Engineering and Works Services Standards and Specifications

Section 4

Vehicle Crossovers

This Specification has been adopted by the Council and is required to be practised in the City of Busselton for the construction of vehicle crossovers. This Specification will be used for processing vehicle crossover applications and will be maintained by the Director, Engineering and Works Services as per the City Policy.

Revision No	Date	Section Amended	Prepared	Reviewed
A	**December 2009**	**All**	**Community Infrastructure**	**Infrastructure Development**
B	**March 2011**	**All**	**Engineering and Works Services**	**Development Control**

I n d e x

1 General

1.1 Introduction

The information contained in this document represents a set of engineering standards, specifications, guidelines and practices for the supervision and construction of vehicle crossovers - herein referred to as “this Specification”.

This Specification sets out the minimum standards for the construction and completion of vehicle crossovers in accordance with the City policy and guidelines. This Specification is suitable for domestic crossovers and is designed to take loaded commercial vehicles of medium size.

This Specification is required to be practised in the City of Busselton for:

- The construction of vehicle crossovers;
- To be eligible for a the City contribution (subsidy); and/or
- To be eligible for the return (refund) of bond money where a bond was paid as a condition of the Building Licence or Planning consent.

The City has developed the engineering standards, specifications, guidelines and practices contained in this Specification to ensure:

- Uniformity of construction, methods and appearance;
- To provide a good quality crossover which will last;
- To provide a safe entry/exit point to/from properties;
- To prevent material (eg. gravel) from being carried onto the road;
- To prevent damage to the edge of the road; and
- To prevent expensive mistakes from being made;

This Specification relates to the construction of vehicle crossovers, it does not relate to the development of verge areas. If you are interested in developing the verge area, please refer to the City’s Local Law (ByLaw) relating to Street Lawns and Gardens, Section 9b of the City’s technical specifications titled “Street/Road Verge – Landscaping, Revegetation and Stabilisation” and the booklet titled “Nature Verge” which provides further guidelines.

NOTE: It is important to note that the City does not permit the sealing or paving of verge areas for carparking.

It is acknowledged that accepted industry standards will change over time. In order to accommodate such changes, the contents of this Specification will be reviewed on a regular basis. These standards and specifications will be posted on the City’s website at www.busselton.wa.gov.au/services/engineering/tech_stds and are available for downloading.

1.2 Definitions

The term vehicle “crossover” is defined as the section of a driveway between the edge of the road and the property boundary.

For properties adjoining a sealed road, the term "standard crossover" shall mean a drained, sealed or paved crossover constructed to a size conforming with this Specification

For properties greater than 20 hectares in size or for those adjoining a gravel road, the term “standard crossover” may mean a gravelled and drained crossover to a size conforming with this Specification.

1.3 The City’s Statutory Obligations

The legislation that governs crossovers or crossings from a public thoroughfare to private land or a private thoroughfare is:

- Local Government Act 1995, Schedule 9.1 (7).
- Local Government (Uniform Local Provisions) Regulation 1996, Sections 12, 13, 14, 15 and 16.

The legislation describes requirements to construct or repair crossovers and the City’s contribution (subsidy) towards the cost of crossovers. Copies are available from the Engineering and Works Services Division upon request.

2 Planning a Crossover

2.1 Services

Particular care must be taken to protect survey pegs, benchmarks and public utility services. It is advisable to contact the relevant public utility service authority if underground services are likely to be endangered by the crossover construction process. If the proposed location of a crossover conflicts with the location of existing services, such as manholes, power poles, street trees, etc. it is the responsibility of the Owner/Agent/Developer to relocate such services.

2.2 Trees and Shrubs

Permission must be obtained from the City's Parks and Gardens Section BEFORE trees or shrubs can be relocated or removed. Please contact the City's Parks and Gardens Co-ordinator to arrange an inspection.

In Special Rural and Rural areas with significant vegetation on the verge, the crossover will need to be located to achieve sight distances and avoid unnecessary removal of vegetation. Please contact the City's Engineering and Works Services Division.

2.3 Reinstatement of Crossovers

If a public utility service authority or Contractor removes part or all of a crossover, they will be responsible for its reinstatement (to its original condition if possible).

Coloured concrete crossovers are acceptable - but in the event of reinstatement - the City will not accept responsibility for matching colours or finish.

2.4 Footpaths

Where a footpath exists within the road verge the footpath is to take priority over a crossover. The footpath is not to be removed to make way for a crossover, rather the crossover is to butt up to the footpath on both sides.

If the path is damaged during construction, it is to be repaired by the builder prior to installing the crossover.

2.5 Dimensions

The width of a crossover at the property line is to be a minimum of 2.75 metres and splay to 4.5 metres wide at the road edge, with 1.0 metre radii or 1.0 metre truncations at the road edge. The total minimum width of opening at the kerb line is 6.5 metres. This configuration represents the standard crossover, with the length being variable. Extra width is allowable, with approval, but no additional subsidy applies. Please refer to the drawing on page 15 of these specifications for further clarification of these dimensions.

In the bulb of a cul-de-sac road, where frontages to residential blocks are small, a width of less than 6.5 metres at the kerb face/road edge may be acceptable. Please contact the City's Engineering and Works Services Division for advice.

Where a footpath or dual use path has been constructed across the frontage and the path is located immediately behind the kerb; no splays on the crossover are required.

2.6 Subgrade Formation

The site of the crossover should first be cleared of all vegetation, roots and poor foundation soil. The site should then be boxed out or filled, and formed to levels and gradients as required. It is advisable to have the sub-grade treated to prevent weed growth. Levels must conform to those set by the City for the street verge. If the street verge levels have not been established, the City's Engineering and Works Services Division should be requested to provide the level. Incorrect levels may cause rejection of the crossover.

The formation shall be compacted with a vibratory compactor, ready to place the required thickness of base.

2.7 Base

A gravel base is not required for concrete crossovers.

The base is to be of good quality laterite gravel or crushed rock, free of excess amounts of clay and vegetation, silt, etc.

The base is to be spread, rolled, water bound and corrected as necessary to shape, grade, etc. - to a minimum compacted thickness of not less than 150mm in the case of a domestic car crossover, and not less than 200mm in the case of a heavy duty crossover, which is required for farms, service stations, factories and shops, and all places subject to more than domestic traffic.

3 Urban Crossovers

3.1 Drainage

Streets which contain flush kerbing, or have no kerbing, require the design of the crossover to suit the swale drain that runs parallel to and either side of the street.

A swale drain is necessary across the crossover and verge to provide drainage relief in heavy rainfalls.

Crossovers not constructed to this Specification will not attract a subsidy.

Swale drainage is sensitive to changes in levels. No fill or crossover is to be constructed which alters the levels of the verge area. If the verge area is filled to give an even grade from the property boundary to the kerb, the street then has no drainage and is prone to flooding.

Swale drainage must be protected.

Where a property is situated uphill from the road, stormwater run-off must be retained within private property and prevented from entering the road reserve, except by an approved method.

Where a portion of a crossover slopes toward private property - the property owner must make provision for consequent stormwater disposal on their own property and the City will not be liable for any damage or consequence arising from this design.

On all crossovers - a minimum grade of 2% (1 in 50) is desirable to drain the surface water adequately.

3.2 Levels

In older subdivisions where existing crossovers are established, new crossovers are to be constructed to the same level (in respect to the road) as existing crossovers.

Where a footpath exists (either at the property line or adjoining kerb), this will be used as level control with the crossover graded from that level to the road or property boundary respectively. The footpath must not be removed.

In the case of kerbing, a crossover must ramp up from the kerb height over a distance 600-900mm toward the property, to prevent flow of stormwater onto the crossover (refer to Diagram C on page 16 of this Specification).

Where there is no kerbing or footpath, information can be obtained from the City's Engineering and Works Services Division regarding possible future plans for your street. Where kerbing is proposed, the location and height of the kerb will be indicated by a Engineering and Works Services Division Officer.

NOTE: Care must be taken that no edges protrude in such a way that pedestrians may trip over them when walking across the area - especially at night.

If in doubt, contact the Engineering and Works Services Division for further information and advice as incorrect levels may affect payment of the City's contribution.

3.3 Urban Crossover Types

There are basically four (4) different types of sealed crossovers:

- Two (2) Coat Seal;
- Asphalt;
- Concrete**; and
- Clay Brick or Concrete Block Pavers.

** *Concrete is the preferred construction material as it gives a low maintenance and long lasting service.*

3.4 Two Coat Seal

TWO COAT SEAL WITH GRANITE - Spray bitumen emulsion at the rate of 1.35 litres per square metre then bound with 10mm metal. The metal shall be lightly broomed to remove high areas and rolled. A second coat of bitumen emulsion shall be applied at a rate of 1.65 litres per square metre, bound with 7mm granite aggregate and broomed and rolled as before. Keep traffic off the new work for a minimum of 24 hours.

TWO COAT SEAL WITH PEA GRAVEL OR CRUSHED LATERITE - Spray bitumen emulsion at the rate of 1.45 litres per square metre then bind with 10mm washed pea gravel or crushed laterite. The gravel shall be lightly broomed to remove high areas and rolled. A second coat of bitumen emulsion shall be applied at a rate of 1.70 litres per square metre, bound with 7mm pea gravel or crushed laterite and broomed and rolled as before.

NOTE: Pea gravel is not recommended as it is slippery when wet and is easy to unravel.

3.5 Asphalt

Spray tack coat of bitumen, or similar material, at a rate of not less than 0.9 litres per square metre.

For domestic driveways, the minimum thickness of asphalt is 20mm consolidated thickness. For commercial and industrial areas, or where loads warrant, the thickness should be at least 25mm and up to 50mm, especially where tandem drive trucks regularly turn on and use the crossover.

The asphalt is to be provided by an approved Plant - capable of meeting the standard Specification for the No.1 Mix as drawn up by AAPA.

The aggregate material is to be granite or basalt. The material is to be laid at a temperature of not less than 182 degrees Celsius (360 degrees F), spread to provide the compacted (vibratory) consolidated thickness required. The thickness of the materials is to be even and this is to be maintained by approved techniques.

The finishing work shall be undertaken whilst the materials are hot - to produce a fine, dense, smooth surface - free of surface voids.

Alternatively, cold asphalt mix can be used. When cold mix is used, it must comply with the grading specification for 5mm aggregate asphalt and be applied to the prepared base as above. Surfacing using cold mix is to be protected from vehicle use for 48 hours, to allow curing to take place.

Where the Applicant requests a “gravel pave” type asphalt mixture - such will be approved subject to a check with the supplier that the surface at the thickness nominated, is guaranteed.

NOTE: The minimum “Gravel pave” thickness should be 25mm and the gravel must be hard and clean, and carefully graded.

3.6 Concrete Crossovers

The profile and dimensions are the same as for the bitumen crossings as referred to in this Specification. The minimum thickness is to be 100mm for light residential, to 200mm for heavy industrial and service stations. The concrete is to have a minimum strength of 25 Mpa at 28 days and be mixed in accordance with the Australian Standard.

The sub-grade is to be watered, compacted and screeded before placement of the concrete.

The concrete crossover is to be ruled out with a jointing tool in approximately 1.8 - 2 metre sections. The surface is to be broomed to a non-slip finish. An expansion joint is required at the boundary line and at the back of kerb, to allow for the expansion and contraction of the concrete. Concrete may be coloured to the Owners requirements, however, the City will not accept responsibility for matching colour should any future reinstatements be required. Jointing with road and kerb must be neat, matched and free of sharp edges, corners and spillage.

Concrete pattern pave crossovers are acceptable provided:

- A stencil or pattern stamp is used on the concrete when still wet to achieve the desired pattern;
- The colouring of the concrete must be achieved by spreading a powder over the concrete when it is still wet; and
- Two (2) coats of acrylic sealer must be provided over the concrete to protect the colour and act as the wearing surface for the crossover. This sealer must be an abrasive non-slip surface.

Owners must be aware that the sealer may wear away in two (2) or three (3) years, which may cause the colour to fade slightly. The City recommends that a fresh sealer be applied every three (3) years to maintain the appearance.

3.7 Quindalup Special Character Area Policy

If you live in the area covered by the Quindalup Special Character Area Policy, crossovers are required to be in "character colour and texture" such as gravel or earth tones. Examples of sealed crossovers with earthy tones are pea gravel on bitumen emulsion or gravelpave asphalt. Crossovers not keeping with earth tones are actively discouraged (refer to Section 3.2.2 (ii) of the Quindalup Special Character Area Policy which may be obtained by contacting the City's Planning and Development Services Directorate.

3.8 Eagle Bay Special Character Area Policy

If you live in the area covered by the Eagle Bay Special Character Area Policy, crossovers within the front setback area are required to be constructed of consolidated pea gravel, red asphalt or dark tone brick/concrete pavers. Crossovers not keeping with these colours and materials are actively discouraged (refer to Section 4.4 of the Eagle Bay Special Character Area Policy which may be obtained by contacting the City's Planning and Development Services Directorate.

3.9 Paving Brick and Blocks (Pavers)

Only new materials are acceptable for crossover construction. Salvage materials or cleaned used bricks are acceptable only at the express approval of the Director, Engineering and Works Services. The minimum thickness is 60mm for pavers for domestic crossovers, and to manufacturers specifications for industrial and commercial crossovers.

Concrete block or clay brick pavers 50mm minimum thickness may be used, strictly subject to the following variations to these specifications:

- Minimum compressive strength of 40 Mpa, to be confirmed by test, and warranty statement from the manufacturer;

- Edge restraint in 4:1 sand/cement is to be constructed to the depth of base and bedding sand at the soldier course and haunched at 45^{o}; and

- Joint width shall not be greater than 3mm.

3.10 Preparation - Base and Bedding

All brick paved crossovers will require a minimum of 100mm (residential), 150mm (commercial) or 200mm (industrial) of compacted thickness of approved base course material (i.e. approved road making gravel or road base). It is to be spread, rolled, water bound and levelled to conform to the proposed shape and grade of the crossover.

After the base has been laid, the City's Engineering and Works Services Division shall be notified and given the opportunity to inspect the base prior to laying of the brick paving.

Bedding sand is required to be clean, well graded, 100% passing a 4.75mm sieve, and not greater than 5% passing the 75 micron-sieve, and be of 30mm uniform thickness but not less than 20mm or greater than 50mm compacted depth.

If the Owner/Agent believes suitable sub-grade (i.e. the natural soil) material exists, Engineering and Works Services Division staff shall inspect the site. Where, in the opinion of Engineering and Works Services Division staff, suitable sub-grade (i.e. the natural soil) materials exists, the site may be excavated and compacted with a vibratory compactor to a depth being the sum of the depth of the pavers PLUS a uniform depth of 30mm below the required finished level. 30mm of bedding sand is then to be added.

3.11 Laying of Pavers

Prior to commencement of laying pavers, bedding sand is to be spread over sub-grade or base course. This is to be screeded to level grade, maintained in a loose condition and protected from pre-compaction.

Approved laying patterns are stretcher bond and 45^{o} or 90^{o} Herringbone (for rectangular pavers), or 45^{o} diamond bond or stretcher bond (for square pavers) laying pattern with soldier courses and edge restraint shall be used.

Pavers shall be placed on the screeded bedding sand by hand with 2-5mm gaps. All full pavers shall be laid first. Closure pavers shall be cut with a saw and filled subsequently. Spaces of less than 20% of a full paver shall be in-filled by adjusting the length of adjacent whole pavers.

3.12 Compaction of Pavement

Sheets of plywood of minimum thickness of 12mm shall be laid on the pavers to prevent the compactor coming in direct contact with the surface. Two (2) passes with a high frequency, low amplitude plate compactor (having an area sufficient to cover a minimum of 12 pavers) shall be used for compaction.

3.13 Joint Filling

After compaction, the joints shall be filled with a clean dry siliceous sand 100% passing a 2.36mm sieve which should be brushed into joints. A further two (2) passes with the plate compactor shall be applied.

3.14 Edge Restraint

Of the four (4) basic types of crossover that are acceptable - two (2) types require timber edging and a gravel base - these are:

- Two (2) Coat Seal crossover; and
- Asphalt crossover.

The edging is to consist of 100mm x 25mm merchantable quality Jarrah. The edging is to be installed on both sides of the crossing, including sweeps, from the boundary to the kerb or road shoulder. Where a concrete path exists, the edging is to be made good up to the path on either side and flush with the path.

The timber edging is to be supported by 100mm x 50mm x 300mm Jarrah pegs at a maximum spacing of 1.5 metres, where the crossing is being constructed in sandy terrain. Alternatively, an additional shoulder of 300mm metres wide and 100mm

consolidated thickness, shall be provided to support the edging. The shoulder is to finish flush with the top of the timber edging.

On asphalt crossovers, the timber edging is to finish 20mm proud of the consolidated gravel surface, so that the edging is flush with the final asphalt surfacing.

Various forms of edge restraint are suitable for paved crossovers.

(a) Road and Property Edge

Where the street has not been kerbed - a 25 Mpa concrete beam 150 x 150mm shall be constructed at the carriageway, to a neatly cut edge. If the crossing construction is not continuous with the internal driveway, a beam is also to be constructed on the boundary. The edge restraint at the carriageway is to coincide with the future street kerb face line as advised by the City. Soldier course pavers set on 100mm of concrete may be used as an alternative to the beam.

Where the street is kerbed, a soldier course is to be used immediately behind the kerbing.

(b) Side

- 60mm Pavers - a 4:1 sand/cement edging is to be 45^{o} haunched from the top edge of the pavers to the top of the compacted base.

- 50mm Pavers - a 4:1 sand/cement edging is to be 45^{o} haunched from the top edge of the pavers and to extend in depth to the bottom of the compacted base.

4 Special Rural and Rural Crossovers

4.1 General

- All special rural developments require a sealed and drained crossover where a sealed road frontage exists. The crossover is to be constructed to at least a two coat seal.

- All rural developments less than or equal to 20 hectares in size require a sealed and drained crossover where a sealed road frontage exists or a graveled and drained crossover where a graveled road exists.

- Rural properties greater than 20 hectares (off a sealed road) may choose to construct either a sealed and drained crossover or a graveled and drained crossover.

4.2 Drainage

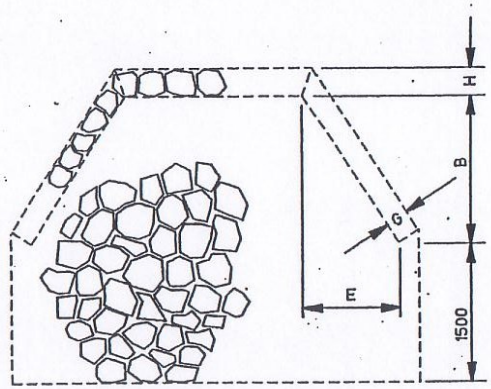
Where a culvert may be necessary (Special Rural or Rural areas usually require a culvert) please contact the City's Engineering and Works Services Division for advice. Note that the City does not supply culverts and headwalls.

Where piped drainage is required, headwalls are to comply with this Specification (refer page 14 of this specification). The City's Engineering and Works Services Division will advise on the pipe size required.

4.3 Base

The gravel should be spread, rolled, watered and compacted to the shape as shown in diagram "B" (refer page 15 of this specification). It should also tie in with the existing road, and be a uniformly graded surface with a minimum grade of 2% (1 in 50) to drain surface water adequately.

TYPICAL CULVERT SINGLE & DOUBLE HEADWALL DETAIL
HEADWALLS TO BE CONSTRUCTED OF MORTARED STONEWORK



PLAN

HEAD AND WING WALLS DIMENSIONS FOR RC PIPES								
D	A(MIN)	B	C	E	F	G	H	M
300	300	400	100	250	300	230	230	450
375	300	500	100	300	300	230	230	450
450	300	600	100	345	400	250	250	450
525	300	700	150	405	400	250	250	450
600	300	800	150	460	400	250	300	450
750	300	900	200	520	490	250	300	450
900	300	1100	200	635	490	250	300	600
1050	450	1500	300	865	490	250	300	600
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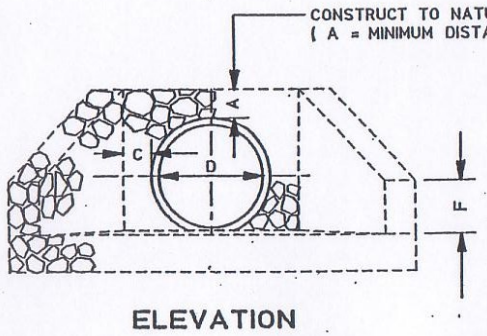
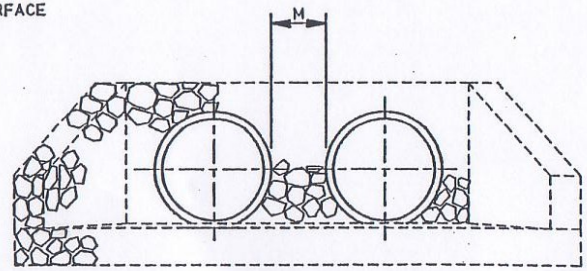
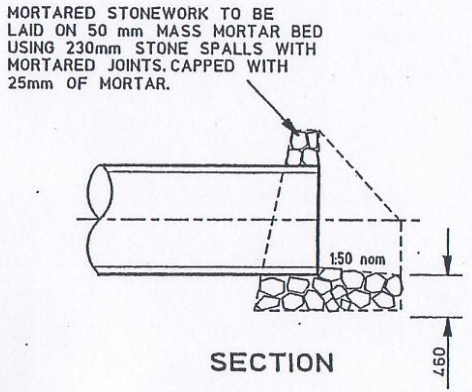
1350	450	1800	350	1040	580	250	300	600



ELEVATION

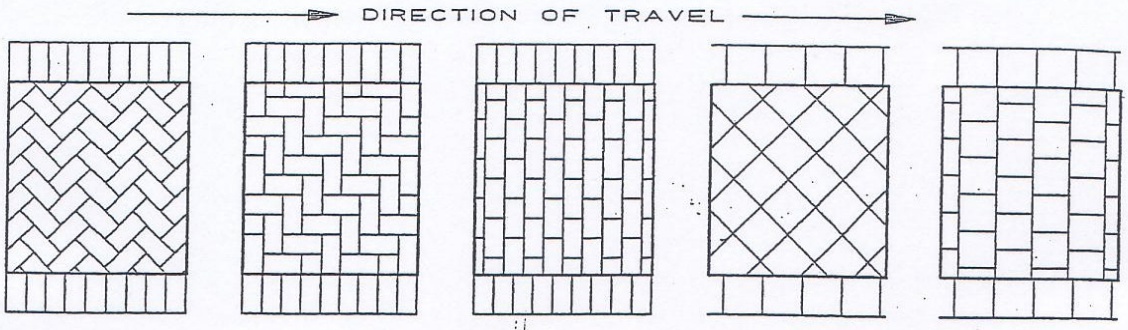


ELEVATION



SECTION

RECOMMENDED LAYING PATTERNS FOR PAVERS



ALL PATTERNS TO HAVE SOLDIER COURSE EDGING

DIAGRAM A
TYPICAL CROSS SECTION - CROSS OVER FOR STREETS WITH FLUSH KERBING AND SWALE DRAIN

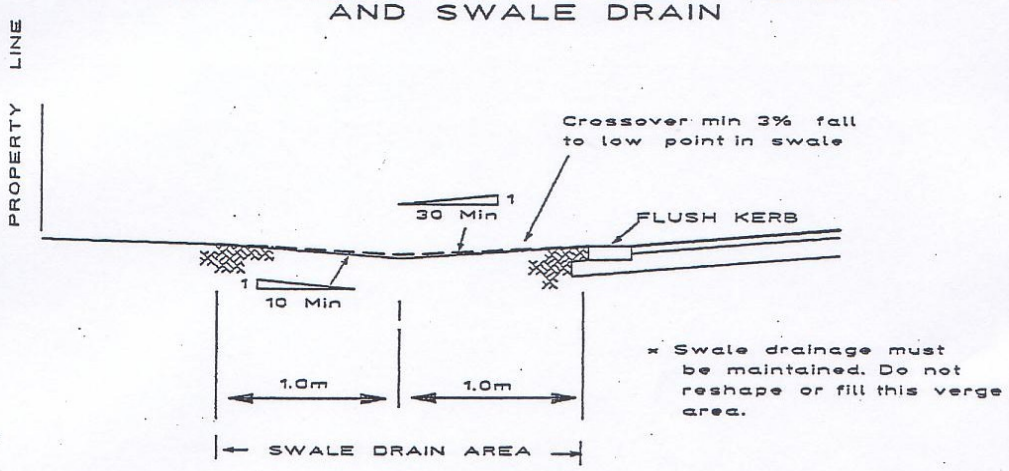


DIAGRAM B
STANDARD CROSS OVER - DIMENSIONS

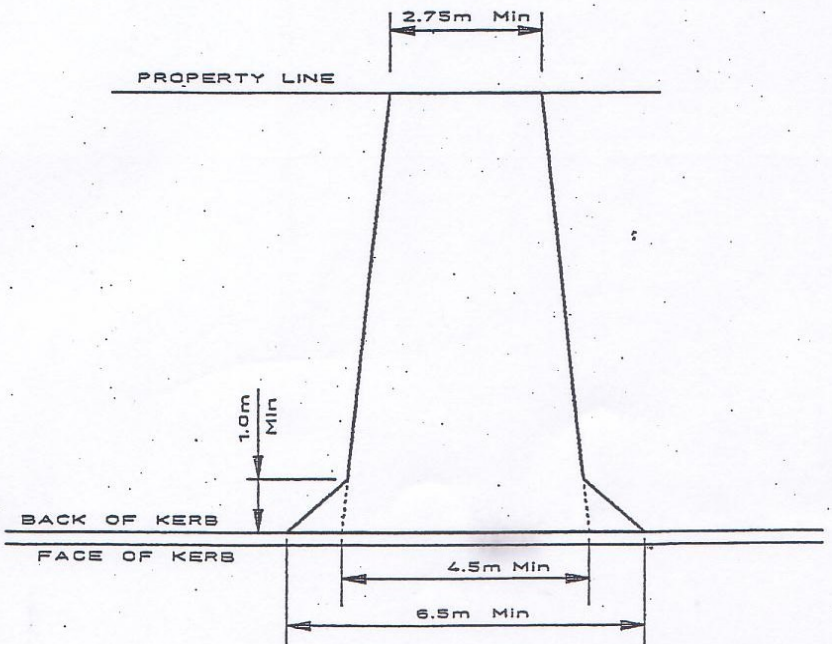
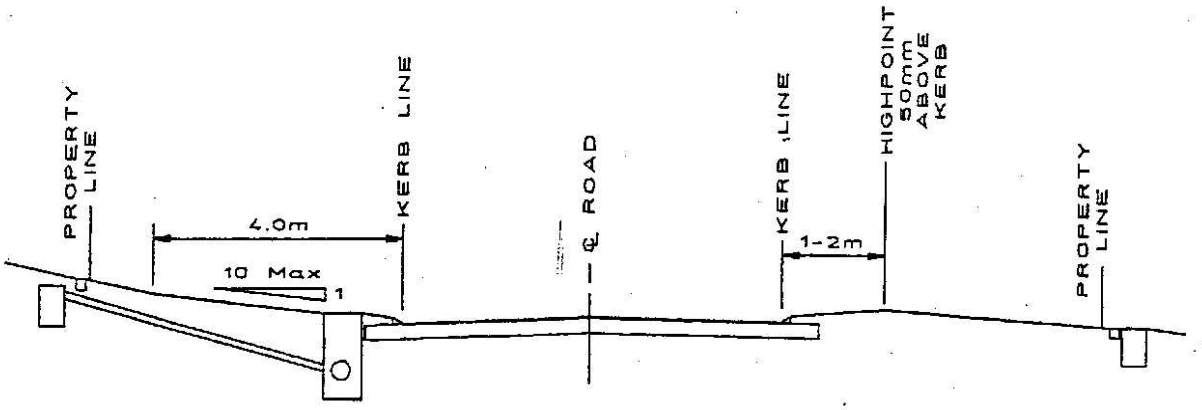
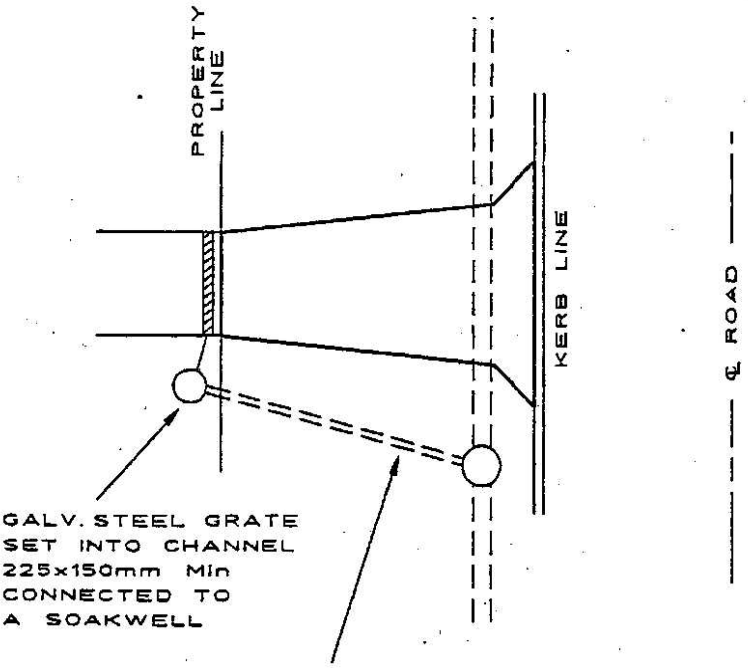


DIAGRAM C
CROSS SECTION



OVERFLOW DRAINAGE OF CROSSOVERS

UPHILL



OVERFLOW MAY BE CONNECTED TO EXISTING STREET DRAINAGE BY A ⌀ 80mm MIN PVC PIPE. CONNECT TO NEW MANHOLE OR INTO EXISTING GULLY OR MANHOLE. CONTACT TECHNICAL SERVICES DEPT FOR DETAILS. A FEE WILL BE CHARGED FOR THE CONNECTION.

DOWNHILL

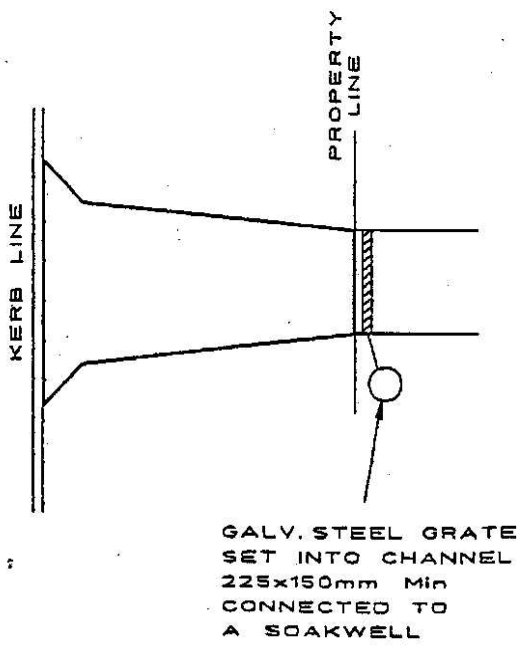


DIAGRAM D
PLAN