protective Treatments

MRTS70 Concrete

MRTS71 Reinforcing Steel

MRTS72 Manufacture of Concrete Precast Elements

★ 16C bars may be rotated slightly to ensure cover requirements are met

TYPICAL SECTION ACROSS ACCESS HOLE

† Refer Standard Drawing 1307

Department of Transport and Main Roads

ACCESS CHAMBER

PRECAST ROOF SLAB FOR 1050 TO 2100 DIAMETER ROADWAY TYPE ACCESS CHAMBER

Queensland Government

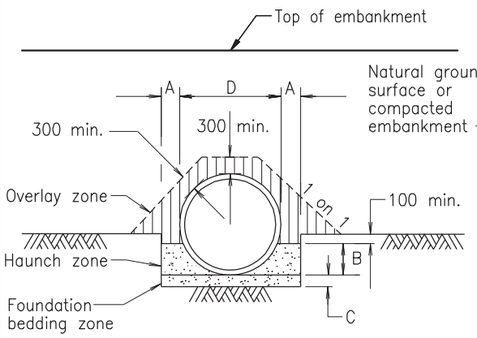
A3

Not to Scale

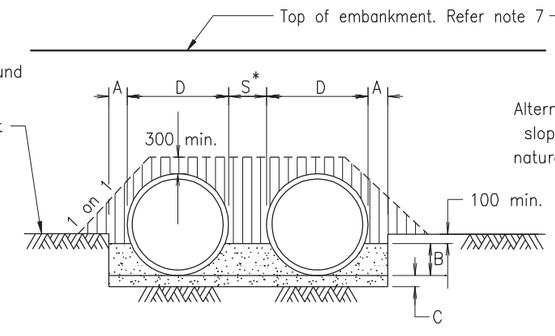
Standard Drawing No 1308

Date 7/19

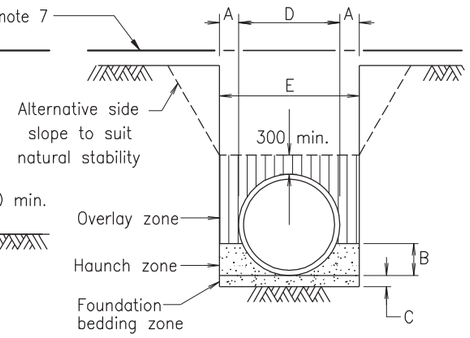
A B C D E



EMBANKMENT INSTALLATION

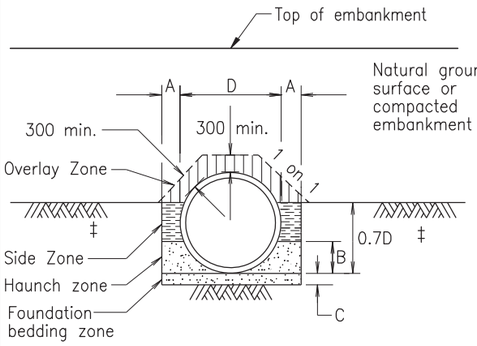


EMBANKMENT INSTALLATION – MULTIPLE PIPES

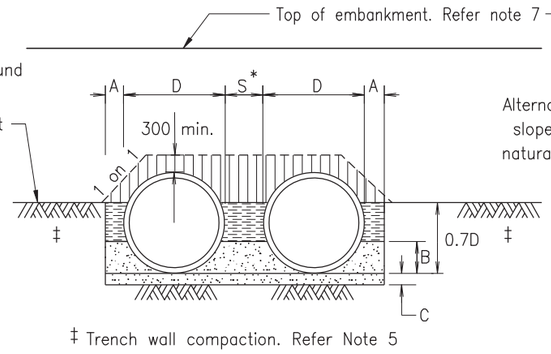


TRENCH INSTALLATION

TYPE H2 SUPPORT FOR CONCRETE PIPES

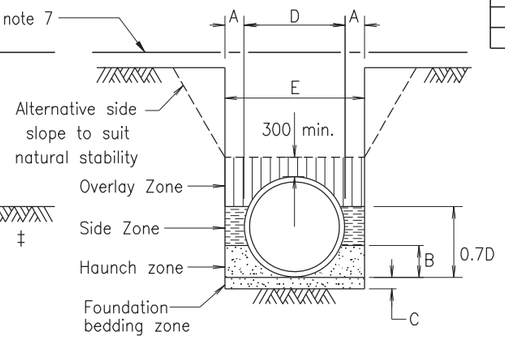


EMBANKMENT INSTALLATION



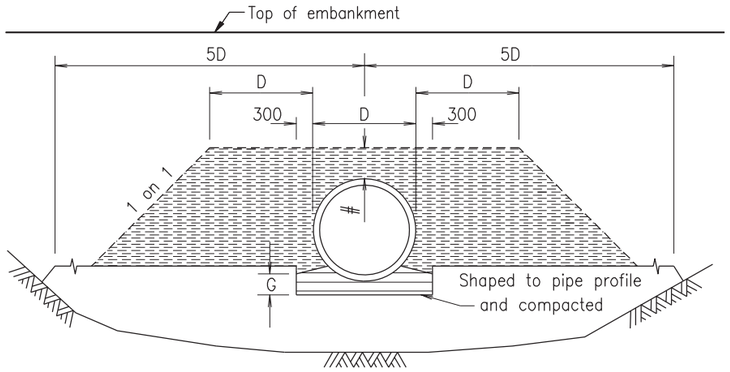
‡ Trench wall compaction. Refer Note 5

EMBANKMENT INSTALLATION – MULTIPLE PIPES

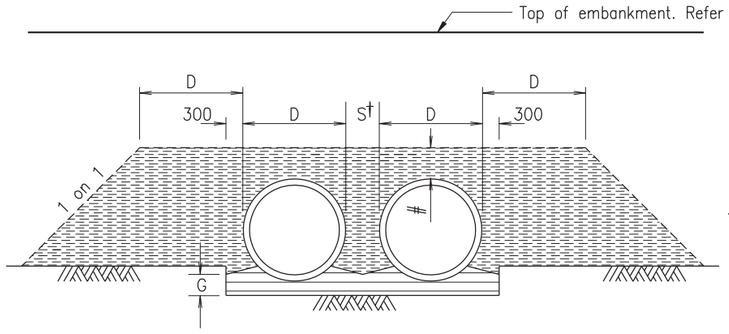


TRENCH INSTALLATION

TYPE HS3 SUPPORT FOR CONCRETE PIPES

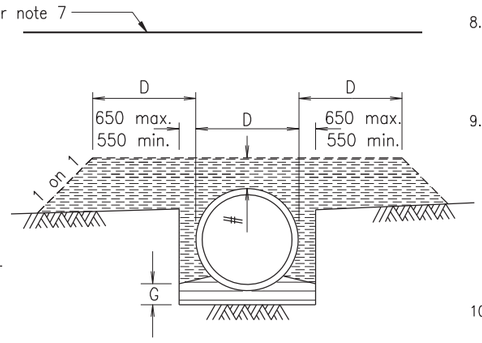


EMBANKMENT INSTALLATION



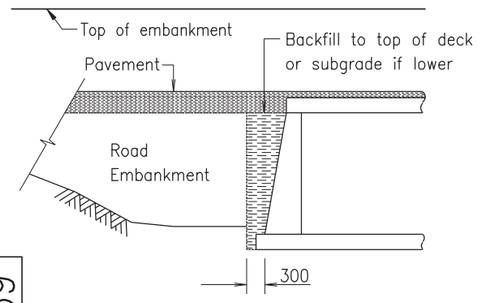
Refer note 9 or 10

EMBANKMENT INSTALLATION – MULTIPLE PIPES

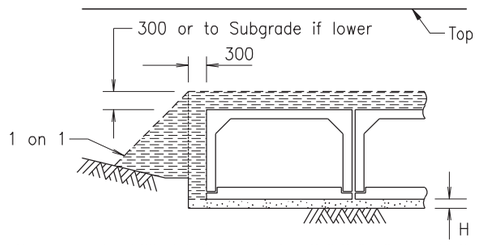


TRENCH INSTALLATION

HELICAL LOCK–SEAM CORRUGATED PIPE CULVERTS/NESTABLE CORRUGATED STEEL PIPE CULVERTS

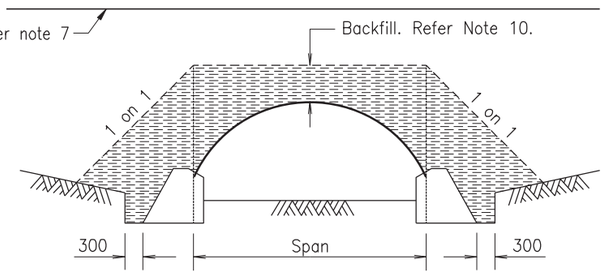


R.C. SLAB DECK CULVERT



The same backfill details apply for R.C.B.C. Crown Units on a cast in situ base slab. However, bedding materials may not be required, refer relevant culvert details shown elsewhere in documents.

PRECAST R.C. BOX CULVERT



MULTIPLE PLATE CORRUGATED STEEL ARCH CULVERT

NOMINAL INTERNAL DIAMETER, ID(mm)	MIMIMUM WIDTH, A (mm)	HAUNCH DEPTH, B (0.3 x D mm)	MAXIMUM ALLOWABLE WIDTH, E(m) TRENCH INSTALLATION
300	300	110	1.1
375	300	135	1.2
450	300	160	1.3
525	300	180	1.5
600	300	205	1.6
750	450	255	1.8
900	450	310	1.9
1050	450	360	2.1
1200	450	405	2.2
1350	450	450	2.4
1500	500	505	2.7
1650	500	550	2.9
1800	500	600	3.1
1950	500	665	3.3
2100	500	715	3.5
2400	600	810	4.2
2700	600	910	4.6
3000	700	1005	5.0

LEGEND:

- Overlay material
- Fill/Backfill material
- Foundation Bedding/Haunch material R.C. Pipes and R.C. Box Culverts
- Foundation Bedding material Corrugated Steel Pipes

NOTES :

1. "D" denotes external diameter of culvert.
2. FOUNDATION BEDDING
   - C R.C. Pipes
     - 100 if ID < 1350
     - 150 if ID ⩾ 1350
   - G Corrugated Steel Culverts
     - 100 in firm material other than rock
     - $\frac{D}{4}$ or 250 which ever the lesser in rock
   - H Precast Box Culverts
     - 75 min. in firm material other than rock
     - 150 min. in rock
3. SPACING BETWEEN MULTIPLE CULVERTS
   - S* R.C. Pipes
     - 300 when nominal ID ⩽ 600
     - 600 when nominal ID > 600 and ⩽ 1800
     - 900 when nominal ID > 1800
   - S† Corrugated Steel Culverts
     1. Nestable Culverts : $\frac{Dia}{2}$ or 300 min.
     2. Helical Lock–seam Culvert : 300 (when nominal ID ⩽ 600); $\frac{Dia}{2}$ (when nominal ID > 600 and ⩽ 1800); 1200 (when nominal ID > 1800)
     3. Plate Culverts : $\frac{Dia\ (or\ span)}{2}$ or 1200 max.
4. WINGWALLS fill/backfill material shall be placed 300mm thick behind wingwalls for the length and height of the wings.
5. TRENCH WALL COMPACTION of natural ground or embankment Minimum 90% Standard RDD for minimum 2.5D each side of trench wall and to a minimum depth of 0.7D.
6. DETAILS TO BE SHOWN ELSEWHERE IN THE DOCUMENTS concrete pipe support type.
7. WORKING LOADS are those due to fill material and standard highway vehicles as per AS 3725. Allowance for construction loads shall comply with standard specification MRS11.03.
8. MINIMUM DEPTH OF OVERLAY ZONE above pipes/culverts as shown may include pavement. Pavement within this area to be compacted by hand or alternatively a lean mix concrete pavement layer may be used.
9. HELICAL LOCK–SEAM CORRUGATED PIPE CULVERTS MINIMUM COVER:

Diameter	Minimum Cover
⩽1200mm	600mm
>1200mm	$\frac{Diameter}{2}$

10. NESTABLE AND MULTIPLE PLATE CORRUGATED STEEL CULVERTS: Minimum cover shall be 600mm or $\frac{Diameter\ or\ Span}{6}$ whichever is the greater.
11. **DIMENSIONS are in millimetres unless shown otherwise.**

ASSOCIATED DOCUMENTS :
Department of Main Roads Manual of Standard Drawings Roads
Department of Main Roads Manual of Standard Specifications Roads
REFERENCED DOCUMENTS :
Australian Standards :
AS 3725 Loads on Buried Concrete Pipes
Standard Specifications :
MRS11.03 Drainage, Retaining Structures and Protective Treatments
MRS11.04 General Earthworks

1359

CULVERTS

Queensland Government
Department of Main Roads

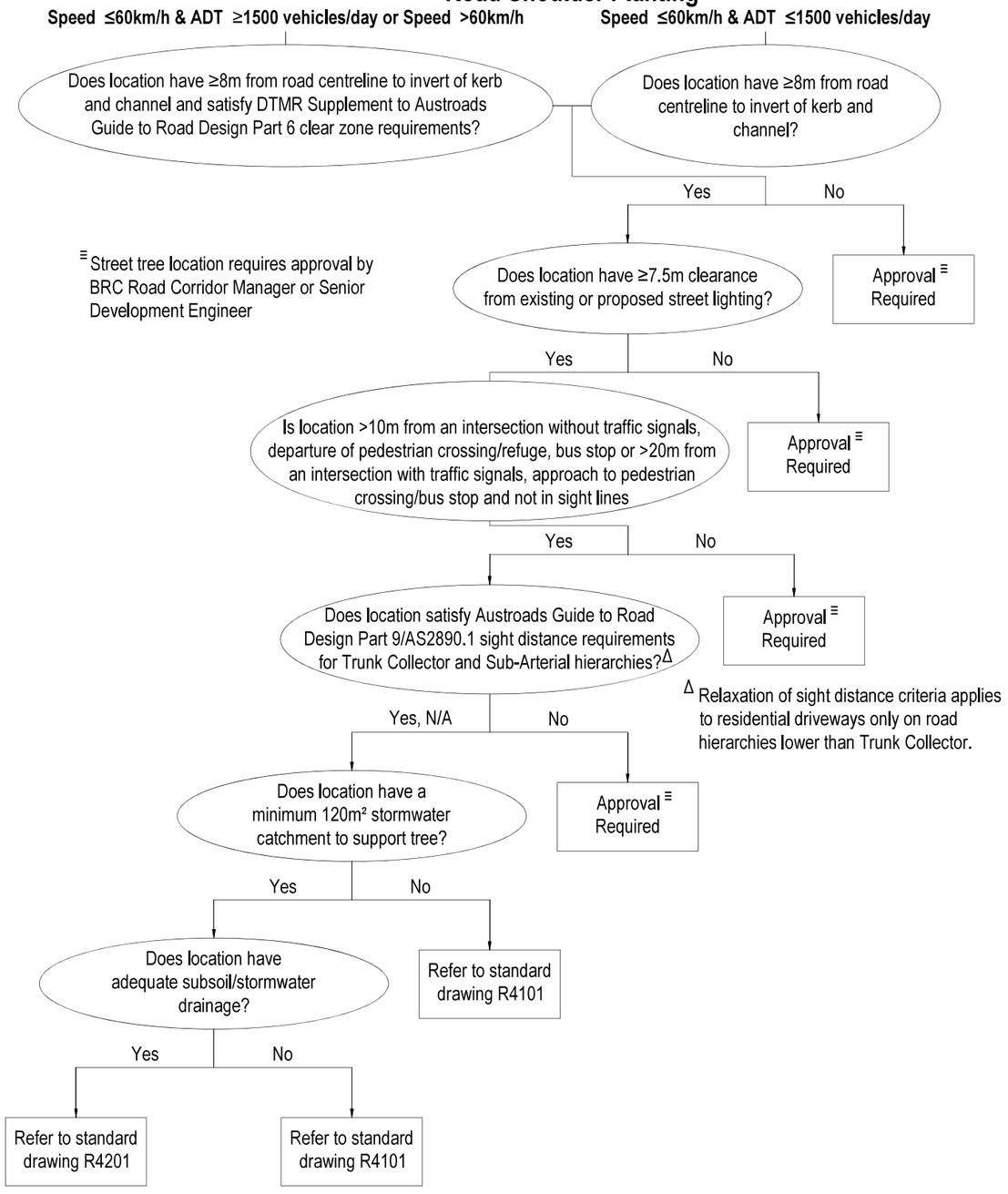
INSTALLATION, BEDDING AND FILLING/BACKFILLING AGAINST/ OVER CULVERTS

Size A3
Scales as shown
Drawing No 1359
Date 10/03
A B C D E

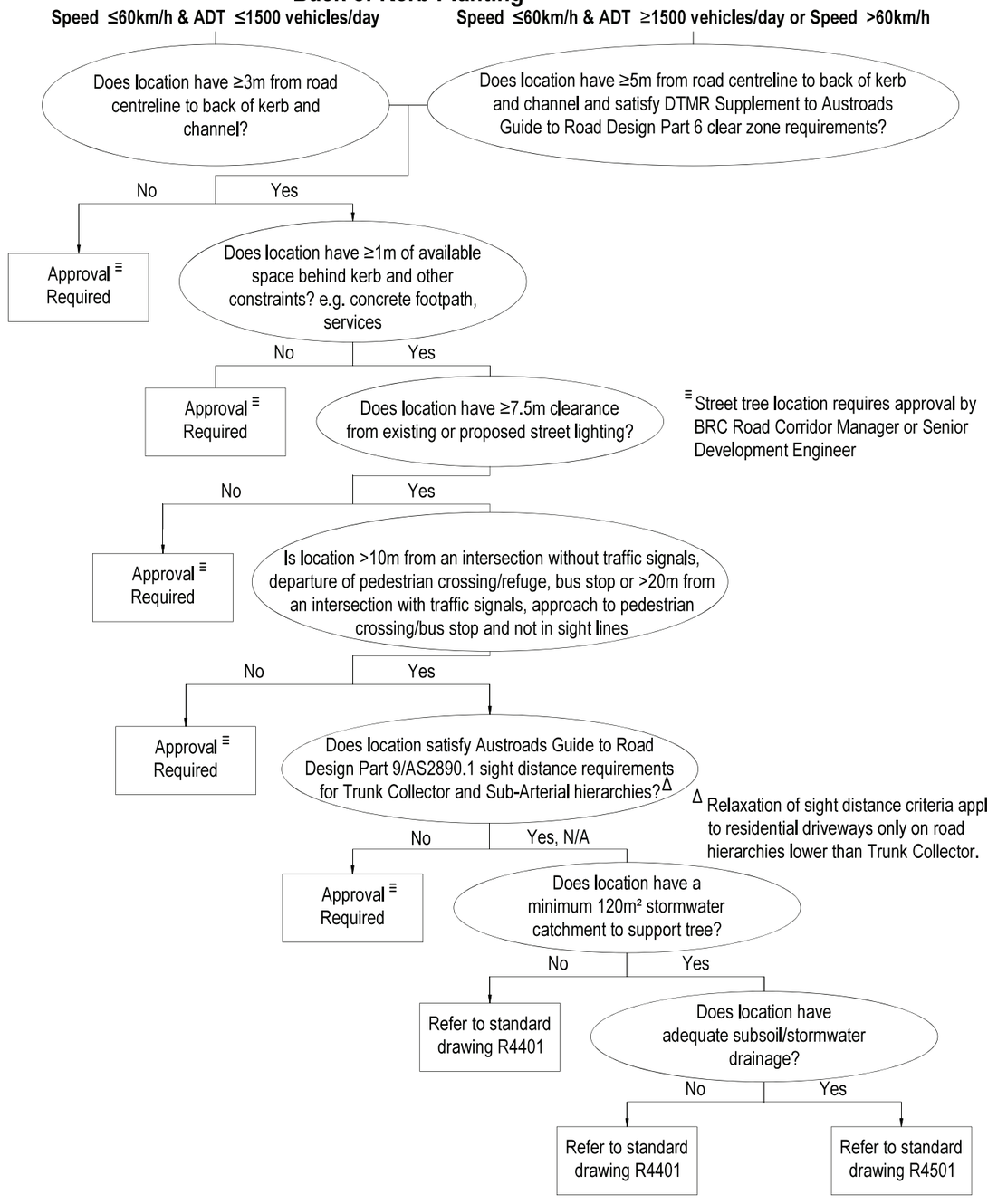
BRC(06/19)

STREET TREE TREATMENT SELECTION

Road Shoulder Planting



Back of Kerb Planting



PASSIVE IRRIGATION INSTALLATIONS TO BE ADOPTED UNLESS CRITERIA CAN'T BE MET

Revisions		Verified	Date
A	Original Issue		

Engineering Certification
Design: JCR Verified: ASJ
Drawn: JCR Checked: ASJ
Digitally signed by Adam Johnston Date: 2020.12.03 14:10:21 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Dwayne Honor Date: 2020.12.18 08:01:58 +10'00'

BUNDABERG REGIONAL COUNCIL

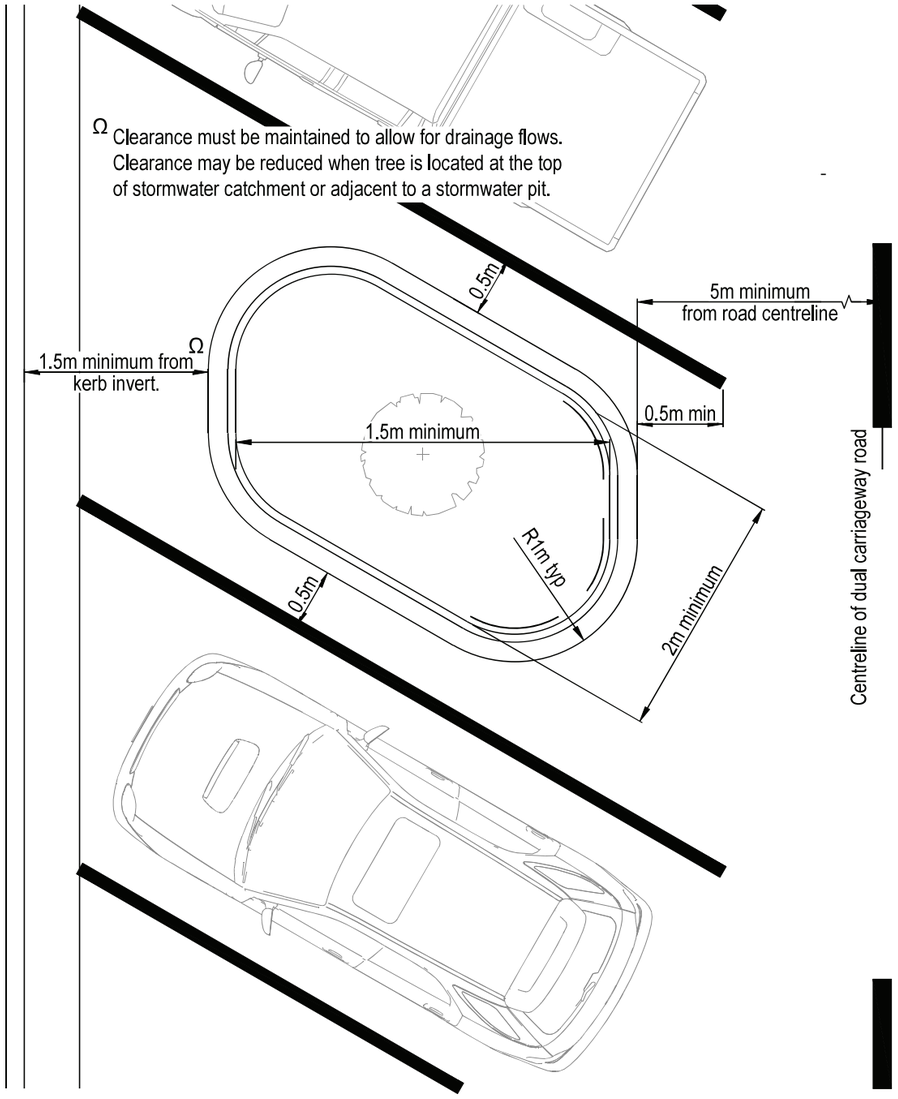
STANDARD STREET TREE PLANTING DETAILS
STREET TREE TREATMENT SELECTION

Standard Drawing No.: R4001
Sheet Size: A3
Rev.: A

C:\BRC Standard Drawings\R4001 Street Tree | 3/12/2020 1:13:54 PM

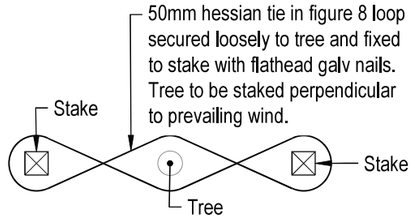
BRC(06/19)

STAKE SCHEDULE			
TREE HEIGHT (mm)	STAKE SIZE (mm)	STAKE NUMBER	TIE HEIGHT
<1000	38x38x1200	2	$\frac{1}{3}$ - $\frac{1}{2}$ tree height
1000 to 2000	38x38x1800	2	$\frac{1}{3}$ - $\frac{1}{2}$ tree height
2000 to 3000	50x50x2400	3	$\frac{1}{3}$ to 1000mm max
> 3000	Arborist advice	Arborist advice	Arborist advice

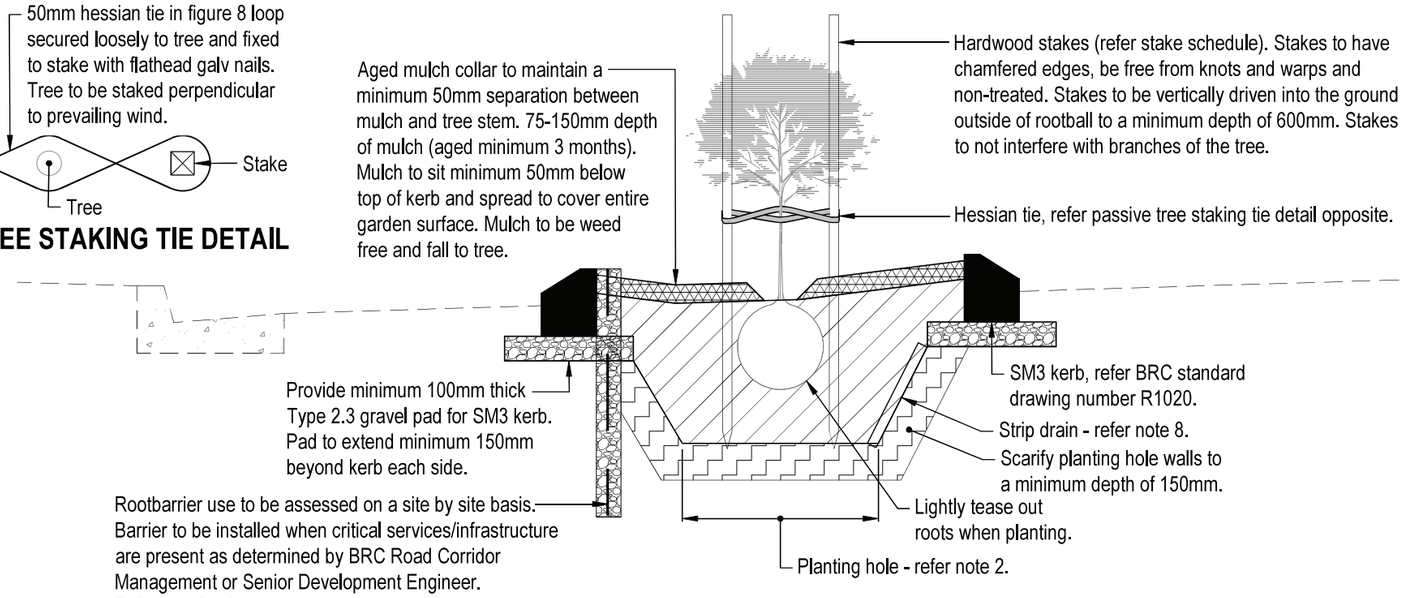


Note: Final shape of garden bed to coincide with parking angle. Orientation shown is INDICATIVE ONLY and is subject to change according to site conditions.

SEALED ROAD SHOULDER PLANTING - TYPICAL LAYOUT
DUAL CARRIAGEWAY SPEED ≤60km/h & ADT ≤1500 VEHICLES/DAY



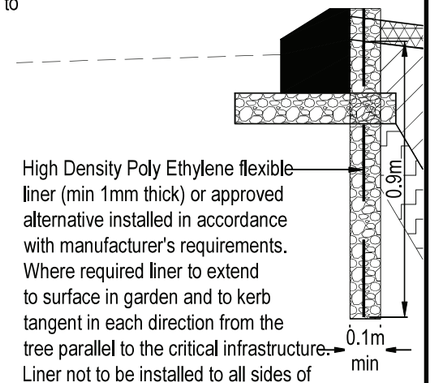
PASSIVE TREE STAKING TIE DETAIL



SEALED ROAD SHOULDER PLANTING - TYPICAL SECTION

NOTES:

1. Prior to any excavation works being undertaken, a Dial Before You Dig search is to be undertaken. Where appropriate, an underground service locator is to be engaged to undertake an inspection of the site to locate and mark underground service locations.
2. Soil test (minimum of compaction, ribbon and pH) to be undertaken to determine whether any soil amelioration works are required to improve soil condition. If soil tests indicate conditions are good, then for up to a 25L pot size tree provide minimum soil depth of 600mm and a minimum volume of 1m³ of ameliorated or imported soil in the planting area. Otherwise provide ameliorated or imported soil in accordance with AS4419.
   - 2.1. If required supply and place non petroleum based soil wetting agent or water crystals in accordance with manufacturer's instructions.
   - 2.2. If required soil wetting agent with fertiliser additive to be mixed through full depth of existing and imported top soil.
3. Prior to planting, half fill planting hole with water. Ensure hole drains within reasonable time. If drainage is very slow or where clay soils are found at the base of planting holes, break up sub-soil and evenly incorporate 1kg of agricultural gypsum per hole into sub-soil. Hole must be drained of water before planting tree. Do not incorporate gypsum in sandy and free draining sub-soils.
4. Mulch to be in accordance with AS4454-2012 Composts, Soil Conditioners and Mulches.
5. On cross falls greater than or equal to 6% mulch shall be hoop pine or aged organic mulch with open weave jute net.
6. Trees to be selected must be appropriate for the location. Trees to be selected from the Bundaberg Regional Council (BRC) approved street tree list. Minimum distance to overhead power pole to be equal to the height of the mature tree in cultivation. Tree stock to meet Natspec Proforma for Nursery Stock. BRC preferred tree stock size is 300mm to 25L pot size.
7. Passive tree staking: All 300mm and larger plant material is to be staked and supported using hessian straps. Once tree is established, tree stakes are to be removed.
8. Where adjacent underground stormwater infrastructure is present a 450 Megaflow strip drain is to be installed to road side of tree pit.
9. For roads with an ADT of greater than 1500 or speed limit greater than 60km/h a clear zone to the street tree garden bed must be maintained in accordance with DTMR Supplement to Austroads Guide to Road Design Part 6: Roadside Design, Safety and Barriers.
10. Sight distance checks in accordance with Austroads Guide to Road Design Part 9: Guide to Road Design Part 9: Sight Distance must be undertaken for each proposed street tree location as outlined on BRC standard drawing R4001.
11. Existing street lighting to not be compromised by the installation of a street tree. Where trees are within 7.5m of existing lighting the adequacy of existing street lighting is to be assessed before installing a street tree. Guidance to be provided by BRC Road Corridor Management or Senior Development Engineer.



High Density Poly Ethylene flexible liner (min 1mm thick) or approved alternative installed in accordance with manufacturer's requirements. Where required liner to extend to surface in garden and to kerb tangent in each direction from the tree parallel to the critical infrastructure. Liner not to be installed to all sides of tree planting.

ROOT BARRIER DETAIL

DIAL BEFORE YOU DIG
PHONE 1100
www.1100.com.au
ARRANGE FOR LOCATIONS ON SITE BY THE APPROPRIATE AUTHORITIES BEFORE DIGGING. CALL 48 HOURS BEFORE YOU DIG.

Revisions		Verified	Date
A	Original Issue		

Engineering Certification
Design: AECOM Verified: ASJ
Drawn: JCR Checked: ASJ
Digitally signed by Adam Johnston
Date: 2020.12.03 14:17:28 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Dwayne Honor
Date: 2020.12.18 08:02:35 +10'00'

BUNDABERG REGIONAL COUNCIL

STANDARD STREET TREE PLANTING DETAILS
ROAD SHOULDER PLANTING WITHOUT PASSIVE IRRIGATION
SEALED SHOULDER

Standard Drawing No.: R4101
Sheet Size: A3
Rev.:

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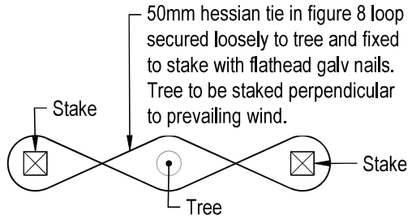
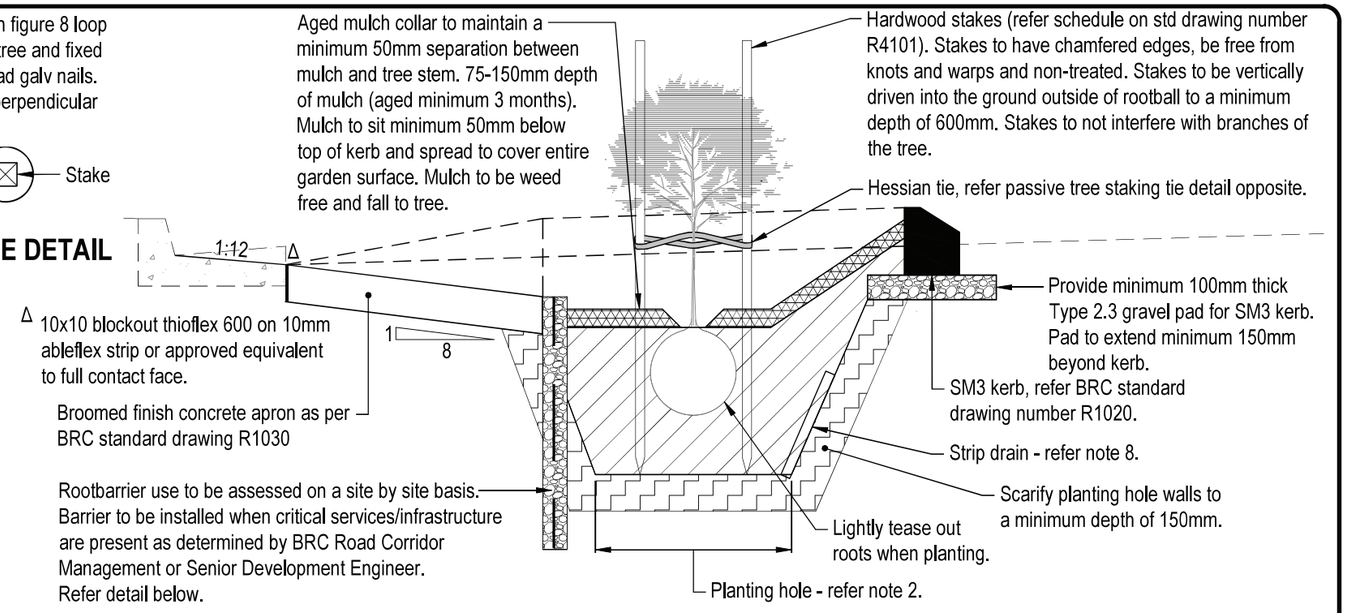
BRC(06/19)

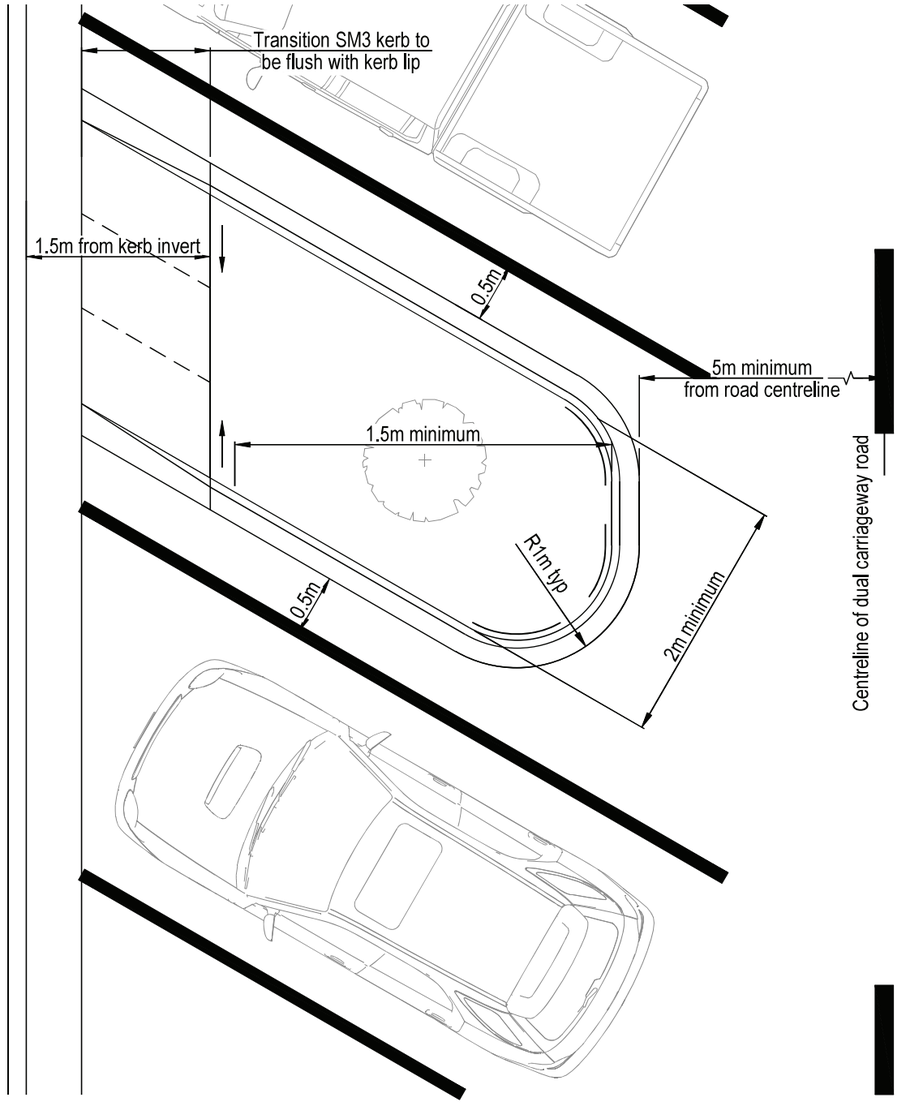
STAKE SCHEDULE			
TREE HEIGHT (mm)	STAKE SIZE (mm)	STAKE NUMBER	TIE HEIGHT
<1000	38x38x1200	2	$\frac{1}{3}$ - $\frac{1}{2}$ tree height
1000 to 2000	38x38x1800	2	$\frac{1}{3}$ - $\frac{1}{2}$ tree height
2000 to 3000	50x50x2400	3	$\frac{1}{3}$ to 1000mm max
> 3000	Arborist advice	Arborist advice	Arborist advice



PASSIVE TREE STAKING TIE DETAIL



SEALED ROAD SHOULDER PLANTING - TYPICAL SECTION

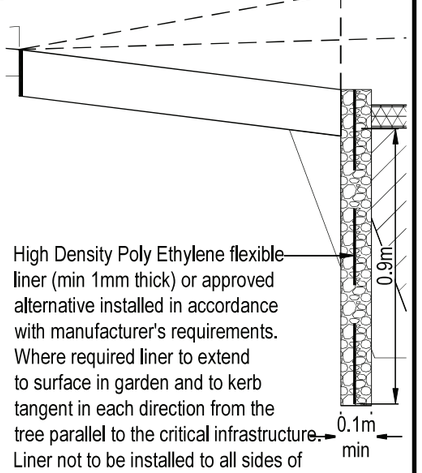


Note: Final shape of garden bed to coincide with parking angle. Orientation shown is INDICATIVE ONLY and is subject to change according to site conditions.

SEALED ROAD SHOULDER PLANTING - TYPICAL LAYOUT
DUAL CARRIAGEWAY SPEED ≤60km/h & ADT ≤1500 VEHICLES/DAY

NOTES:

1. Prior to any excavation works being undertaken, a Dial Before You Dig search is to be undertaken. Where appropriate, an underground service locator is to be engaged to undertake an inspection of the site to locate and mark underground service locations.
2. Soil test (minimum of compaction, ribbon and pH) to be undertaken to determine whether any soil amelioration works are required to improve soil condition. If soil tests indicate conditions are good, then for up to a 25L pot size tree provide minimum soil depth of 600mm and a minimum volume of 1m³ of ameliorated or imported soil in the planting area. Otherwise provide ameliorated or imported soil in accordance with AS4419.
   - 2.1. If required supply and place non petroleum based soil wetting agent or water crystals in accordance with manufacturer's instructions.
   - 2.2. If required soil wetting agent with fertiliser additive to be mixed through full depth of existing and imported top soil.
3. Prior to planting, half fill planting hole with water. Ensure hole drains within reasonable time. If drainage is very slow or where clay soils are found at the base of planting holes, break up sub-soil and evenly incorporate 1kg of agricultural gypsum per hole into sub-soil. Hole must be drained of water before planting tree. Do not incorporate gypsum in sandy and free draining sub-soils.
4. Mulch to be in accordance with AS4454-2012 Composts, Soil Conditioners and Mulches.
5. On cross falls greater than or equal to 6% mulch shall be hoop pine or aged organic mulch with open weave jute net.
6. Trees to be selected must be appropriate for the location. Trees to be selected from the Bundaberg Regional Council (BRC) approved street tree list. Minimum distance to overhead power pole to be equal to the height of the mature tree in cultivation. Tree stock to meet Natspec Proforma for Nursery Stock. BRC preferred tree stock size is 300mm to 25L pot size.
7. Passive tree staking: All 300mm and larger plant material is to be staked and supported using hessian straps. Once tree is established, tree stakes are to be removed.
8. Where adjacent underground stormwater infrastructure is present a 450 Megaflow strip drain is to be installed to road side of tree pit.
9. For roads with an ADT of greater than 1500 or speed limit greater than 60km/h a clear zone to the street tree garden bed must be maintained in accordance with DTMR Supplement to Austroads Guide to Road Design Part 6: Roadside Design, Safety and Barriers.
10. Sight distance checks in accordance with Austroads Guide to Road Design Part 9: Guide to Road Design Part 9: Sight Distance must be undertaken for each proposed street tree location as outlined on BRC standard drawing R4001.
11. Existing street lighting to not be compromised by the installation of a street tree. Where trees are within 7.5m of existing lighting the adequacy of existing street lighting is to be assessed before installing a street tree. Guidance to be provided by BRC Road Corridor Management or Senior Development Engineer.



High Density Poly Ethylene flexible liner (min 1mm thick) or approved alternative installed in accordance with manufacturer's requirements. Where required liner to extend to surface in garden and to kerb tangent in each direction from the tree parallel to the critical infrastructure. Liner not to be installed to all sides of tree planting.

ROOT BARRIER DETAIL

Revisions		Verified	Date
A	Original Issue		

Engineering Certification
Design: AECOM Verified: ASJ
Drawn: JCR Checked: ASJ
Digitally signed by Adam Johnston
Date: 2020.12.03 14:16:57 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Dwayne Honor
Date: 2020.12.18 08:03:13 +10'00'

BUNDABERG REGIONAL COUNCIL

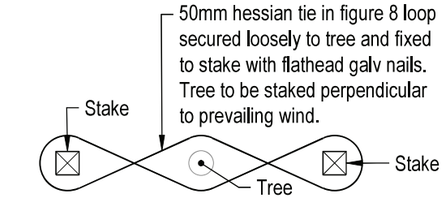
STANDARD STREET TREE PLANTING DETAILS
ROAD SHOULDER PLANTING WITH PASSIVE IRRIGATION
SEALED SHOULDER

Standard Drawing No.: R4201
Sheet Size: A3
Rev.:

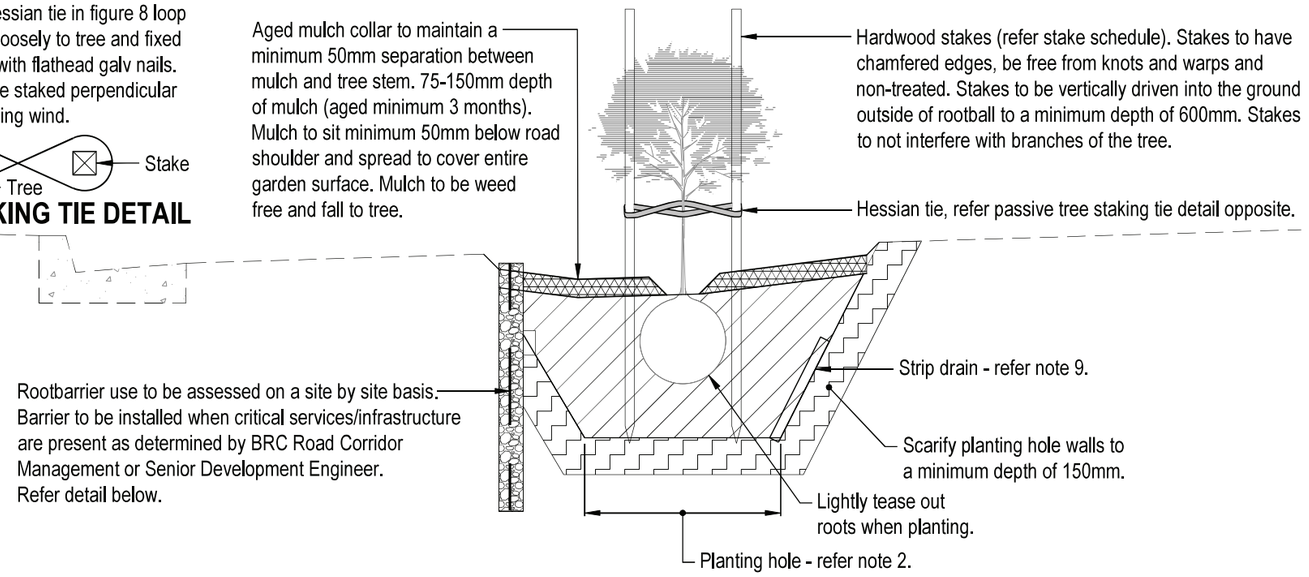
C:\BRC Standard Drawings\R4201 Road Shoulder Planting with Passive Irrigation - Sealed | 3/12/2020 1:11:12 PM

BRC(06/19)

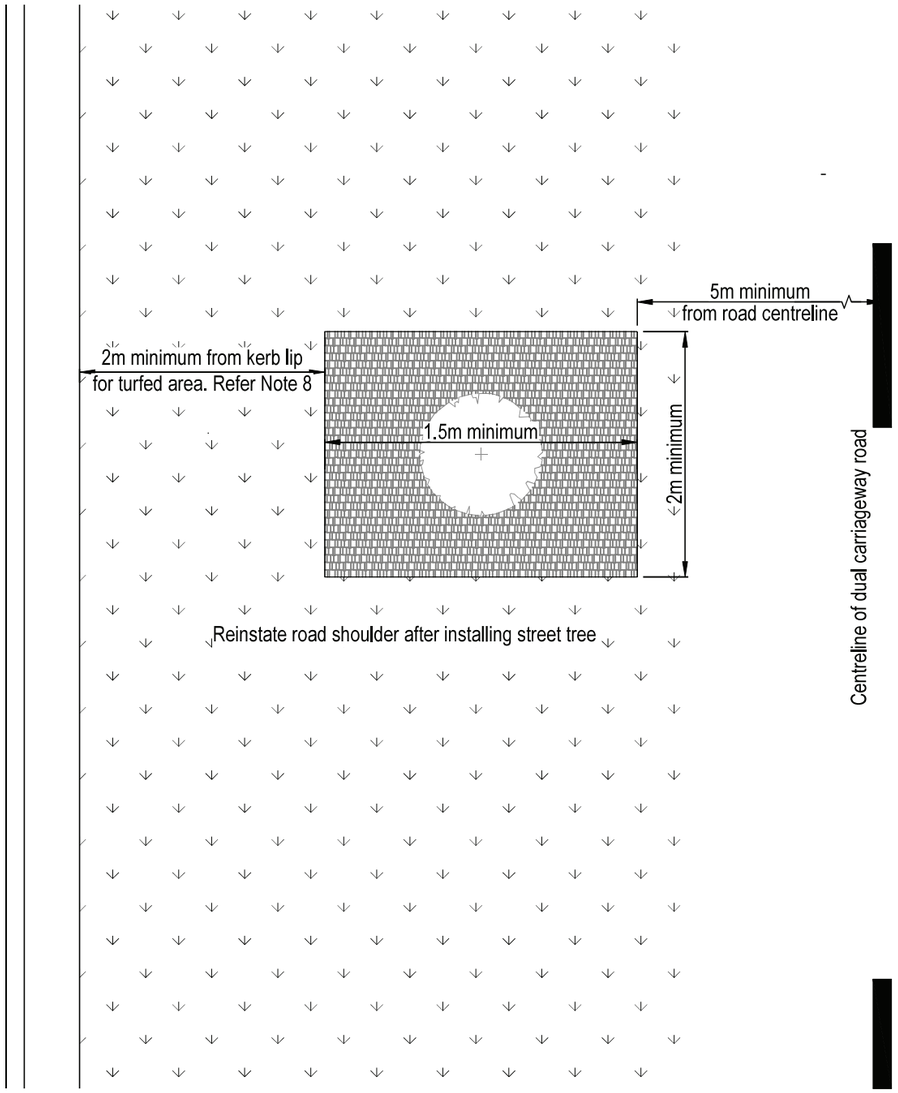
STAKE SCHEDULE			
TREE HEIGHT (mm)	STAKE SIZE (mm)	STAKE NUMBER	TIE HEIGHT
<1000	38x38x1200	2	$\frac{1}{3}$ - $\frac{1}{2}$ tree height
1000 to 2000	38x38x1800	2	$\frac{1}{3}$ - $\frac{1}{2}$ tree height
2000 to 3000	50x50x2400	3	$\frac{1}{3}$ to 1000mm max
> 3000	Arborist advice	Arborist advice	Arborist advice



PASSIVE TREE STAKING TIE DETAIL



UNSEALED ROAD SHOULDER PLANTING - TYPICAL SECTION

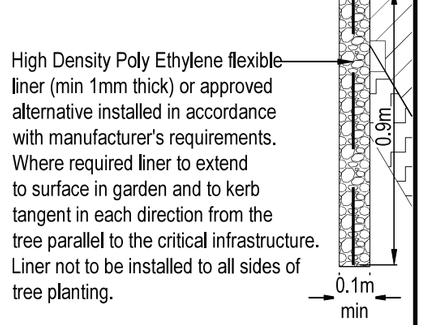


Note: Final shape of garden bed to be determined on-site. Orientation shown is INDICATIVE ONLY and is subject to change according to site conditions.

UNSEALED ROAD SHOULDER PLANTING - TYPICAL LAYOUT
DUAL CARRIAGEWAY SPEED ≤60km/h & ADT ≤1500 VEHICLES/DAY

NOTES:

1. Prior to any excavation works being undertaken, a Dial Before You Dig search is to be undertaken. Where appropriate, an underground service locator is to be engaged to undertake an inspection of the site to locate and mark underground service locations.
2. Soil test (minimum of compaction, ribbon and pH) to be undertaken to determine whether any soil amelioration works are required to improve soil condition. If soil tests indicate conditions are good, then for up to a 25L pot size tree provide minimum soil depth of 600mm and a minimum volume of 1m³ of ameliorated or imported soil in the planting area. Otherwise provide ameliorated or imported soil in accordance with AS4419.
   - 2.1. If required supply and place non petroleum based soil wetting agent or water crystals in accordance with manufacturer's instructions.
   - 2.2. If required soil wetting agent with fertiliser additive to be mixed through full depth of existing and imported top soil.
3. Prior to planting, half fill planting hole with water. Ensure hole drains within reasonable time. If drainage is very slow or where clay soils are found at the base of planting holes, break up sub-soil and evenly incorporate 1kg of agricultural gypsum per hole into sub-soil. Hole must be drained of water before planting tree. Do not incorporate gypsum in sandy and free draining sub-soils.
4. Mulch to be in accordance with AS4454-2012 Composts, Soil Conditioners and Mulches.
5. On cross falls greater than or equal to 6% mulch shall be hoop pine or aged organic mulch with open weave jute net.
6. Trees to be selected must be appropriate for the location. Trees to be selected from the Bundaberg Regional Council (BRC) approved street tree list. Minimum distance to overhead power pole to be equal to the height of the mature tree in cultivation. Tree stock to meet Natspec Proforma for Nursery Stock. BRC preferred tree stock size is 300mm to 25L pot size.
7. Passive tree staking: All 300mm and larger plant material is to be staked and supported using hessian straps. Once tree is established, tree stakes are to be removed.
8. 2m clearance must be maintained between road kerb and channel to street tree garden kerb to allow for road shoulder maintenance if turfed area is provided, otherwise garden to extend to kerb and channel.
9. Where adjacent underground stormwater infrastructure is present a 450 Megaflow strip drain is to be installed to road side of tree pit.
10. For roads with an ADT of greater than 1500 or speed limit greater than 60km/h a clear zone to the street tree garden bed must be maintained in accordance with DTMR Supplement to Austroads Guide to Road Design Part 6: Roadside Design, Safety and Barriers.
11. Sight distance checks in accordance with Austroads Guide to Road Design Part 9: Guide to Road Design Part 9: Sight Distance must be undertaken for each proposed street tree location as outlined on BRC standard drawing R4001.
12. Existing street lighting to not be compromised by the installation of a street tree. Where trees are within 7.5m of existing lighting the adequacy of existing street lighting is to be assessed before installing a street tree. Guidance to be provided by BRC Road Corridor Management or Senior Development Engineer.



ROOT BARRIER DETAIL

DIAL BEFORE YOU DIG
PHONE 1100
www.1100.com.au
ARRANGE FOR LOCATIONS ON SITE BY THE APPROPRIATE AUTHORITIES BEFORE DIGGING. CALL 48 HOURS BEFORE YOU DIG.

Revisions		Verified	Date
A	Original Issue		

Engineering Certification
Design: AECOM Verified: ASJ
Drawn: JCR Checked: ASJ
Digitally signed by Adam Johnston Date: 2020.12.03 14:16:25 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Dwayne Honor Date: 2020.12.18 08:04:03 +10'00'

BUNDABERG REGIONAL COUNCIL

STANDARD STREET TREE PLANTING DETAILS
ROAD SHOULDER PLANTING
UNSEALED SHOULDER

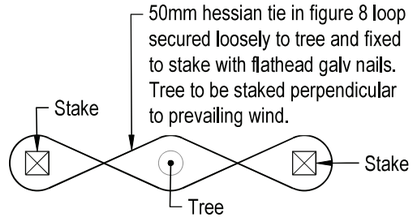
Standard Drawing No.: R4301
Sheet Size: A3
Rev.:

C:\BRC Standard Drawings\R4301 ROAD SHOULDER PLANTING - UNSEALED SHOULDER | 3/12/2020 1:15:28 PM

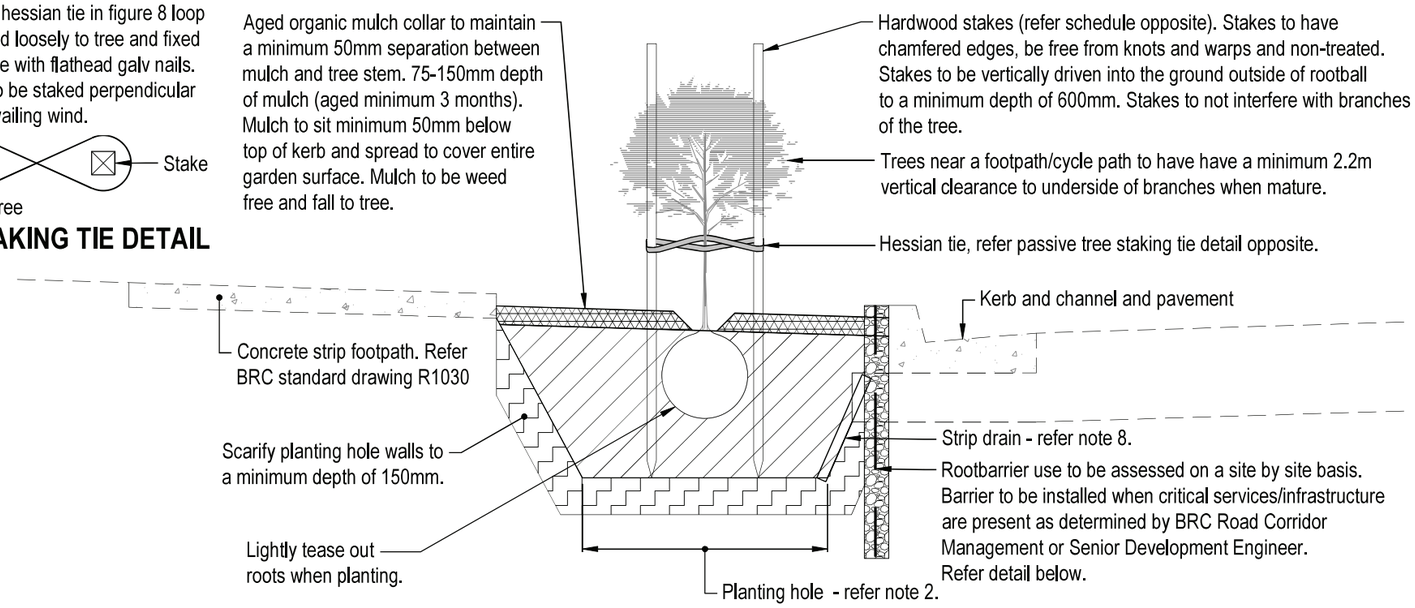
BRC(06/19)

STAKE SCHEDULE

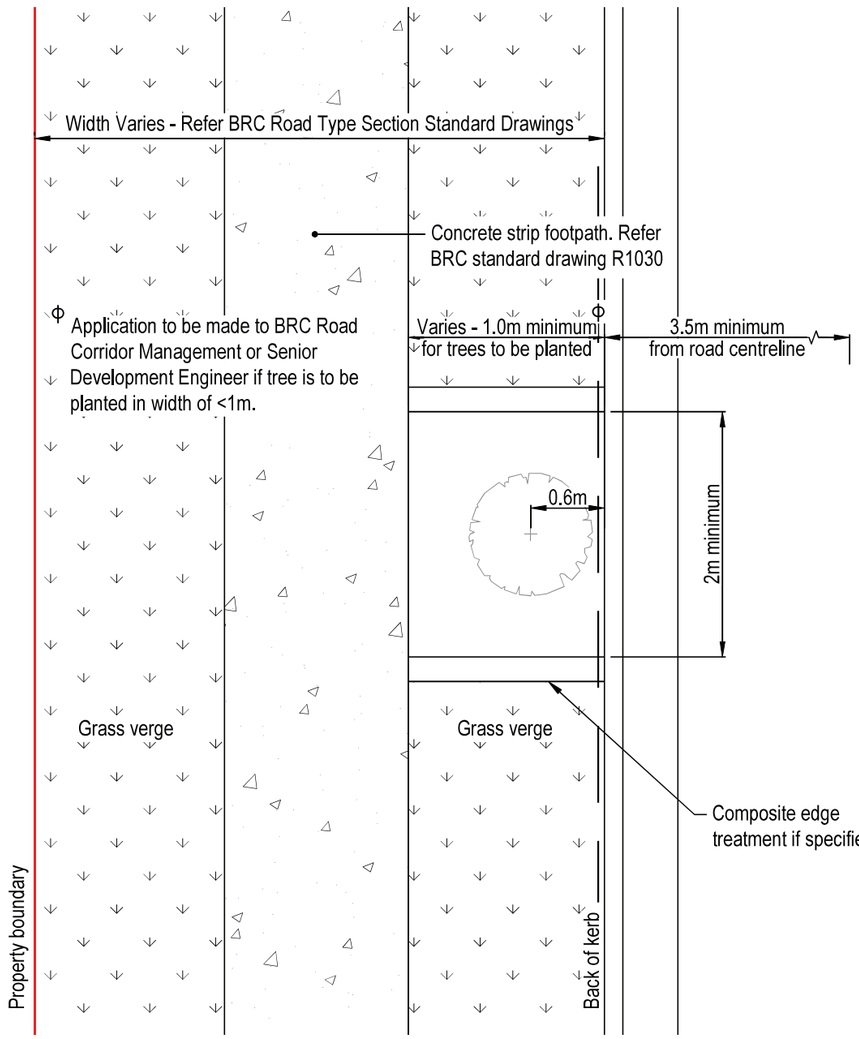
TREE HEIGHT (mm)	STAKE SIZE (mm)	STAKE NUMBER	TIE HEIGHT
<1000	38x38x1200	2	$\frac{1}{3}$ - $\frac{1}{2}$ tree height
1000 to 2000	38x38x1800	2	$\frac{1}{3}$ - $\frac{1}{2}$ tree height
2000 to 3000	50x50x2400	3	$\frac{1}{3}$ to 1000mm max
> 3000	Arborist advice	Arborist advice	Arborist advice



PASSIVE TREE STAKING TIE DETAIL



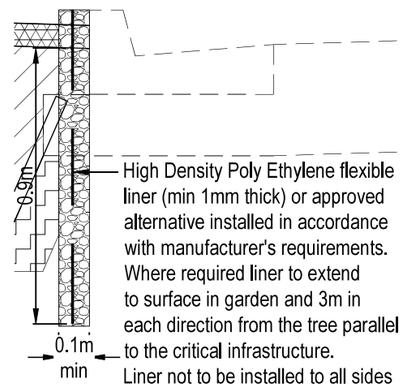
BACK OF KERB PLANTING - TYPICAL SECTION



BACK OF KERB PLANTING - TYPICAL LAYOUT
DUAL CARRIAGEWAY SPEED ≤60km/h & ADT ≤1500 VEHICLES/DAY

NOTES:

1. Prior to any excavation works being undertaken, a Dial Before You Dig search is to be undertaken. Where appropriate, an underground service locator is to be engaged to undertake an inspection of the site to locate and mark underground service locations.
2. Soil test (minimum of compaction, ribbon and pH) to be undertaken to determine whether any soil amelioration works are required to improve soil condition. If soil tests indicate conditions are good, then for up to a 25L pot size tree provide minimum soil depth of 600mm and a minimum volume of 1m³ of ameliorated or imported soil in the planting area. Otherwise provide ameliorated or imported soil in accordance with AS4419.
   - 2.1. If required supply and place non petroleum based soil wetting agent or water crystals in accordance with manufacturer's instructions.
   - 2.2. If required soil wetting agent with fertiliser additive to be mixed through full depth of existing and imported top soil.
3. Prior to planting, half fill planting hole with water. Ensure hole drains within reasonable time. If drainage is very slow or where clay soils are found at the base of planting holes, break up sub-soil and evenly incorporate 1kg of agricultural gypsum per hole into sub-soil. Hole must be drained of water before planting tree. Do not incorporate gypsum in sandy and free draining sub-soils.
4. Mulch to be in accordance with AS4454-2012 Composts, Soil Conditioners and Mulches.
5. On cross falls greater than or equal to 6% mulch shall be hoop pine or aged organic mulch with open weave jute net.
6. Trees to be selected must be appropriate for the location. Trees to be selected from the Bundaberg Regional Council (BRC) approved street tree list. Minimum distance to overhead power pole to be equal to the height of the mature tree in cultivation. Tree stock to meet Natspec Proforma for Nursery Stock. BRC preferred tree stock size is 300mm to 25L pot size.
7. Passive tree staking: All 300mm and larger plant material is to be staked and supported using hessian straps. Once tree is established, tree stakes are to be removed.
8. Where adjacent underground stormwater infrastructure is present a 450 Megaflow strip drain is to be installed to road side of tree pit.
9. For roads with an ADT of greater than 1500 or speed limit greater than 60km/h a clear zone to the street tree garden bed must be maintained in accordance with DTMR Supplement to Austroads Guide to Road Design Part 6: Roadside Design, Safety and Barriers.
10. Sight distance checks in accordance with Austroads Guide to Road Design Part 9: Guide to Road Design Part 9: Sight Distance must be undertaken for each proposed street tree location as outlined on BRC standard drawing R4001.
11. Existing street lighting to not be compromised by the installation of a street tree. Where trees are within 7.5m of existing lighting the adequacy of existing street lighting is to be assessed before installing a street tree. Guidance to be provided by BRC Road Corridor Management or Senior Development Engineer.
12. Refer to BRC standard drawing R1050 for typical conduit and service locations.



ROOT BARRIER DETAIL

DIAL BEFORE YOU DIG
PHONE 1100
www.1100.com.au
ARRANGE FOR LOCATIONS ON SITE BY THE APPROPRIATE AUTHORITIES BEFORE DIGGING. CALL 48 HOURS BEFORE YOU DIG.

Revisions	Verified	Date
A Original Issue		

Engineering Certification
Design: AECOM Verified: ASJ
Drawn: JCR Checked: ASJ
Digitally signed by Adam Johnston Date: 2020.12.03 14:15:51 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Dwayne Honor Date: 2020.12.18 08:04:42 +10'00'

BUNDABERG REGIONAL COUNCIL

STANDARD STREET TREE PLANTING DETAILS
BACK OF KERB PLANTING WITHOUT PASSIVE IRRIGATION

Standard Drawing No.: R4401
Sheet Size: A3
Rev.:

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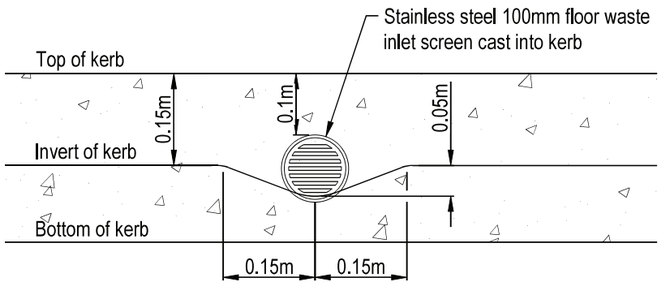
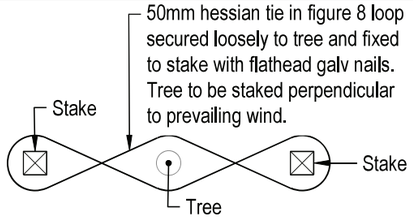
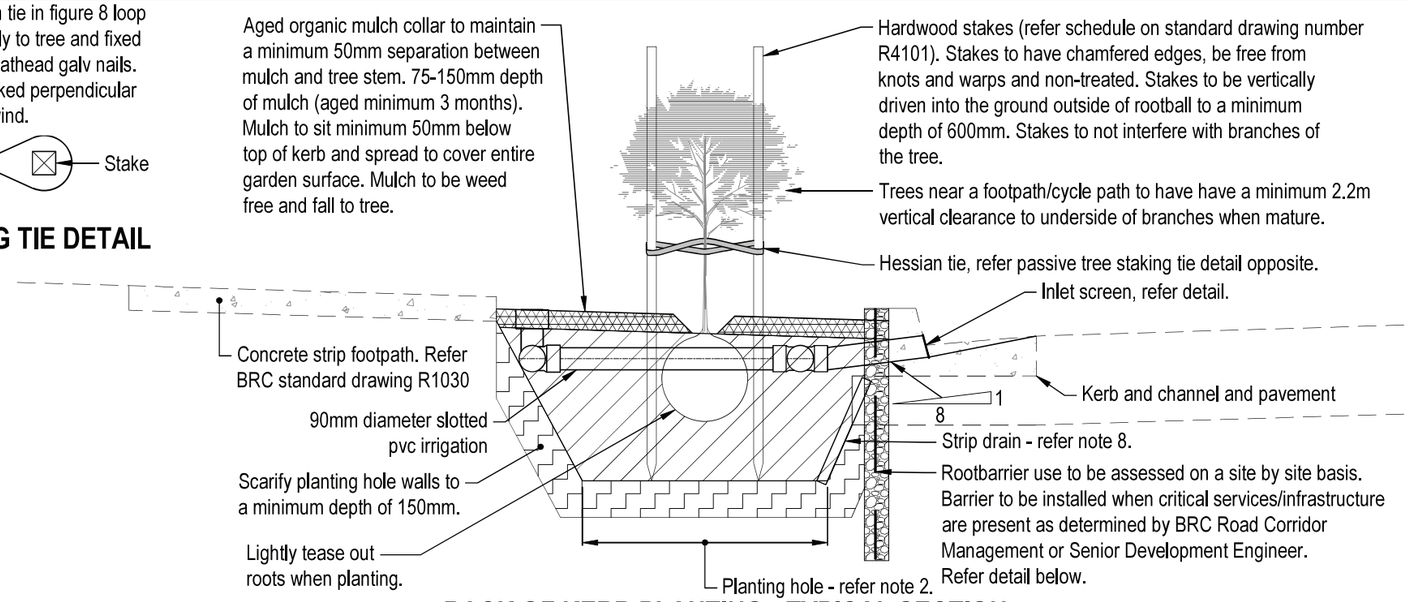
BRC(06/19)



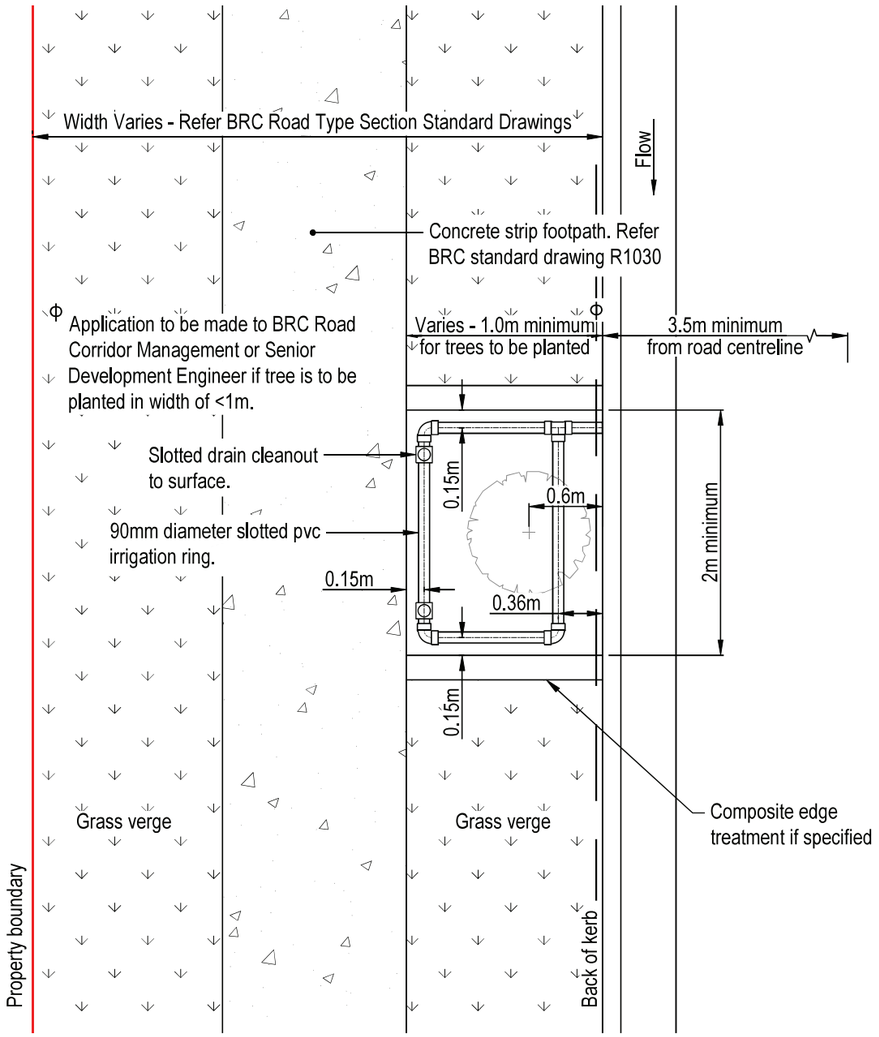
INLET SCREEN DETAIL



PASSIVE TREE STAKING TIE DETAIL



BACK OF KERB PLANTING - TYPICAL SECTION



BACK OF KERB PLANTING - TYPICAL LAYOUT
DUAL CARRIAGEWAY SPEED ≤60km/h & ADT ≤1500 VEHICLES/DAY

NOTES:

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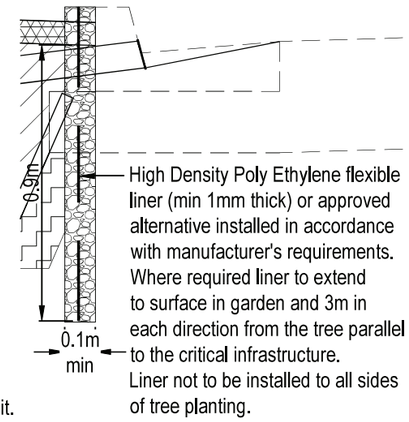

ROOT BARRIER DETAIL

DIAL BEFORE YOU DIG
PHONE 1100
www.1100.com.au
ARRANGE FOR LOCATIONS ON SITE BY THE APPROPRIATE AUTHORITIES BEFORE DIGGING. CALL 48 HOURS BEFORE YOU DIG.

Revisions		Verified	Date
A	Original Issue		

Engineering Certification
Design: AECOM Verified: ASJ
Drawn: JCR Checked: ASJ
Digitally signed by Adam Johnston Date: 2020.12.03 14:15:19 +10'00'

Approved
Branch Manager Engineering Services
Digitally signed by Dwayne Honor Date: 2020.12.18 08:05:19 +10'00'

BUNDABERG REGIONAL COUNCIL

STANDARD STREET TREE PLANTING DETAILS
BACK OF KERB PLANTING WITH PASSIVE IRRIGATION

Standard Drawing No.: R4501
Sheet Size: A3
Rev.:

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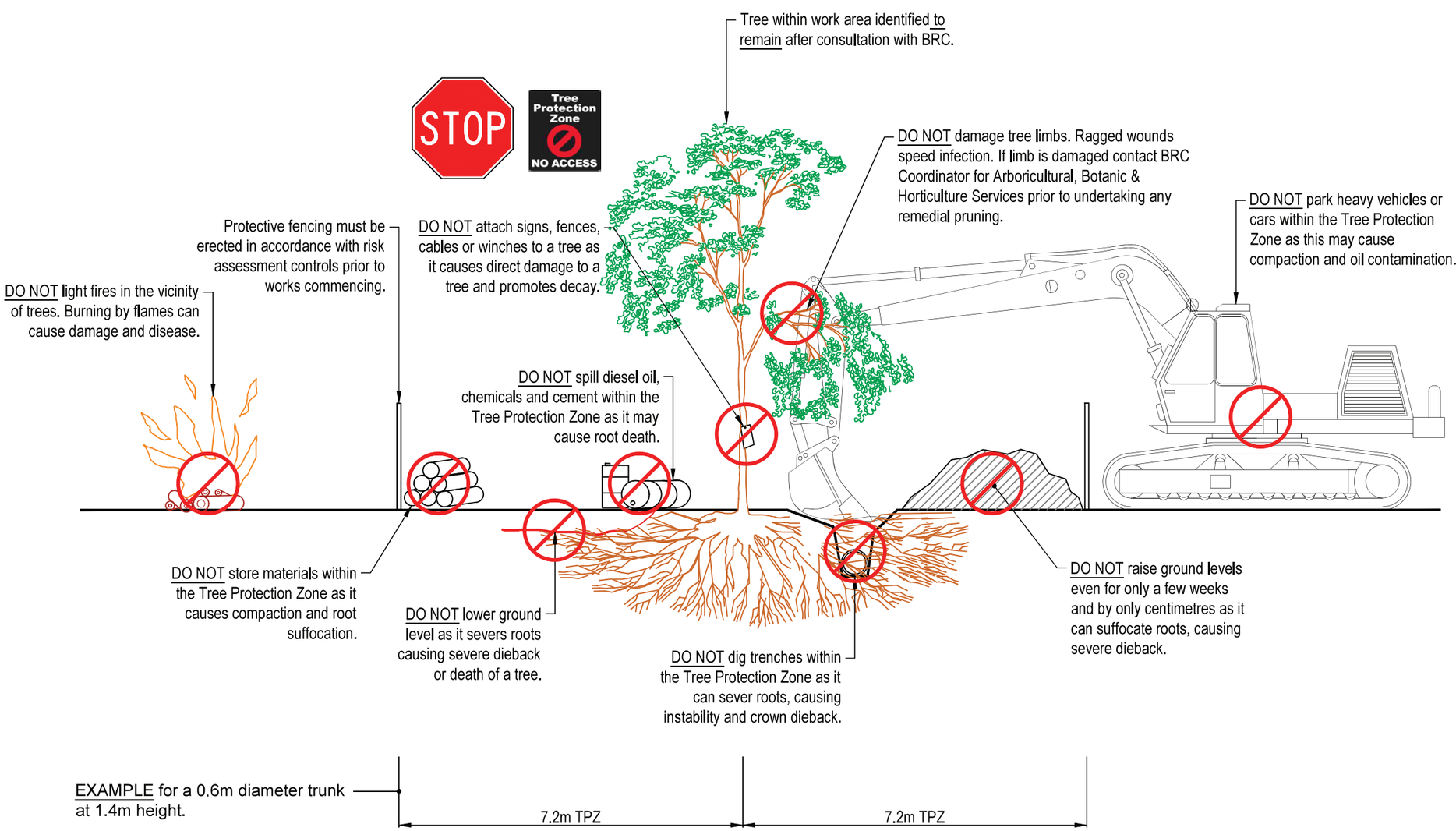
NOTES:

1. When working around trees identified to remain, protection is foremost. Best practice standards and AS4970-2009 (Protection of Trees on Development Sites) must be adhered to at all times.
2. All work around identified trees must comply with approved plans and adhere to recommendations of the Bundaberg Regional Council approved arborist, BRC Superintendent (internal works) or Senior Development Engineer (operational works - external works) .
3. The Tree Protection Zone (TPZ) is calculated by multiplying the trunk diameter at a height of 1.4m by 12. For example a tree with a trunk diameter of 0.6m the TPZ has a radius of 7.2m.



EXISTING TREE TO REMAIN PROTECTION REQUIREMENTS

Revisions		Verified	Date
A	Original Issue		

Engineering Certification
Design: CM Verified: ASJ
Drawn: JCR Checked: ASJ
Digitally signed by Adam Johnston Date: 2021.01.27 09:34:08 +10'00'

Approved
Branch Manager
Engineering Services
Digitally signed by Dwayne Honor Date: 2021.01.27 10:34:14 +10'00'

BUNDABERG REGIONAL COUNCIL

EXISTING TREE PROTECTION DETAILS
TREE PROTECTION REQUIREMENTS

Standard Drawing No.: R4601
Sheet Size: A3
Rev.: