



WORKS AND SERVICES
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**Specification for the Construction of
Standard Type Residential Concrete
or Bitumen Vehicle Crossings**

Residents intending to construct or arrange the construction of a vehicle crossing privately are advised that Council's contribution towards the cost will only be made if all the requirements of this specification are satisfied.

Any claim for Council's contribution must be supported by receipts or invoices for the work and/or materials supplied. A written quote from a contractor is not acceptable for this purpose.

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CITY OF MANDURAH

Specification for the Construction of Standard Type Residential Concrete or Bitumen Paved Vehicle Crossings

This Specification is made pursuant to the provisions of Schedule 9.1.7 of the *Local Government Act 1995*, which requires that vehicle crossings be constructed to Council specifications.

The construction of concrete crossings shall be executed under the supervision of the Director of Works and Services or his authorised representative, (hereafter referred to as City Engineer), in accordance with this specification and attached Drawing No's STDA01, STDD03, STDD04, STDD05, STDD06, STDD07, STDD08 and STDD10.

It is preferable that the internal driveway be constructed prior to the crossing to avoid damage to the crossing.

DEFINITION - STANDARD RESIDENTIAL CROSSOVERS

- a) Under Section 12/2 of Council's Policy Manual a "Standard Crossing" place shall provide a minimum 2.8m wide pavement splayed at the road edge or kerb with a 1.0m x 3.0m wing on each side, that is constructed in accordance with this document.

Council contribution towards the construction of a crossover will only be made if the width of the crossover pavement is no less than 2.8m.

Although the crossover may be wider than 2.8m, Council reimbursement will only be paid up to a maximum width of 3m.

- b) It should be noted that these specifications only apply to roads controlled by Council; roads controlled by Main Roads Western Australia (Fremantle Road, Mandurah Bypass, Old Coast Road, part of Pinjarra Road) must have vehicle crossing places built to their specifications.

STRATA TITLED PROPERTIES

Council subsidy is only available to strata titled properties that have a road frontage to a constructed road and individual vehicle crossings. Council subsidy is not available to strata title developments that share a common driveway.

1. **Principal Requirements for Concrete or Bitumen Crossovers**

1.1	Concrete:	Minimum Thickness	100mm
		UCS Strength	25 MPa @ 28 days
		Subgrade Compaction	95% MMDD
1.2	Bitumen:	Wearing Course	25mm-AC10 Asphalt (red or black)
		Base-Gravel	75mm @ 98%MMDD
		Subbase-Limestone	100mm @ 95%MMDD
		Subgrade Compaction	95% MMDD
1.3	Reconstituted Limestone Concrete	Minimum Thickness	150mm
		UCS Strength	>15 MPa @ 28 days
		Subgrade Compaction	95% MMDD
1.4	Minimum Width at Property Line	2.8 metres	
1.5	Maximum Width (Excluding Wings)	6 metres	Single Residential
		7.5 metres	Duplex
		10 metres	Multiple Residential and Commercial
1.6	Wing Dimension	Splayed on each side at the kerb with a one metre x three metre splay at 70° to the kerb.	
1.7	Length	From the edge of the road to the property line. Determined by the width of the road reserve.	
1.8	Expansion Joints	To be provided wherever existing concrete joins new concrete, at kerb line, at property boundary, and at a maximum interval of 10 metres.	
1.9	Existing Reticulation Systems	Removal and reinstatement of any reticulation system in the area of the proposed crossover must be carried out by the ratepayer.	
1.10	Future Path Construction	Where the construction of a new footpath/dual use path is undertaken, Council policy requires the removal of any material other than plain grey concrete from driveways/crossovers and reinstatement with plain grey concrete to ensure uniformity of the path system. The section to be removed is to be the width of the path. The cost of reinstatement will be borne by the City.	

2. Location

A concrete or bitumen crossing shall:-

- a) Be located to not cause interference to public utility facilities in the verge and to avoid trees.
- b) **Not be positioned within a corner truncation** or closer than 7m from the property line intersection point at corner sites/where no truncation exists on corner lots.
- c) Be constructed at 90 degrees to the kerb line.
- d) Be positioned a minimum of 1m from the side boundary or truncation peg.

3. Levels and Shape

If the internal driveway has not been constructed, the level of the driveway at the property boundary shall be obtained from the City Engineer giving 48 hours notice. Refer to the attached standards regarding carport and verge levels for various locations (STDD04, STDD05 & STDD06)

Crossovers are not to be higher or lower than the surrounding natural ground level in such a manner that would cause difficulty for pedestrian access. This precludes the use of raised kerbing or raised edging along the edges of crossovers within the first 2 metres from the back of the kerb.

3.1 Unkerbed Roads in Rural/Special Rural Areas, (eg Goegrup, Pleasant Grove, Wannanup etc.)

All crossovers which go over a swale drain or drainage ditch require a pipe culvert to be installed. The City will supply and deliver at no charge two (2) culvert pipes. The owner of the property may obtain additional pipes at their own cost if required. Request forms for the delivery/collection of culvert pipes are available from the City of Mandurah's Administration Office, 3 Peel Street, Mandurah.

Two 225mm diameter concrete pipes, 2.44 metres long, will be delivered within three (3) working days of being ordered, to the required address.

Please note, the property owner must ensure the pipe culvert is maintained and kept clear of grass and debris at all times.

4. Public Utility Services and Trees

Every endeavour should be made to avoid public utility services and trees present in the verge when locating the vehicle crossing.

Approval must be obtained prior to any relocation of, or alternations to, the existing utility services or facilities and/or the removal of trees to make way for the crossing. All work and costs shall be at the ratepayer's expense. City of Mandurah drainage manholes will be adjusted by Council at the ratepayer's expense if the existing level is in conflict with the proposed crossover.

The removal of any trees will need written authorisation from the City's Horticultural Technical Officer.

5. **Path Removal**

Where an existing footpath is in the location of a proposed vehicle crossover:-

- a) If the footpath is precast concrete slabs:
the contractor shall remove the slabs that conflict with the new crossover location. Once the crossover has been completed any gaps between the crossover and the slab path shall be rectified by cutting slabs to the correct shape and replacing so that the path carries through the crossover and ensures smooth uniformity of path material and enhance safety of the path user. Any leftover slabs shall be removed from site by the contractor at their expense.
- b) If the footpath is in-situ concrete and is less than 100mm thick:
the contractor shall cut the concrete footpath using an approved concrete saw parallel to the proposed alignment of the crossover. This section of footpath shall be replaced by grey concrete to the specified thickness. A gap of 12mm shall be left between the footpath and the crossover for the provision of an expansion joint (canite strip) to be placed on both sides of the crossover. If a loose fillet of footpath, (less than 0.1m²), is left by this process it should be replaced by incorporation into the crossover. All replaced sections of footpath and rubble shall be removed from site by the contractor at their expense.
- c) If the footpath is in-situ concrete and has a thickness of 100mm or more:
construct the vehicle crossing either side of the footpath. (ie. paving to butt up to the in-situ concrete).

NOTE: Confirmation of the thickness should be obtained from the City Engineer.

6. **Removal of Kerbing**

Where barrier or semi-mountable kerbing is in place at the crossing entrance, the length of kerbing equal to the appropriate entrance width of the crossing and transitions shall be removed in all cases.

Where mountable kerbing is in place at the crossing entrance, the crossing is installed to abut the kerbing. The length of mountable kerbing equal to the appropriate entrance width of the crossing shall be removed where the mountable kerbing is damaged or displaced.

In no circumstances shall asphalt or any other filling material be placed in front of the existing kerbing to provide smoother transition between the road pavement and the crossover. If the owner requires a smoother transition between the road and the crossover, the existing mountable kerbing may be replaced by "Layback Kerbing", refer drawing STDA01.

Where kerbing is to be removed, it shall be cut clean and removed carefully so as not to disturb the surface of the roadway.

7. **Crossing Entrance**

Where kerbing has been removed to permit the construction of a crossover refer to Drawing No's STDA01 and STDD08 for replacement kerb types and details.

Ensure a lip of 25-30mm shall be created between the road surface and the top of the front edge of the crossing entrance to allow for the future resurfacing of the road.

Any damage caused to the edge of the road surface shall **not** be corrected with concrete. The City Engineer shall be advised of the damage on completion of the crossing and arrangements will be made for its repair.

8. **Wide Crossings**

Where two residential crossings abut one to the other, they may be combined, subject to the combined width not exceeding 10m.

Where the combined width would exceed 10m, the two crossings shall be separated by a pedestrian refuge of 1m minimum width.

9. **Construction - Concrete and Reconstituted Limestone Crossovers**

a) **Concrete**

Premix concrete shall comply with the requirements of Australian Standard AS1379 - 1997. All concrete used in the works shall develop a minimum compressive strength of 25 MPa at 28 days and shall be composed of a mixture of screenings, sand and cement to give the strength specified with a maximum slump of 90mm.

All concrete shall have an approved high early strength additive to give rapid hardening.

Documentation on concrete used for vehicle crossing construction shall be made available to the City Engineer when requested.

b) **Reconstituted Limestone**

Premix reconstituted limestone shall comply with the following requirements:

- Sand and limestone aggregate shall comprise of clean sound particles screened to the manufacturers grading specification.
- Cement shall meet the requirements of AS3972, (Type A – Cockburn Crème Cement).
- Only additives approved by product manufacture shall be used.
- Minimum compressive strength of 15 MPa at 28 days.

Documentation of the reconstituted limestone used for the vehicle crossing shall be made available to the City Engineer when requested.

c) Excavation

- (i) The excavation for the crossing bed shall be taken out to the levels, lines and grades as per the standard design shown on Drawing No. STDD08. Excavation shall be cleanly and efficiently executed, watered and compacted to give a minimum of 95% of Maximum Modified Dry Density (MMDD) as determined by AS1289.5.2.1-2003 to provide for a sound base free from depressions or any deleterious materials.
- (ii) All surplus material resulting from site preparation and construction of the vehicle crossing shall become the property of the contractor and shall be removed at the contractor's expense.

d) Placing Concrete

The base shall be thoroughly and evenly moistened, but not saturated, prior to placing concrete.

Concrete shall be evenly placed to a depth specified and shovelled into position continuously and spaded especially at all edges to give maximum density. No break in operation shall be permitted from time of placing to finishing except as authorised by the City Engineer.

e) Finishing

The finish shall be obtained by screeding to correct levels and broom finishing to provide a non-slip, dense surface free of any depressions, marks, jointing marks, honeycomb sections or accumulation of fine dusty accretions liable to cause excessive surface wear. The final surface finish shall be to the satisfaction of the City Engineer who shall reserve the right to require the removal of or the correction of any surface deficiencies or finish.

Where required and/or where directed, any portion of the surface may be required to be treated with a multi-grooved grooving tool with grooving to be at 200mm centres worked parallel to the kerb line to minimise the slipping effect.

A STEEL TROWEL FINISH IS NOT PERMITTED ON A VEHICLE CROSSING.

f) Surface Patterns

The final surface shall be broom finished and non-slip. It should provide a safe route for pedestrians. All expansion joints must comply with the concrete vehicle crossing specifications.

g) Jointing

Joints shall be formed by cutting across the concrete for its full depth with the edge of a steel trowel. The surface of the concrete over these cuts is then grooved with a special grooving tool at positions indicated on Drawing No STDD08.

Contraction Joints

Joints shall be made in the form of dummy construction joints, a minimum of 10mm deep with an approved jointing tool as follows:-

- i) Along the crossing property line junction.
- ii) Along the edges of existing or future footpath construction.
- iii) Across the crossing from the wing junction points on opposite sides parallel to the kerb, and additional joints parallel and not greater than 1.8 metres apart.
- iv) Along the centre of the crossing at 90° to the kerb line and at not greater than 1.8 metres apart. Also from the wing junction points at 90° to the kerb line.

An approved edging tool is to be used on all edges. Picture framing is not necessary.

Expansion Joints

The expansion joint filler shall be 12mm wide, continuous from form to form and the full depth of the crossing shall be of an approved bitumen-impregnated fibreboard or equivalent or other material approved by the City Engineer. The expansion joint material shall not protrude above the surface of the crossing. It shall be such that when it is subjected to compression in hot weather, no bitumen is extruded.

Construction joints around manholes, junction boxes and any other similar obstructions shall be treated as expansion joints.

10. Construction - Bitumen Crossovers

(a) Excavation/Subgrade

The excavation for the crossing bed shall be taken out to the levels, lines and grades as per the standard design shown on Drawing No. STDD08. Excavation shall be cleanly and efficiently executed, watered and vibrator rolled to give a compaction of 95% of Maximum Modified Dry Density (MMDD) to provide for a sound base free from depressions or any deleterious materials.

(b) Limestone/Subbase

Minimum of 100mm of compacted limestone watered and vibrator rolled to give a compaction of 95% of MMDD.

(c) Gravel/Base

Minimum 75mm of compacted gravel watered and vibrator rolled to give a compaction of 98% of MMDD.

(d) Asphalt/Wearing Course

25mm-AC10 (red or black) as per Australian Asphalt and Pavement Association specifications. Compaction of subgrade and base course materials is determined by modified compaction test under AS1289.5.2.1-2003.

11. **Material Quality**

All materials used in the construction of vehicle crossings shall be in accordance with the standard specification of Council and any material used which is inferior to those specified or as directed by the City Engineer shall be liable to rejection and replacement without payment or compensation being made to the contractor for the supply, delivery, laying, placing, finishing, removal or disposal of anything so rejected as directed by the City Engineer.

12. **Protection of Works**

Protection of works and the public shall be provided by the contractor who shall supply and keep supplied as directed all necessary signs, barricades, road warning lamps, temporary bridges or any other thing necessary or as may be directed by the City Engineer and failure to provide or keep provided shall render the contractor liable under Schedule 9.1.8 of the *Local Government Act 1995*.

Any damage which may occur to any Council facilities or private property during the course of the works or which may subsequently become evident from the operations thereof shall be the sole responsibility of the contractor who shall be held responsible for the repair, replacement, legal claim liability or any other thing which may arise from the carrying out of any such works.

13. **Canite Material**

Approved canite-type material shall be such that when it is subject to compression in hot weather, no bitumen is extruded. The following materials are approved and the use of any other material requires the approval of the City Engineer:-

NON PORITE Bitumen impregnated canite by the cold solvent process.

FOSROC EXPANDITE

MELJOINT

14. **Contribution**

If it is a first vehicle crossing constructed to the premises, Council may contribute towards the cost. Application for a subsidy payment must be made on the prescribed form within 6 months of the date it was constructed and is to be accompanied by proof of payment, (invoice or delivery docket).

Council will pay a subsidy of \$21.00 per square metre toward the cost of one Standard Residential crossover and \$42.50 per lineal metre toward the cost of one Standard Industrial crossover per property upon application, provided such application meets the above specifications.

Application forms are available from the City of Mandurah, Administration Office, 3 Peel Street, Mandurah.

15. **Second Crossover**

Upon application, Council may approve a second crossover to any property, subject to the compliance of the above specification, however no subsidy is applicable.

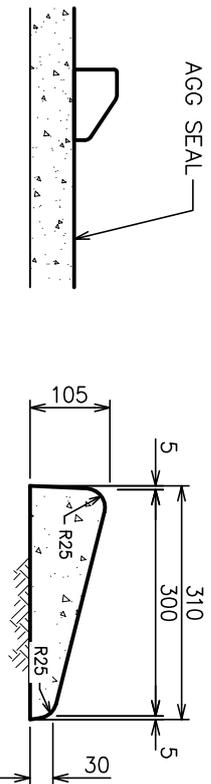
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CARPORT LEVELS AND DRIVEWAY GRADIENTS

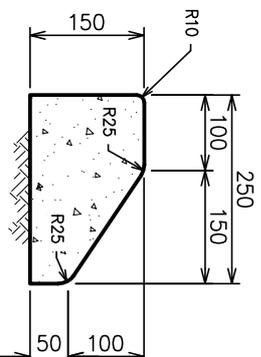
Due to difficulties experienced with the setting of driveway gradients, a comprehensive guide to these gradients has been laid out.

The relevant points are:-

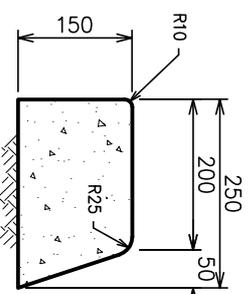
1. The changes of grade on the attached plan(s) are NOT to be exceeded as these are the maximum permissible in design calculations.
2. Carport levels are set according to the table, in the absence of a carport, the finished floor level of the residence is set. If this does not appear satisfactory to the owner, then they should be consulted.
3. Under NO circumstances should the verge be excavated. This is because of the location of services along the boundary line, specifically Telstra, which is generally only buried 300mm below the surface.
4. An appeal against the above condition may be lodged with the Works and Services Department, **PRIOR** to installation of the crossover.
5. If the verge is not constructed at a 2% grade to the boundary, contact the Works and Services Department for the plan that shows the grades available for such a situation. This must be done in conjunction with a site meeting to ascertain the exact location of services, damage caused during construction etc. This situation is rare and must be dealt with carefully.



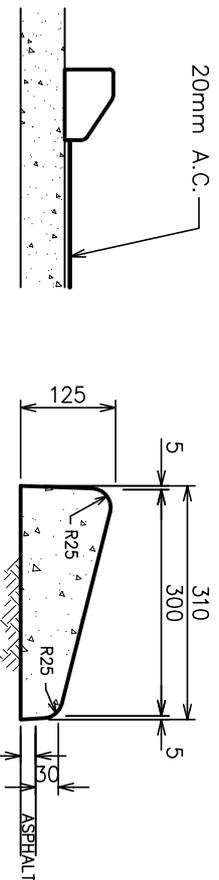
**MOUNTABLE KERB
TYPE 1**



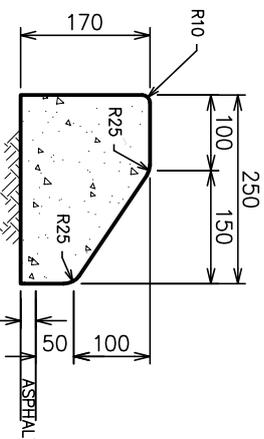
**SEMI-MOUNTABLE KERB
TYPE 1**



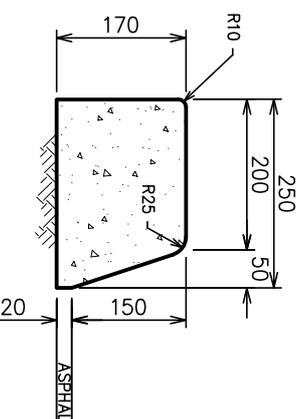
**BARRIER KERB
TYPE 1**



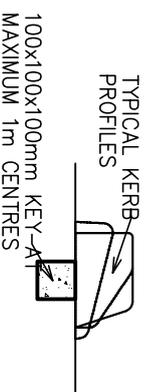
**MOUNTABLE KERB
TYPE 2**



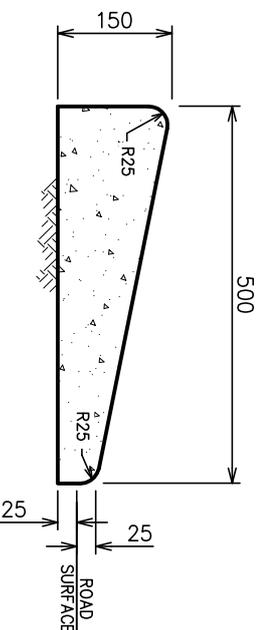
**SEMI-MOUNTABLE KERB
TYPE 2**



**BARRIER KERB
TYPE 2**



TYPICAL KERB
PROFILES
100x100x100mm KEY-A
MAXIMUM 1m CENTRES



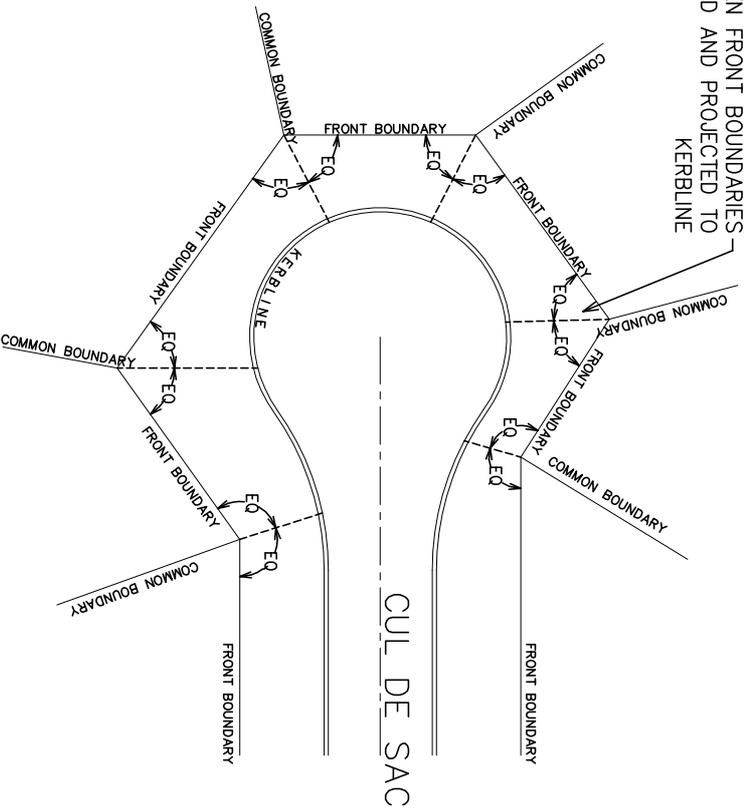
'LAYBACK' KERB (FOR CROSSOVERS)

- NOTES:**
1. CONCRETE FOR KERBING SHALL CONFORM TO AS 1379-1991
 2. MINIMUM COMPRESSIVE STRENGTH 32 MPa AT 28 DAYS.
 3. MAXIMUM AGGREGATE SIZE 10mm.
 4. MAXIMUM SLUMP 50mm.
 5. KEYED KERBING SHALL BE PROVIDED WHERE RADIUS OF CURVATURE IS LESS THAN 40m. KEYS SHALL BE PROVIDED AT MAXIMUM 1m CTRS ON KERB CENTRELINE.
 6. EXPANSION JOINTS SHALL BE PROVIDED AT 5m CENTRES AND SHALL CONSIST OF A FOAM FILLED, MASTIC SEALED GAP 12mm WIDE CUT TO THE FULL DEPTH OF THE KERB.
 7. CONTRACTION JOINTS SHALL BE PROVIDED AT 1.60m CENTRES, CONSISTING OF A GROOVE TROWELLED INTO THE CONCRETE SURFACE.
 8. CONTRACTION JOINTS FOR MOUNTABLE KERBS TYPE 1 SHALL BE PROVIDED AT 1.25m CTRS.
 9. KERB TYPES ARE AS INDICATED ON THE DRAWINGS.
 10. ALL DIMENSIONS ARE IN MILLIMETERS.
 11. RIGHT HAND SIDE INDICATES FACE OF KERB

TYPICAL KERB KEYING

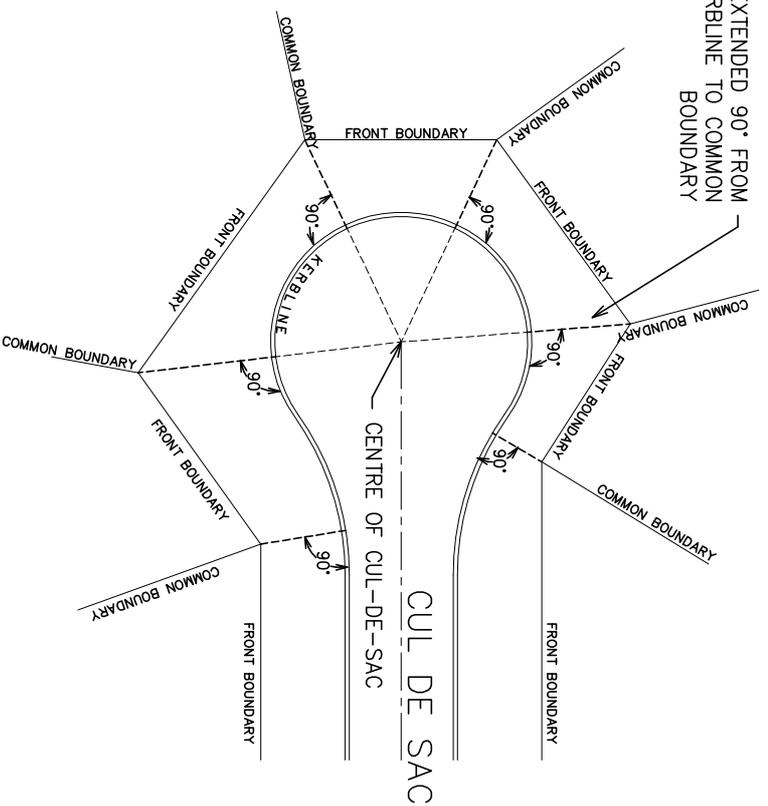
REV No.	DATE	DESCRIPTION	BY	CHK'D	APPR	DATE	Designed	Approved	TITLE:
							Drawn	Position	
							Draft Check	Date	
							Eng. Check		
A	04/08	UPDATED FROM A01	BA						FILE:U:\STANDARD DRAWINGS\COM STANDARD DRAWINGS\A ROADWORKS\STD RD01.DWG SCALE: NTS DWG No: A4 STD RD01/A

ANGLES BETWEEN FRONT BOUNDARIES
BISECTED AND PROJECTED TO
KERBLINE



METHOD 1 -- BISECTING ANGLE

LINE EXTENDED 90° FROM
KERBLINE TO COMMON
BOUNDARY

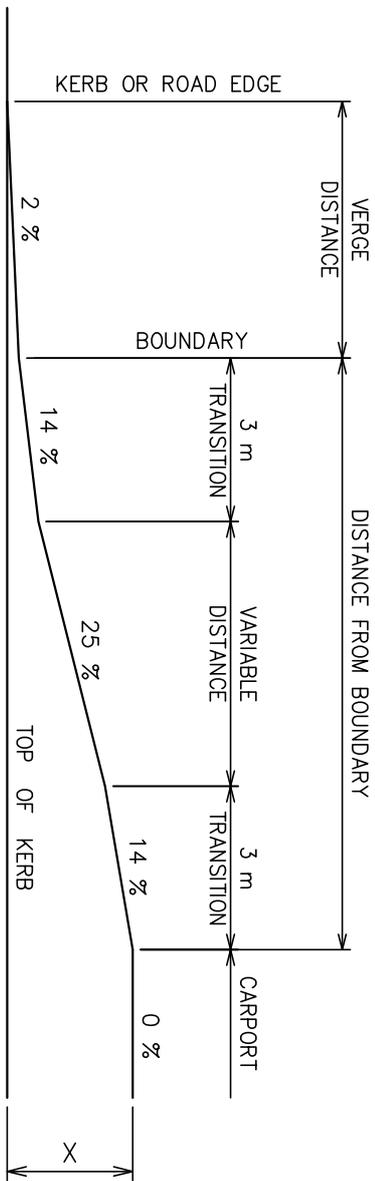


**METHOD 2 -- PERPENDICULAR
FROM KERBLINE (90°)**

- NOTES:**
1. METHOD 1 TO BE USED IN CONSULTATION WITH THE ADJOINING NEIGHBOURS.
 2. METHOD 2 TO BE USED WHERE METHOD 1 WILL NOT ACCOMMODATE CROSSOVERS AND IS TO BE USED ONLY IN CONSULTATION WITH THE ADJOINING NEIGHBOURS AND COUNCIL.

REV No.	DATE	DESCRIPTION	BY	CHK'D	APPR	DATE	Designed		Approved
							Drawn	BA	07/08
							Draft Check		Date
							Eng. Check		
A	04/08	UPDATED FROM D03	BA						
<p>TITLE:</p> <p>VERGE ALLOCATION AT CUL-DE-SAC HEADS</p> <p>FILE:u:\STANDARD DRAWINGS\COM STANDARD DRAWINGS\D - CROSSOVERS\STD CR03.DWG</p> <p>SCALE: N.T.S</p> <p>DWG No: A4 STD CR03/A</p>									





VERGE LENGTH

	3	4	5	6	7	8	9	10	11	12	13
3.2	.51	.53	.55	.57	.59	.61	.63	.65	.67	.69	.71
3.6	.56	.58	.60	.62	.64	.66	.68	.70	.72	.74	.76
4.0	.62	.64	.66	.68	.70	.72	.74	.76	.78	.80	.82
4.4	.68	.70	.72	.74	.76	.78	.80	.82	.84	.86	.88
4.8	.73	.75	.77	.79	.81	.83	.85	.87	.89	.91	.93
5.2	.79	.81	.83	.85	.87	.89	.91	.93	.95	.97	.99
5.6	.84	.86	.88	.90	.92	.94	.96	.98	1.00	1.02	1.04
6.0	.90	.92	.94	.96	.98	1.00	1.02	1.04	1.06	1.08	1.10
6.4	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.14	1.16	1.18	1.20
6.8	1.10	1.12	1.14	1.16	1.18	1.20	1.22	1.24	1.26	1.28	1.30
7.2	1.20	1.22	1.24	1.26	1.28	1.30	1.32	1.34	1.36	1.38	1.40
7.6	1.30	1.32	1.34	1.36	1.38	1.40	1.42	1.44	1.46	1.48	1.50
8.0	1.40	1.42	1.44	1.46	1.48	1.50	1.52	1.54	1.56	1.58	1.60
8.4	1.50	1.52	1.54	1.56	1.58	1.60	1.62	1.64	1.66	1.68	1.70
8.8	1.60	1.62	1.64	1.66	1.68	1.70	1.72	1.74	1.76	1.78	1.80
9.2	1.70	1.72	1.74	1.76	1.78	1.80	1.82	1.84	1.86	1.88	1.90
9.6	1.80	1.82	1.84	1.86	1.88	1.90	1.92	1.94	1.96	1.98	2.00
10.0	1.90	1.92	1.94	1.96	1.98	2.00	2.02	2.04	2.06	2.08	2.10
10.4	2.00	2.02	2.04	2.06	2.08	2.10	2.12	2.14	2.16	2.18	2.20
10.8	2.10	2.12	2.14	2.16	2.18	2.20	2.22	2.24	2.26	2.28	2.30
11.2	2.20	2.22	2.24	2.26	2.28	2.30	2.32	2.34	2.36	2.38	2.40
11.6	2.30	2.32	2.34	2.36	2.38	2.40	2.42	2.44	2.46	2.48	2.50
12.0	2.40	2.42	2.44	2.46	2.48	2.50	2.52	2.54	2.56	2.58	2.60
12.4	2.50	2.52	2.54	2.56	2.58	2.60	2.62	2.64	2.66	2.68	2.70
12.8	2.60	2.62	2.64	2.66	2.68	2.70	2.72	2.74	2.76	2.78	2.80
13.2	2.70	2.72	2.74	2.76	2.78	2.80	2.82	2.84	2.86	2.88	2.90
13.6	2.80	2.82	2.84	2.86	2.88	2.90	2.92	2.94	2.96	2.98	3.00

- NOTES:**
- FIGURES INSIDE THE CHART ARE THE MAXIMUM HEIGHT DIFFERENCE (X) BETWEEN THE TOP OF KERB AND CARPORT FLOOR LEVEL.
 - DIMENSIONS AND MEASUREMENTS IN METRES.

REV No.	DATE	DESCRIPTION	BY	CHK'D	APPR	DATE	Designed	BA	07/08	Approved
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							Draft Check			Date
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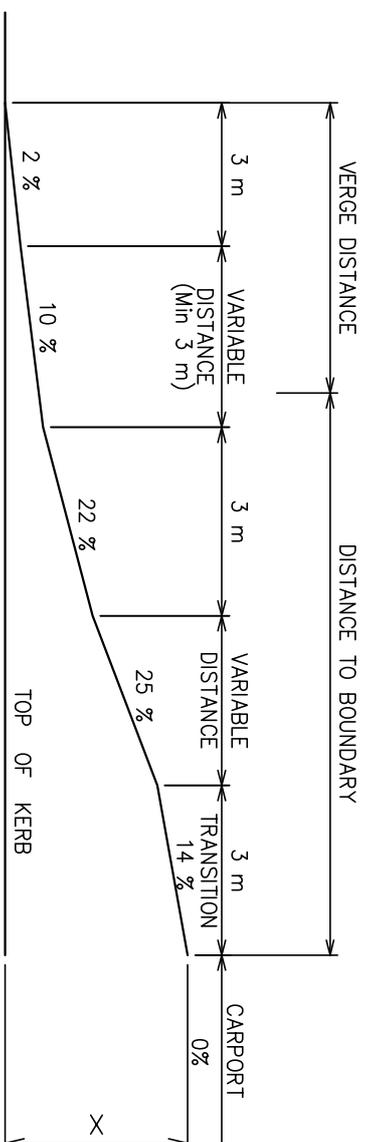


TITLE: MAXIMUM CARPORT LEVEL AND DRIVEWAY GRADES FOR VERGES AT 2% GRADIENT

FILE: J:\STANDARD DRAWINGS\COM STANDARD DRAWINGS\D - CROSSOVERS\STD CR04.DWG

SCALE: **N.T.S**

DWG No: **A4 STD CR04/A**



	VERGE LENGTH												
	3	4	5	6	7	8	9	10	11	12	13		
3.2	.52	.62	.72	.82	.92	1.02	1.12	1.22	1.32	1.42	1.52		
3.6	.61	.71	.81	.91	1.01	1.11	1.21	1.31	1.41	1.51	1.61		
4.0	.70	.80	1.00	1.10	1.20	1.30	1.40	1.50	1.60	1.70			
4.4	.79	.89	1.09	1.19	1.29	1.39	1.49	1.59	1.69	1.79			
4.8	.88	.98	1.08	1.18	1.28	1.38	1.48	1.58	1.68	1.78	1.88		
5.2	.96	1.06	1.16	1.26	1.36	1.46	1.56	1.66	1.76	1.86	1.96		
5.6	1.05	1.15	1.25	1.35	1.45	1.55	1.65	1.75	1.85	1.95	2.05		
6.0	1.14	1.24	1.34	1.44	1.54	1.64	1.74	1.84	1.94	2.04	2.14		
6.4	1.24	1.34	1.44	1.54	1.64	1.74	1.84	1.94	2.04	2.14	2.24		
6.8	1.34	1.44	1.54	1.64	1.74	1.84	1.94	2.04	2.14	2.24	2.34		
7.2	1.44	1.54	1.64	1.74	1.84	1.94	2.04	2.14	2.24	2.34	2.44		
7.6	1.54	1.64	1.74	1.84	1.94	2.04	2.14	2.24	2.34	2.44	2.54		
8.0	1.64	1.74	1.84	1.94	2.04	2.14	2.24	2.34	2.44	2.54	2.64		
8.4	1.74	1.84	1.94	2.04	2.14	2.24	2.34	2.44	2.54	2.64	2.74		
8.8	1.84	1.94	2.04	2.14	2.24	2.34	2.44	2.54	2.64	2.74	2.84		
9.2	1.94	2.04	2.14	2.24	2.34	2.44	2.54	2.64	2.74	2.84	2.94		
9.6	2.04	2.14	2.24	2.34	2.44	2.54	2.64	2.74	2.84	2.94	3.04		
10.0	2.14	2.24	2.34	2.44	2.54	2.64	2.74	2.84	2.94	3.04	3.14		
10.4	2.24	2.34	2.44	2.54	2.64	2.74	2.84	2.94	3.04	3.14	3.24		
10.8	2.34	2.44	2.54	2.64	2.74	2.84	2.94	3.04	3.14	3.24	3.34		
11.2	2.44	2.54	2.64	2.74	2.84	2.94	3.04	3.14	3.24	3.34	3.44		
11.6	2.54	2.64	2.74	2.84	2.94	3.04	3.14	3.24	3.34	3.44	3.54		
12.0	2.64	2.74	2.84	2.94	3.04	3.14	3.24	3.34	3.44	3.54	3.64		
12.4	2.74	2.84	2.94	3.04	3.14	3.24	3.34	3.44	3.54	3.64	3.74		
12.8	2.84	2.94	3.04	3.14	3.24	3.34	3.44	3.54	3.64	3.74	3.84		
13.2	2.94	3.04	3.14	3.24	3.34	3.44	3.54	3.64	3.74	3.84	3.94		
13.6	3.04	3.14	3.24	3.34	3.44	3.54	3.64	3.74	3.84	3.94	4.04		

- NOTES:**
- FIGURES INSIDE THE CHART ARE THE MAXIMUM HEIGHT DIFFERENCE (X) BETWEEN THE TOP OF KERB AND CARPORT FLOOR LEVEL
 - DIMENSIONS AND MEASUREMENTS ARE IN METRES.

REV No.	DATE	DESCRIPTION	BY	CHK'D	APPR	DATE	Designed	BA	07/08	Approved	
							Drawn			Position	
							Draft Check			Date	
							Eng. Check				
A	04/08	UPDATED FROM D05	BA								

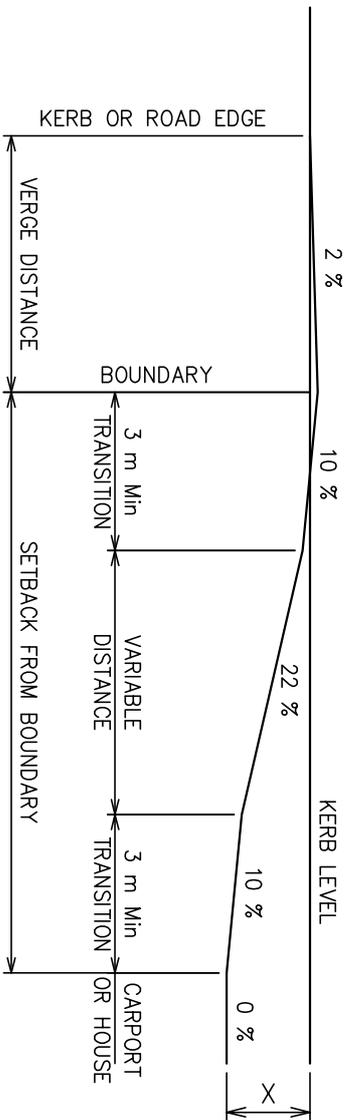
CITY OF MANDURAH

TITLE
MAXIMUM CARPORT LEVEL AND DRIVEWAY GRADES FOR VERGES EXCEEDING 2% GRADIENT

FILE J:\STANDARD DRAWINGS\COM STANDARD DRAWINGS\D - CROSSOVERS\STD CRO5.DWG

SCALE: AS SHOWN

DWG No: A4 STD CRO5/A



	3	4	5	6	7	8	9	10	11	12	13
3.2	.26	.24	.22	.20	.18	.16	.14	.12	.10	.08	.06
3.6	.30	.28	.26	.24	.22	.20	.18	.16	.14	.12	.10
4.0	.34	.32	.30	.28	.26	.24	.22	.20	.18	.16	.14
4.4	.38	.36	.34	.32	.30	.28	.26	.24	.22	.20	.18
4.8	.42	.40	.38	.36	.34	.32	.30	.28	.26	.24	.22
5.2	.46	.44	.42	.40	.38	.36	.34	.32	.30	.28	.26
5.6	.50	.48	.46	.44	.42	.40	.38	.36	.34	.32	.30
6.0	.54	.52	.50	.48	.46	.44	.42	.40	.38	.36	.34
6.4	.63	.61	.59	.57	.55	.53	.51	.49	.47	.45	.43
6.8	.72	.70	.68	.66	.64	.62	.60	.58	.56	.54	.52
7.2	.80	.78	.76	.74	.72	.70	.68	.66	.64	.62	.60
7.6	.89	.87	.85	.83	.81	.79	.77	.75	.73	.71	.69
8.0	.98	.96	.94	.92	.90	.88	.86	.84	.82	.80	.78
8.4	1.07	1.05	1.03	1.01	.99	.97	.95	.93	.91	.89	.87
8.8	1.16	1.14	1.12	1.10	1.08	1.06	1.04	1.02	1.00	.98	.96
9.2	1.24	1.22	1.20	1.18	1.16	1.14	1.12	1.10	1.08	1.06	1.04
9.6	1.33	1.31	1.29	1.27	1.25	1.23	1.21	1.19	1.17	1.15	1.13
10.0	1.42	1.40	1.38	1.36	1.34	1.32	1.30	1.28	1.26	1.24	1.22
10.4	1.51	1.49	1.47	1.45	1.43	1.41	1.39	1.37	1.35	1.33	1.31
10.8	1.60	1.58	1.56	1.54	1.52	1.50	1.48	1.46	1.44	1.42	1.40
11.2	1.68	1.66	1.64	1.62	1.60	1.58	1.56	1.54	1.52	1.50	1.48
11.6	1.77	1.75	1.73	1.71	1.69	1.67	1.65	1.63	1.61	1.59	1.57
12.0	1.86	1.84	1.82	1.80	1.78	1.76	1.74	1.72	1.70	1.68	1.66
12.4	1.95	1.93	1.91	1.89	1.87	1.85	1.83	1.81	1.79	1.77	1.75
12.8	2.04	2.02	2.00	1.98	1.96	1.94	1.92	1.90	1.88	1.86	1.84
13.2	2.12	2.10	2.08	2.06	2.04	2.02	2.00	1.98	1.96	1.94	1.92
13.6	2.21	2.19	2.17	2.15	2.13	2.11	2.09	2.07	2.05	2.03	2.01

- NOTES:**
- FIGURES INSIDE THE CHART ARE THE MAXIMUM HEIGHT DIFFERENCE (X) BETWEEN THE TOP OF KERB AND CARPORT FLOOR LEVEL
 - DIMENSIONS AND MEASUREMENTS ARE IN METRES.

REV No.	DATE	DESCRIPTION	BY	CHK'D	APPR DATE
A	04/08	UPDATED FROM D06	BA		

Designed
Drawn
Draft Check
Eng. Check

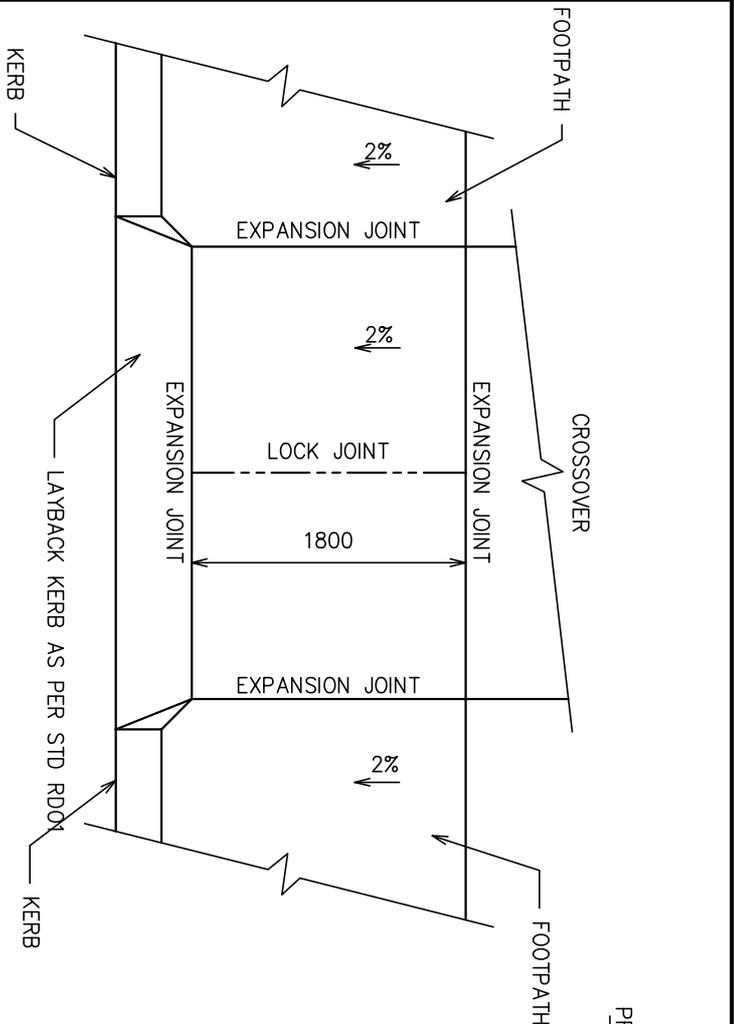
Approved
Position
Date

TITLE: MINIMUM CARPORT LEVEL AND DRIVEWAY GRADES FOR VERGES AT 2% GRADIENT

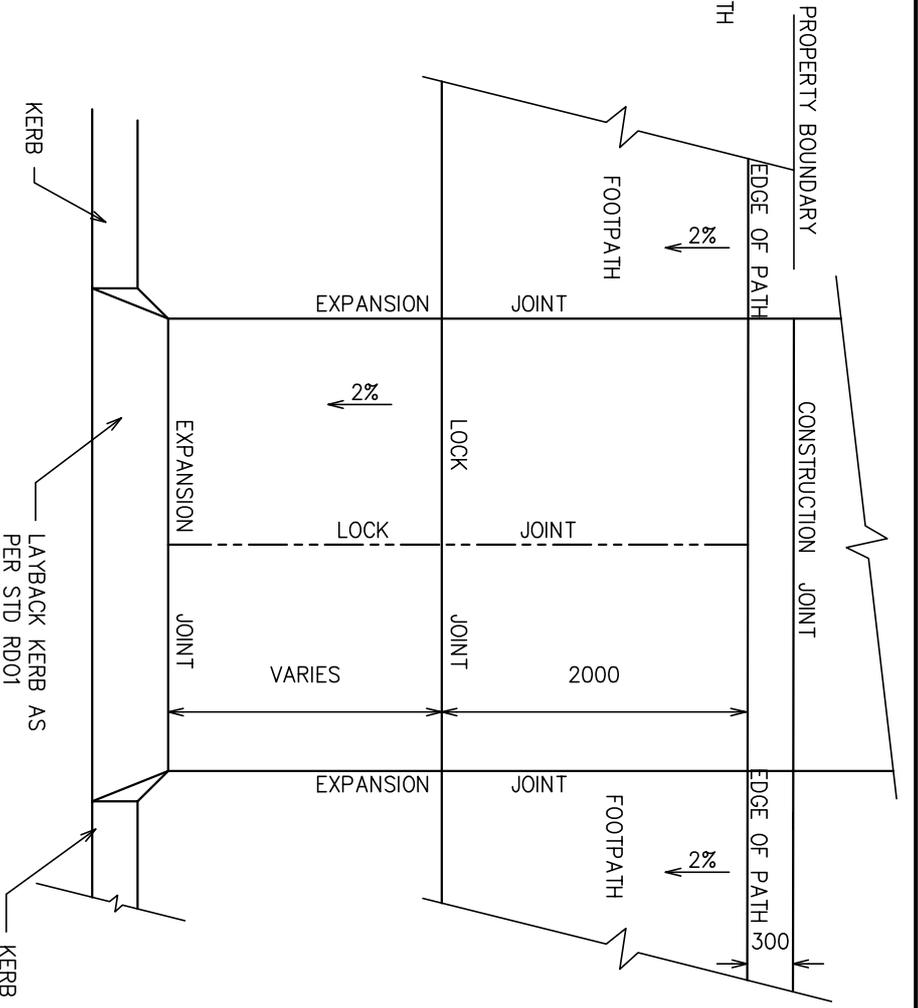
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SCALE: **A4**

DWG No: **STD CR06/A**

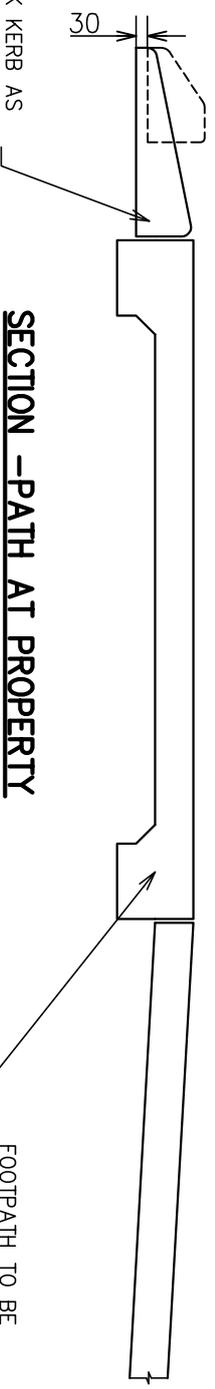


PLAN - PATH ON BACK OF KERB



PLAN - PATH AT PROPERTY BOUNDARY

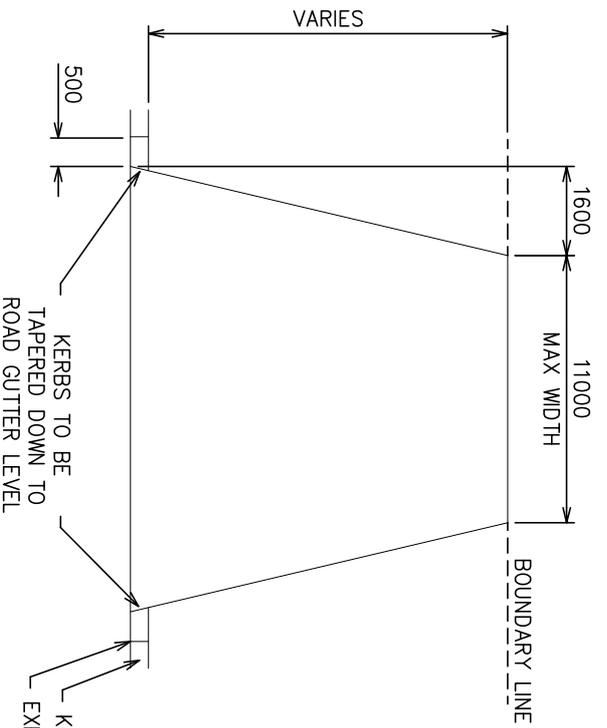
- NOTES:**
1. AS A MINIMUM LEVELS ARE TO BE THE SAME AT TOP OF KERB AND 2.0m BEHIND BACK OF KERB.
 2. PATHS TO BE CONSTRUCTED IN ACCORDANCE WITH STD FP010.
 3. KERBING TO BE CONSTRUCTED IN ACCORDANCE WITH STD RD01.
 4. DIMENSIONS ARE IN MILLIMETRES.



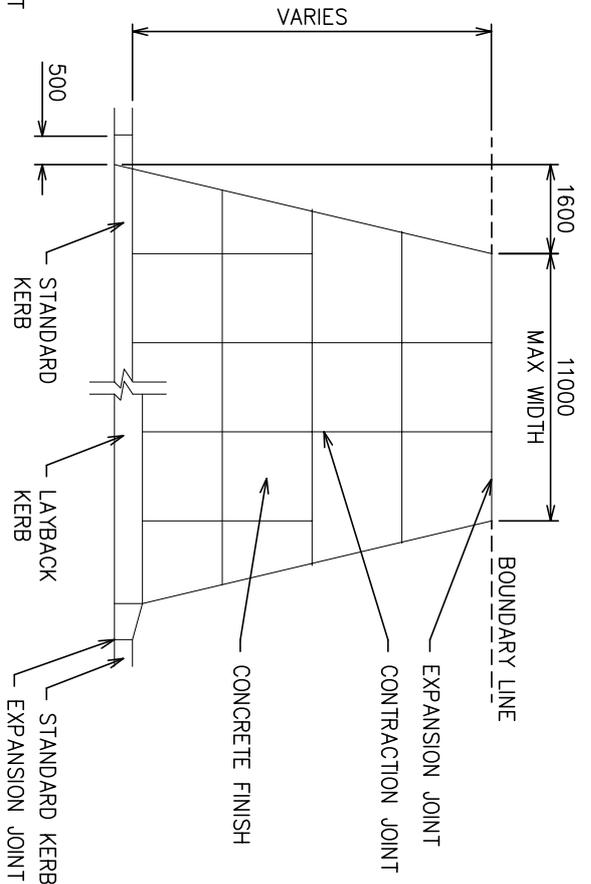
SECTION - PATH AT PROPERTY BOUNDARY

REV No.	DATE	DESCRIPTION	BY	CHK'D	APPR. DATE
A	06/08	UPDATED FROM D06	BA		

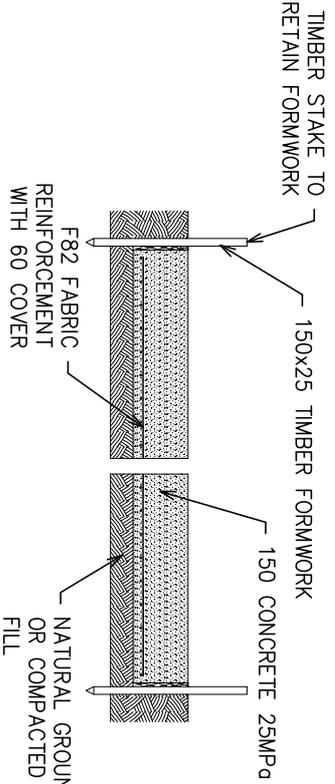
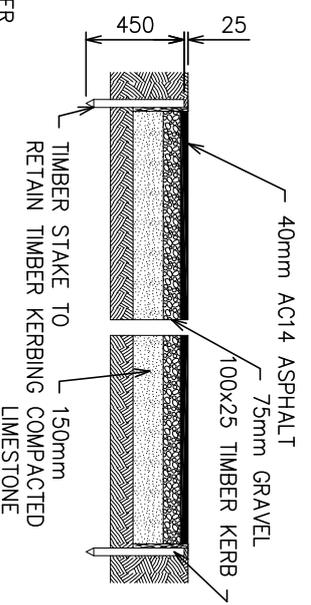
DESIGNED		APPROVED			TITLE: CROSSOVERS AT SHARED PATHS
Drawn	BA	Position	Date		
Draft Check	07/08				
Eng. Check				FILE Ju:\STANDARD DRAWINGS\COM STANDARD DRAWINGS\STD CRO7.DWG	SCALE: AS SHOWN
				DWG No: A4 STD CRO7/A	



INDUSTRIAL BITUMEN CROSSOVER PLAN



COMMERCIAL OR LIGHT INDUSTRIAL CONCRETE CROSSOVER PLAN

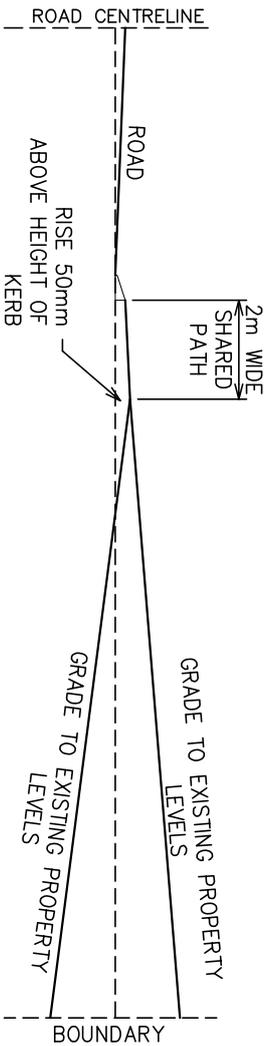


INDUSTRIAL BITUMEN CROSSOVER SECTION

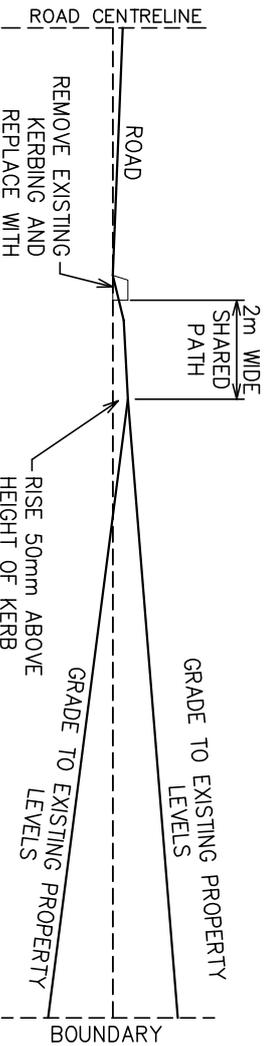
COMMERCIAL OR LIGHT INDUSTRIAL CONCRETE CROSSOVER SECTION

- NOTES:**
1. FOR JOINTING DETAILS REFER TO STD FP03.
 2. FOR KERBING DETAILS REFER TO STD RD01 & STD RD02.
 3. DIMENSIONS IN MILLIMETRES.

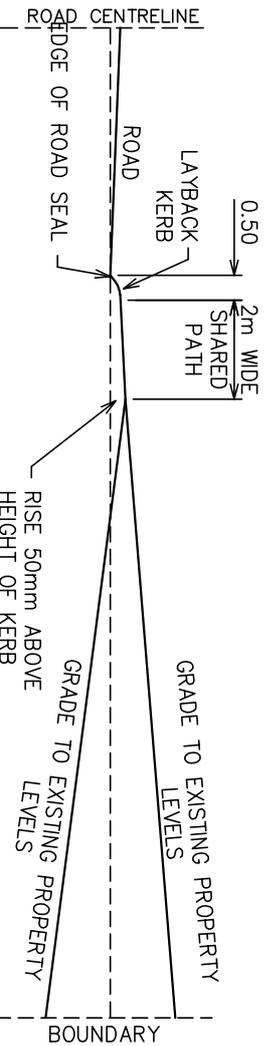
REV No.	DATE	DESCRIPTION	BY	CHK'D	APPR	DATE	Designed		Approved		TITLE:	INDUSTRIAL BITUMEN AND CONCRETE CROSSOVER					
							Drawn	Position	Date				INDUSTRIAL BITUMEN AND CONCRETE CROSSOVER				
							Draft Check							FILE: J:\STANDARD DRAWINGS\COM - STANDARD DRAWINGS\STD - CROSSOVERS\STD CR09.DWG	SCALE: N.T.S	DWG No: CR09/A	
A	04/08	UPDATED FROM D09	BA				Eng. Check										



CROSSOVER SPECIFICATIONS FOR MOUNTABLE KERBED LOADS

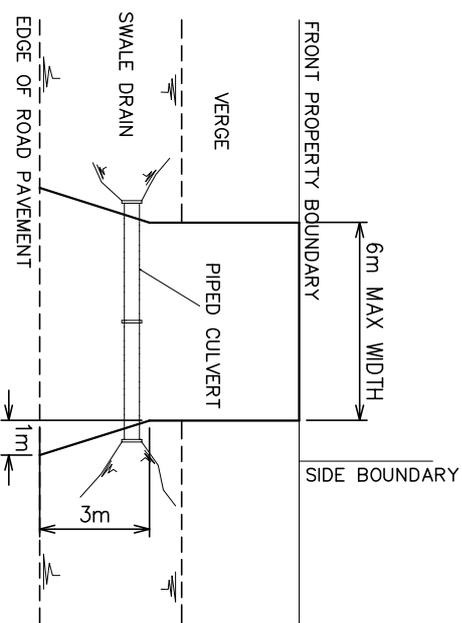


CROSSOVER SPECIFICATIONS FOR BARRIER OR SEMI-MOUNTABLE KERBER LOADS.



CROSSOVER SPECIFICATIONS FOR UNKERBED ROADS

- NOTES:**
1. JOINTING DETAIL AS PER STD FP03.
 2. WHERE MOUNTABLE KERB EXISTS A 12mm EXPANSION JOINT IS TO BE PROVIDED BETWEEN THE BACK OF KERB AND THE CROSSOVER.
 3. CONCRETE CROSSOVER TO HAVE A BROOM FINISH WITH JOINTS AND EDGES HIGHLIGHTED. KERB TO HAVE SMOOTH FINISH.
 4. DIMENSIONS ARE IN METRES.
 5. SHOULD ANY TREE, POWER POLE, STREETLIGHT POLE, SIGN, PIT, MANHOLE OR ANY OTHER OBSTRUCTION BE LOCATED ON THE PROPOSED ALIGNMENT OF THE CROSSING THE APPLICANT SHALL BE LIABLE FOR THE COSTS ASSOCIATED WITH THE REMOVAL OR ALTERATION OF SAME.
 6. TRENCH GRATING SHALL BE CONSTRUCTED BY THE APPLICANT IF CONSIDERED NECESSARY TO CUT OFF WATER ENTERING THE PROPERTY, OR ENTERING THE ROAD FROM INTERNAL DRIVEWAYS.
 7. VEHICLE CROSSINGS ABUTTING OLD COAST ROAD AND PINJARRA ROAD EAST OF MANDURAH ROAD SHALL BE SUBJECT TO APPROVAL OF M.R.W.A.
 8. WHERE THE EXISTING CONCRETE FOOTPATH/DUAL USE PATH IS ONLY 75mm THICK IT MUST BE REMOVED FROM THE AREA TO BE REPLACED BY THE CROSSOVER AND REINSTATED AT 150mm THICK CONCRETE.
 9. AN EXPANSION JOINT IS TO BE PLACED AT EACH INTERFACE BETWEEN THE FOOTPATH AND CROSSOVER
 10. KERBING DETAILS AS PER STD RD01 & STD RD02.



RURAL CROSSOVER

REV No.	DATE	DESCRIPTION	BY	CHK'D	APPR	DATE
A	04/08	UPDATED FROM D10	BA			
			Designed			
			Drawn	BA	07/08	Position
			Draft Check			Date
			Eng. Check			



TITLE:		CROSSOVER SPECIFICATIONS	
FILE:u:\STANDARD DRAWINGS\COM - CROSSOVERS\STD CR10.DWG	SCALE:	N.T.S	A4
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