TECHNICAL SPECIFICATIONS FOR CROSSOVERS

City of Fremantle

Revision Date: January 2019

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1.0 INTRODUCTION

This Technical Specification must be read in conjunction with the City of Fremantle's Crossover Policy and Crossover manual.

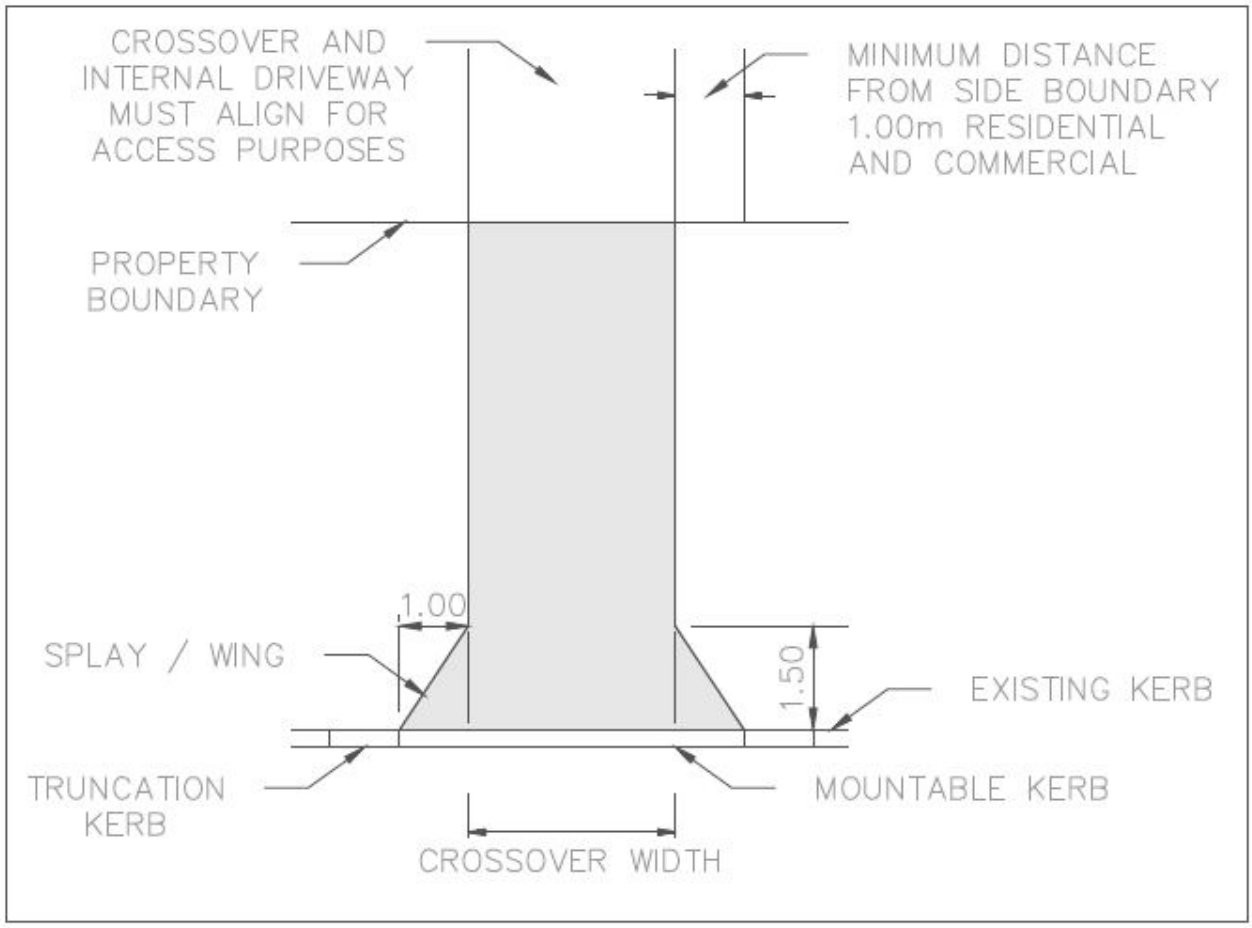
1.1 PURPOSE

The purpose of this document is to provide technical details for the City's requirements for construction of vehicle crossovers in the road reserve. Approval for installation and/or modification of crossovers must be obtained before construction can commence.

2.0 CROSSOVER REQUIREMENTS

2.1 GEOMETRY/DIMENSIONS

a. Crossovers are to be aligned at right angles to the roadside kerb and street.
b. Crossovers are to be positioned such that sight lines between path users and vehicles are unobstructed by permanent fixtures (trees, poles, fences, etc.).
c. Crossovers and internal driveways must line up for access purposes at the property boundary.
d. Crossover width (excluding the splays/wings) for single, duplex or multi residential properties require to be a minimum of 3.0 meters and maximum of 4.5 meters.
e. Crossover width (excluding the splays/wings) for commercial properties require to be a minimum of 3.0 meters and maximum of 7.5 meters.
f. The splays/wings of the crossover are required to be 1.0 meter in width and 1.5 meters in length.
g. The splays/wings of the crossover cannot encroach over to the neighbouring verge.
h. Crossovers shall have the following minimum offsets and/or clearances:
    - Side boundary (at front property line) 1.0 meter.
    - Street trees 2.0 meters.
    - Western Power poles, lights and stay wires 1.0 meter.
    - Drainage side entry pits 1.0 meter.
    - Utility pits (Telstra, Water, etc.) 1.0 meter.
i. Crossover site requirements and geometry shall be in accordance with the diagram shown below.



2.2 CROSSOVER NUMBERS

Only one (1) crossover is permitted per property. Where two (2) or more properties share a street access way (through common property driveway, easement of land title, or the like), those properties will only be permitted one (1) crossover in total. The crossover should only connect to the shared driveway and be for the benefit of all relevant lots.

Variations may be permitted where an additional crossover does not result in the unacceptable loss of street parking and at least complies with one (1) of the following criteria:

a. Two (2) or more driveways have received planning approval (where two (2) crossovers are necessary to allow vehicle circulation for developments involving five (5) or more units), or
b. The frontage of the lot exceeds 30 meters in length, the crossovers do not represent more than 20% of the frontage, and the lot is not within a heritage area.

The above variations may require additional verge landscaping to soften the impact of hardstand on the streetscape. The additional landscaping must be approved by the City and be installed at

the applicant's expense.

2.3 LOCATION

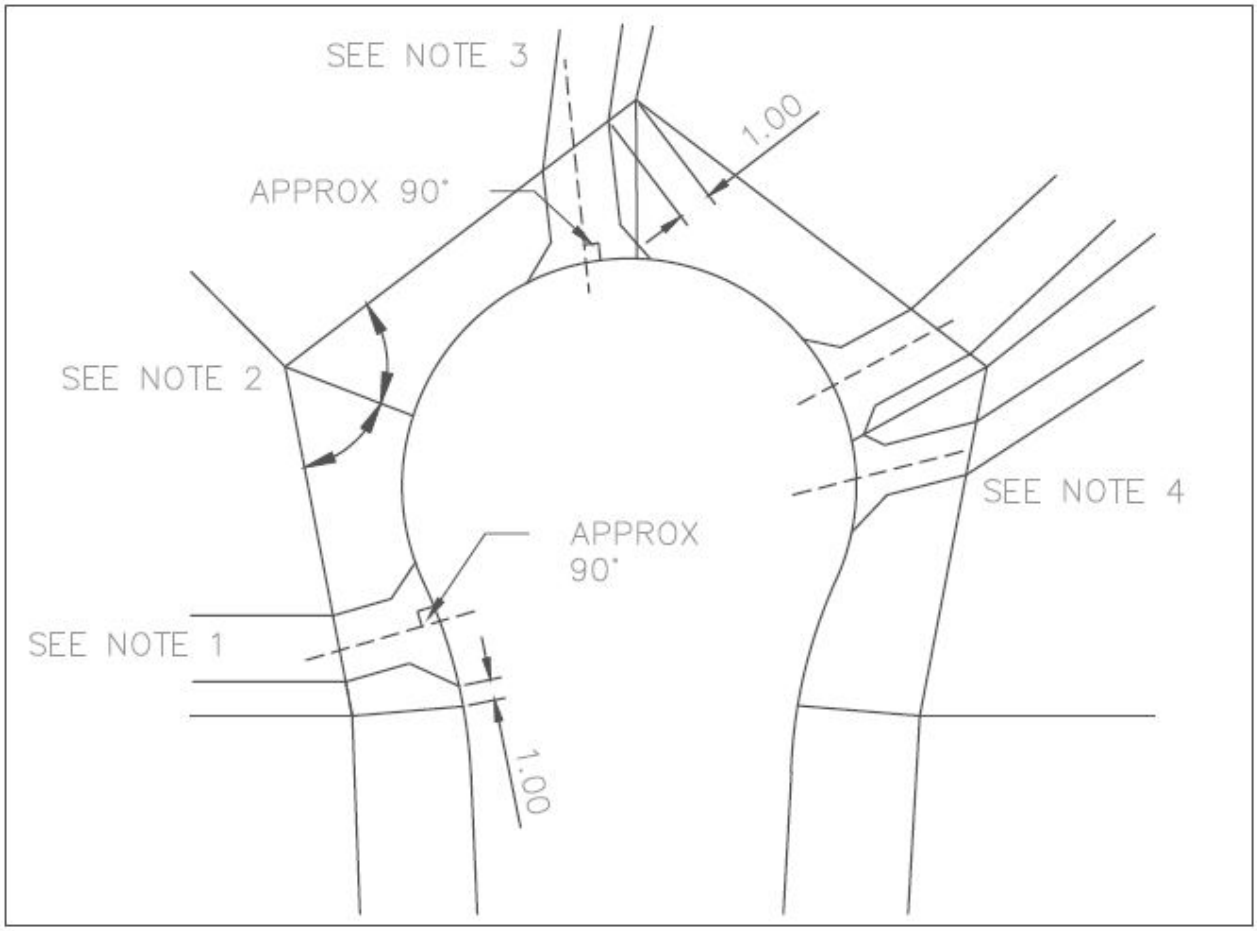
Residential and commercial crossovers are to be no closer than 1.0 meter from the adjoining property boundary.

Crossovers will only be permitted or their retention supported where they provide access to an approved or constructed (already existing) driveway or parking area within the property.

Crossovers which do not ('redundant crossover') provide sufficient access (as per the above) will not be approved, and will be required to be removed as a condition of other works.

CROSSOVERS IN CUL-DE-SACS

Crossovers in cul-de-sacs are to be located as shown on the diagram below:



NOTE 1: Crossover to be installed at approximately 90 degrees to the kerb and to be a minimum of 1.0 meter from the boundary.

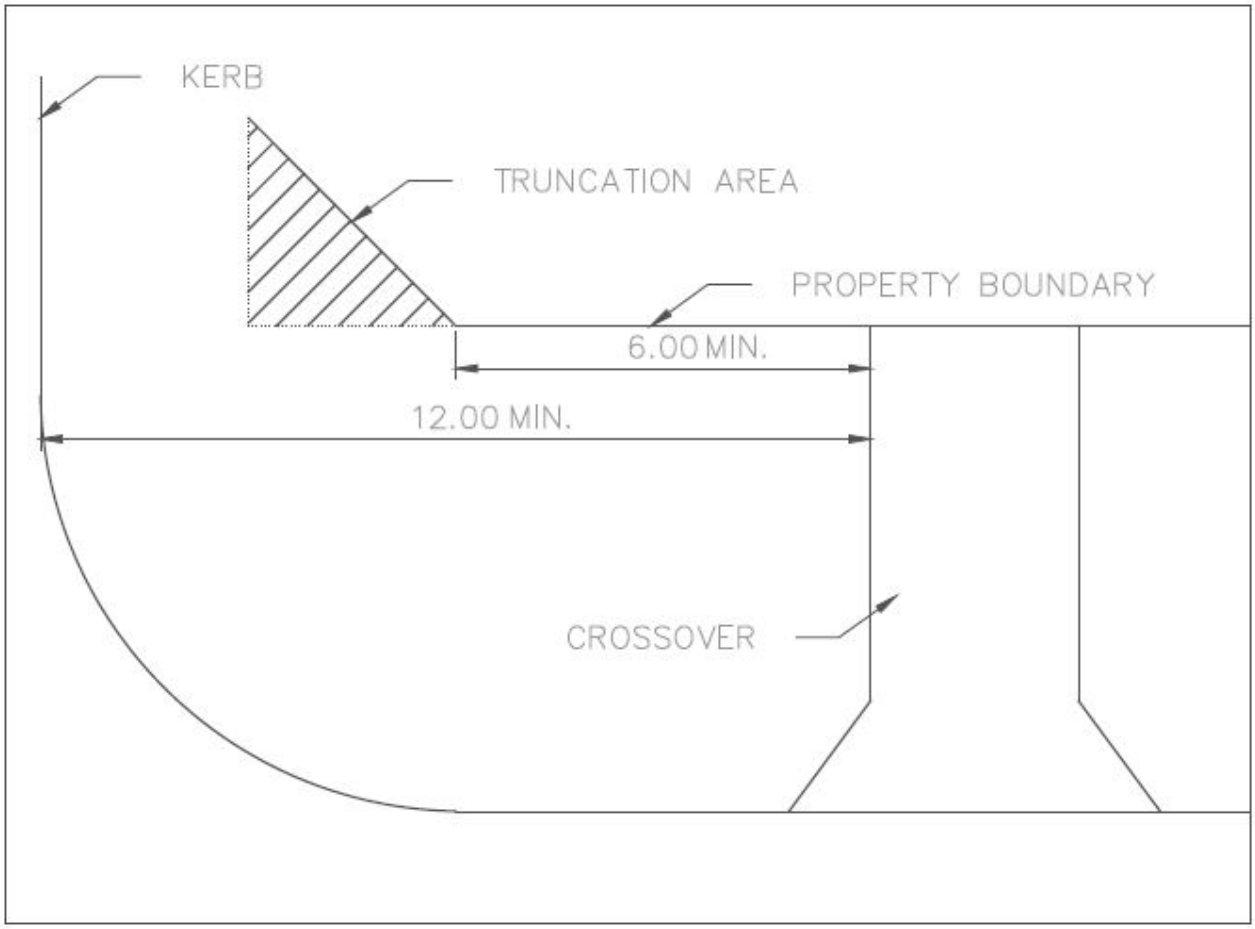
NOTE 2: Dividing the verge between neighbouring properties is achieved by bisecting the angle of the two front boundaries.

NOTE 3: The crossover splay/wing may only encroach on the adjacent neighbouring verge, if written approval has been received from the owner of the neighbouring property.

NOTE 4: Crossovers may intersect when they are constructed along the same side boundary. 90 degree rule not enforced in favour of crossovers parallel to verge dividing line to give best access to each lot.

CROSSOVERS AT INTERSECTIONS

Crossovers at intersections are to be located as shown on the diagram below or as per Australian Standard AS2890.1:



- Crossovers are NOT permitted within the lot truncation area.
- Crossovers located near road corners may be obstructed by traffic islands. Crossovers should be located in a position to avoid traffic islands, as the removal or alteration will not be considered.
- Crossovers located on MRWA roads near traffic lights must be approved by MRWA in accordance with MRWA standards and guidelines.

2.4 LEVELS AND GRADES

a. Where difficulties are encountered on site and the levels cannot be achieved, the applicant should contact the City for further advice. The applicant may be required to provide site-specific drawings to obtain approval for the crossover.
b. Existing road/verge reserve infrastructure assets such as storm water drainage and their surface levels, including vehicle accessibility, should be considered when designing a new crossover.

STORMWATER DRAINAGE

- The crossover must be constructed such that stormwater cannot flow from the roadway onto the crossover and into adjoining properties.
- The level of the crossover at the road gutter or edge of kerb is to be 40 mm higher than the road surface at that point for future resurfacing.
- The level of the crossover at a distance of 1.5 meters from the back of the kerb to be a minimum of 150 mm higher than the road surface at the road gutter.
- The property owner may be required to install a trench grate and soak wells to prevent water entering the property, or entering the road from internal driveways. A trench grate must be installed inside the property boundary.
- Stormwater drainage pits cannot be relocated unless there is no other way to install a crossover. Cost of the relocation will be at the applicant's expense.

VEHICULAR ACCESS

The property owner is responsible to ensure that the crossover is constructed at the appropriate grades and levels to enable a standard vehicle, in accordance with Road Traffic (Vehicle Standards) Rules 2002 Regulation 67, to enter/exit from the roadway into the property without scraping the under carriage of the vehicle.

2.5 EXISTING FOOTPATHS

In most cases the City's existing footpaths have a 2% to 3% cross fall towards the road.

As part of the new crossover construction, where the existing footpath is less than 100 mm in thickness, the footpath is to be removed and replaced at 100 mm thickness.

WHERE THE FOOTPATH IS AGAINST THE BACK OF THE ROADSIDE KERB

The existing footpath is to be accommodated (see Accommodation Works) as a continuous footpath in the new crossover works. The section of the footpath that intersects the location of the new crossover shall be reconstructed in grey premixed concrete to accommodate the

splays/wings and rise up to the crossover so as to visually show the continuation of the footpath.

WHERE THE FOOTPATH IS NOT AGAINST THE BACK OF THE ROADSIDE KERB

The existing footpath must remain continuous in grey concrete through the crossover. An existing footpath can only be replaced where the footpath meets at least one of the following:

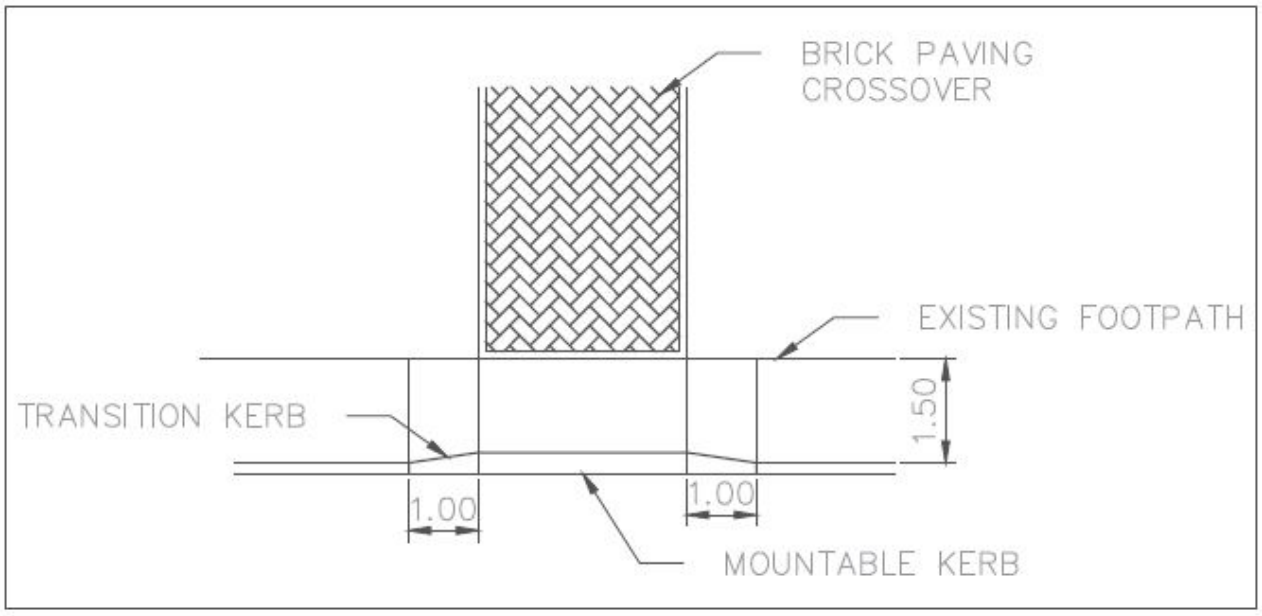
- is damaged or less than 100 mm thick for residential crossover;
- is damaged or less than 150 mm thick and/or un-reinforced for commercial crossovers;
- has incorrect gradient;
- is immediately behind the kerb and therefore requires to be reconstructed to accommodate access for the new crossover.

ACCOMMODATION WORKS

Where the existing footpath is accommodated as part of the crossover construction:

- Expansion and contraction joints are required in accordance with the below specifications.
- The existing footpath is to be cut neatly to the nearest joint with a concrete cutting saw perpendicular to the existing alignment with no joint less than 900 mm apart as shown below.

Sketch showing details for the existing footpath against the back of the kerb:



2.6 PROTECTION OF INFRASTRUCTURE & THE PUBLIC DURING CONSTRUCTION

a) The property owner is responsible for ensuring that the road reserve infrastructure assets are protected and maintained in a condition that does not interfere or obstruct their function.

b) When constructing a crossover, the property owner will be responsible for the arrangement and all costs associated with the necessary protection, guarding (against vandalism), repair, relocation and adjustment of road reserve infrastructure assets. This includes obtaining service information (Dial Before You Dig), necessary permits and location of all services prior to excavation.

c) The owner must ensure that they:

- Protect the work, private (including reticulation and approved verge treatments).
- Safeguard the public.
- Allow reasonable access to all properties during progress of work.
- Protect all land monuments, property marks and all public and private property from disturbance or damage.
- Construct crossovers with full consideration of the protection and retention of street trees to enable them to fully mature, all in accordance with the City of Fremantle Verge Garden Policy.
- Crossovers are not constructed closer than 2.0 meters from the base of a street tree when fully mature.
- Provide all traffic management and safety equipment required. The cost for these will be at the property owner's expense.

2.7 MAINTENANCE OF CROSSOVERS

It is the responsibility of the property owner to maintain the crossover in a safe and serviceable condition.

2.8 RESPONSIBILITY BY OTHERS

a) Crossovers, road reserve infrastructure assets and adjoining property damaged from works undertaken by others (including the City) will be required to be reinstated to a satisfactory condition by the party who caused the damage.

b) Works undertaken by any person or contractor engaged by other parties is required to comply with these Technical Specifications.

2.9 REDUNDANT CROSSOVERS

a) The redundant crossover is to be removed immediately after the new crossover comes into use, at the property owner's expense.

b) Any depression created on the verge by the removal of the redundant crossover that is a

potential trip hazard must be levelled and made safe immediately after the redundant crossover is removed.

c) Road kerbing is to be reinstated once the redundant crossover is removed.

3.0 BRICK PAVING SPECIFICATIONS

3.1 GENERAL INFORMATION

3.1.1 Concrete Interlocking Brick Paving Units: Shall comply with the Concrete Masonry Association of Australia (CMAA) PA01 "Concrete Segmental Pavements – Detailing Guideline", PA02 "Concrete Segmental Pavements – Design Guide for Residential Access Ways and Roads" and PA04 "Concrete Segmental Pavements – Maintenance Guide".

3.1.2 Clay Brick Paving Units: Shall conform to AS/NZS4455 and AS/NZS4456. The bricks must be Heavy Duty bricks suitable for Commercial Traffic.

3.1.3 Dimensional Tolerance: Brick on flat shall have ±1 mm tolerance on all dimensions, providing the brick complies with the length to width relationship as determined by AS1255, clay building bricks.

3.1.4 Compressive Strength of Paving Units: The minimum compressive strength for paving bricks shall be in accordance with AS/NZS4456-5.

3.1.5 Manufacturer's Guarantees: Brick paving units used in brick paved crossovers shall be covered by manufacturer's guarantee for structural adequacy, soundness and satisfactory performance for a minimum period of 10 years from the date of laying the brick paving.

3.2 EXCAVATION AND PREPARATION OF SUB-GRADE

3.2.1 The existing ground and topsoil will need to be excavated to allow for the required finished levels which include a 100 mm thick base course layer.

3.2.2 The property owner is responsible for the disposal of all spoil material offsite.

3.2.3 Once the existing ground and topsoil has been removed to the required depth, the exposed ground surface (sub-grade) shall be properly compacted and trimmed to provide a uniform surface true to the levels and cross sections. Compaction tests shall achieve no less than seven (7) blows per 300 mm as measured on a standard Perth penetrometer.

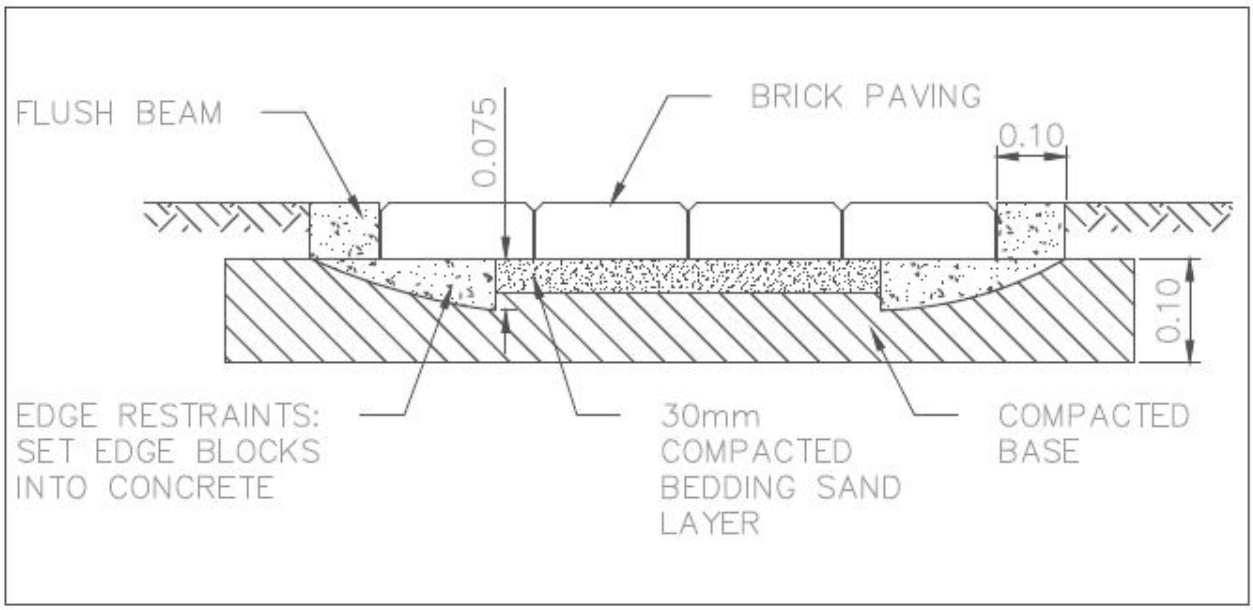
3.3 BASE COURSE CONSTRUCTION

3.3.1 The base course shall consist of a uniform layer, 150 mm thick, of either crushed limestone or rock base.

3.3.2 The base course material shall be loosely spread in a single layer to the required levels and compacted using overlapping passes of a vibrating plate compactor or vibrating pedestrian roller. After compaction, the material shall be trimmed to the final shape and grade.

3.4 EDGE RESTRAINTS

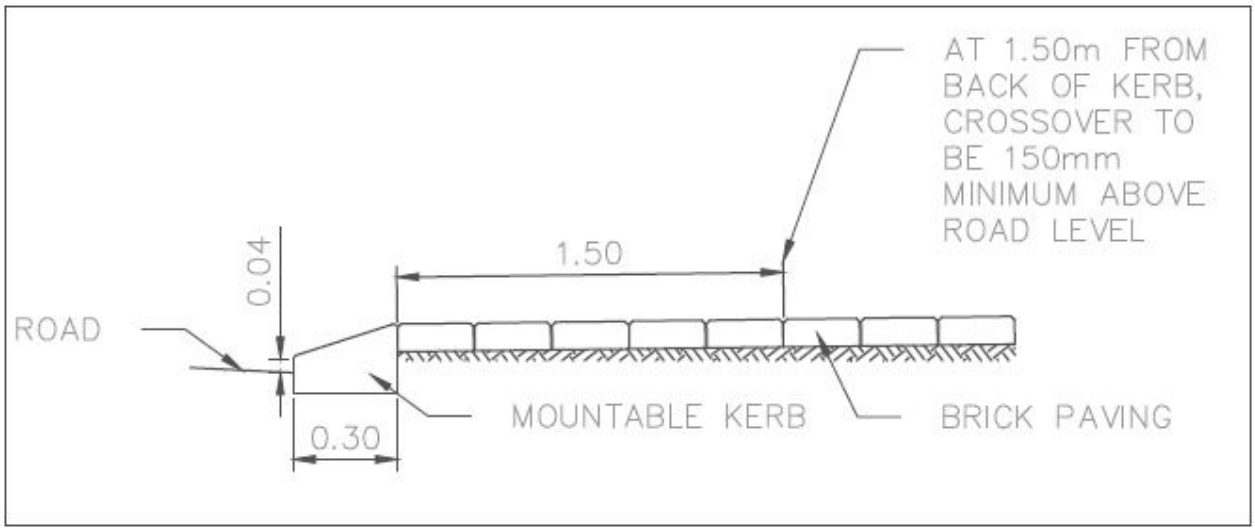
3.4.1 Side Edge Restraint.



3.4.2 The edge restraint shall consist of 25 MPa concrete with a maximum nominal aggregate size of 10 mm.

3.4.3 All edge restraints shall be without any cold joints throughout the whole length of the edge that is being restrained.

3.4.4 Front mountable kerb edge restraint.



3.5 SAND BEDDING LAYER

3.5.1 Bedding sand shall be well-graded sand and be free from soluble and deleterious salts or other contaminants that may cause efflorescence on the paving.

3.5.2 The sand bedding shall be screeded in a loose condition to the design profile to enable the bedding layer to be 30 mm thick.

3.6 LAYING AND COMPACTION OF BRICK PAVING UNITS

3.6.1 Before laying the paving units, the sand bedding is to be brought to design levels and profiles by not less than two (2) passes of a suitable plate compactor.

3.6.2 Brick paving units shall be placed on the screed sand bed to the nominated laying pattern.

3.6.3 Brick paving units shall be placed with 2 to 4 mm gaps between adjacent units ensuring all joints are correctly aligned.

3.6.4 Header courses should adjoin and be secured against an edge restraint.

3.6.5 Full paving units shall be laid first in each row.

3.6.6 Closure paving units shall be sawn and fitted accordingly. Such closure units shall be sized not less than 25% of a full paving unit.

3.6.7 Brick paving units must be cut using a purpose built brick-cutting machine utilising running water. Gaps between the paving units of between 25 mm and 50 mm wide shall be filled with 25 MPa concrete with a nominal aggregate size of 10 mm. The concrete shall be colour-matched to the proposed surrounding pavement colour with approved oxide pigmentation.

3.6.8 Brick paving units shall be neatly sawn to finish flush around any road reserve infrastructure assets.

3.6.9 Use of dry packed mortar (water added after packing) to fill gaps between paving units is unacceptable.

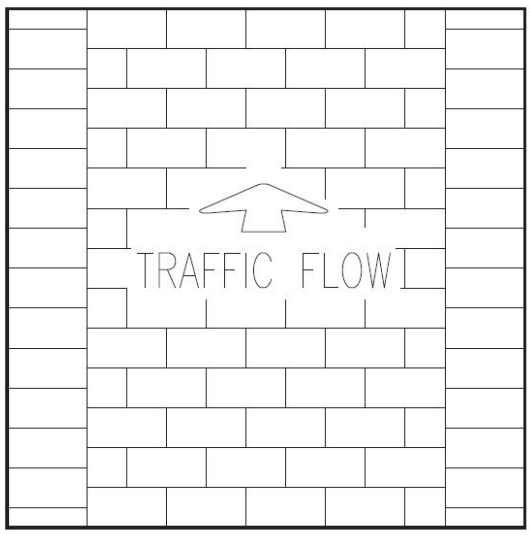
3.6.10 The compaction of the brick paving units shall be undertaken by a high frequency low amplitude mechanical flat plate compactor having a plate area sufficient to cover a minimum of 12 units and an energy output suitable to compact the bedding sand layer.

3.6.11 Compaction shall proceed as closely as possible to follow the laying of the brick paving units and prior to any traffic load.

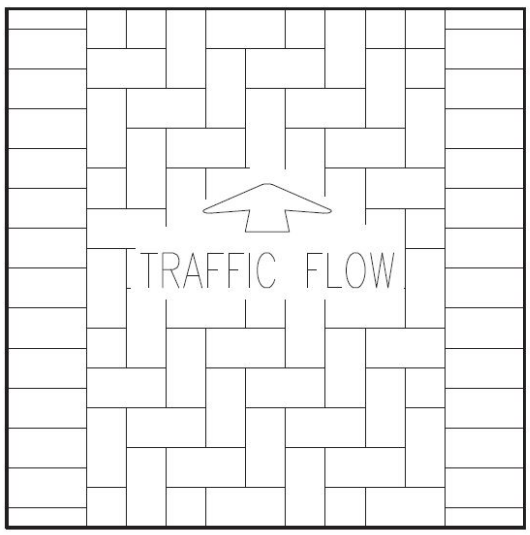
3.6.12 Any brick paving units damaged and cracked during compaction shall be immediately removed and replaced.

3.6.13 Paving shall be laid in accordance with manufacturer's recommendations and specifications.

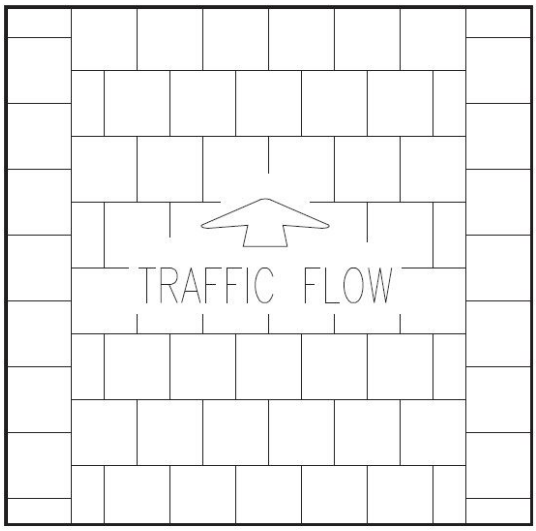
3.6.14 Brick paving patterns shall be constructed in accordance with the following laying patters:



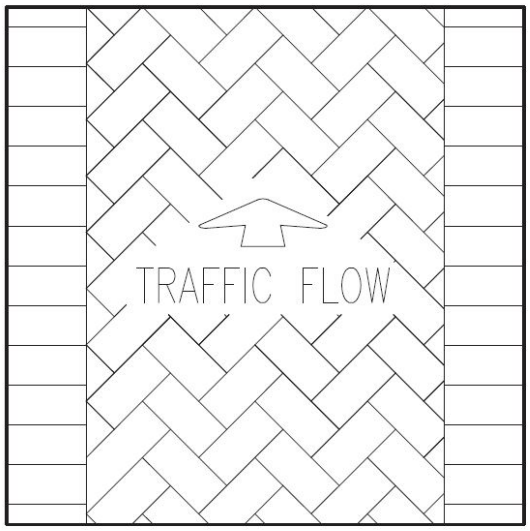
STRETCHER BOND (RECTANGULAR)
(230 x 115mm STANDARD)



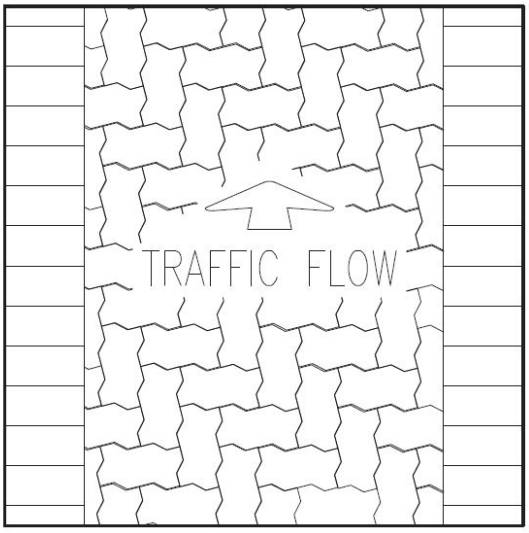
90 DEGREE HERRINGBONE
(230 x 115mm STANDARD
& 230 x 152mm PAVERS)



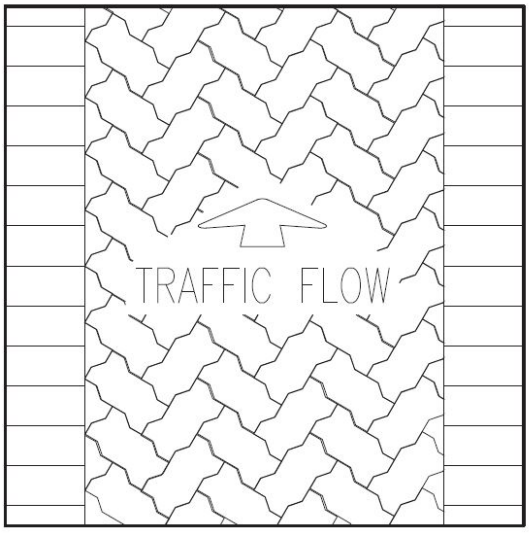
STRETCHER BOND (BLOCKS)
(190 x 190mm BLOCKS)



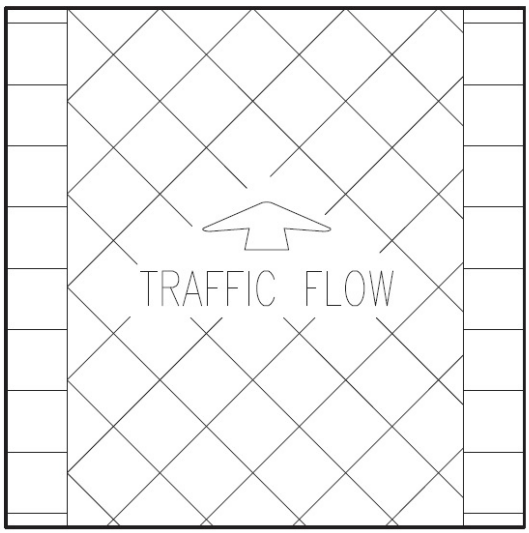
45 DEGREE HERRINGBONE
(230 x 115mm STANDARD
& 230 x 152mm PAVERS)



90 DEGREE HERRINGBONE
INTERLOCKING PAVERS
(230 x 115mm INTERLOCK)



45 DEGREE HERRINGBONE
INTERLOCKING PAVERS
(230 x 115mm INTERLOCK)



45 DEGREE DIAMOND
(190 x 190mm BLOCKS)

3.7 FILLING JOINTS

3.7.1 For all reinstatement and new works, the joint filling sand shall be spread over the pavement as soon as practical after compaction of the paving units.

3.7.2 The joint filling sand must be clean, free of all soluble and deleterious salts or other contaminants and stain the paving units.

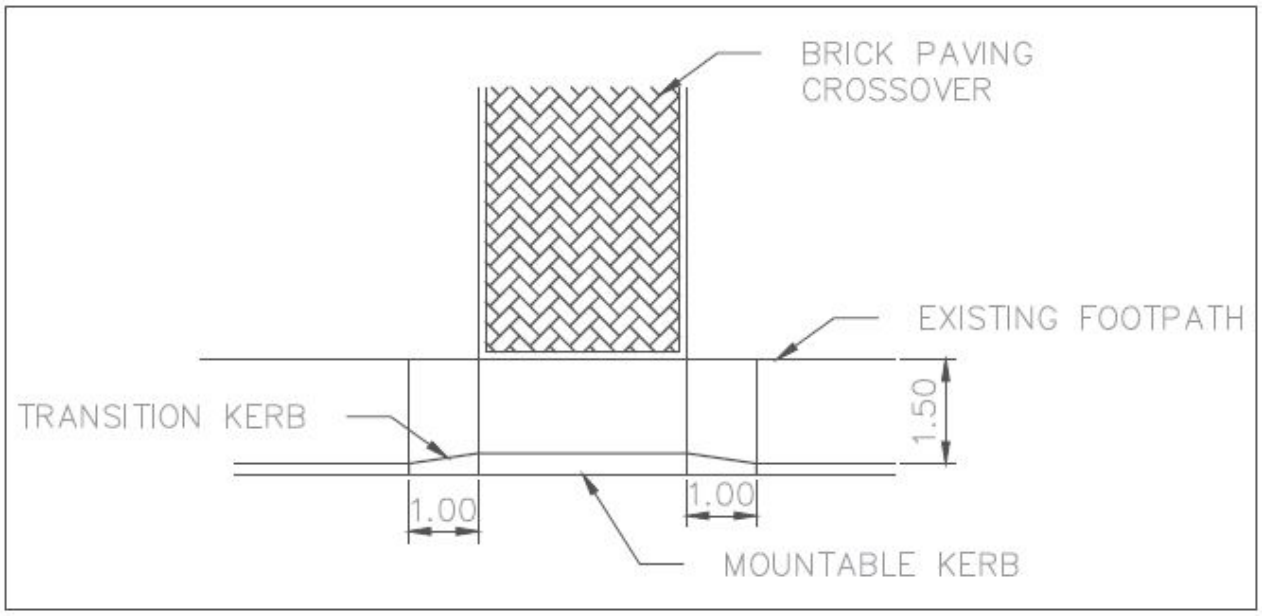
3.7.3 The sand should be placed onto the brick paving units and swept into all joints by means of a stiff broom. When joints are filled, the paving units should be run over with a vibrating plate compactor and then topped up and swept.

3.7.4 The sand must be swept to completely fill all joints.

3.7.5 All excess dry sand shall be removed immediately following works. This operation will be particularly important if the brick paving units are to be coated later.

3.8 KERBING

3.8.1 The adjacent existing kerb on either side of the crossover splays shall be neatly sawn as shown:



3.8.2 The cut out kerb segment shall be filled with 25 MPa strength concrete with maximum aggregate size of 10 mm with the kerbing infill formed to rise gradually from a 40 mm height as the splay tip, to the height of the existing kerb at the point of the saw cut.

3.9 TOLERANCES TO DESIGN PROFILE

3.9.1 The completed brick pavement shall not vary in level from the designed or specified level by more than ± 5 mm at any location, nor shall the finished levels vary by more than 5 mm against a 3 m straight edge when placed along a constant grade line.

3.9.2 The property owner shall finish all pavements to lines and levels to ensure positive drainage at 2 to 3% fall towards the road.

3.10 CLEAN-UP

3.10.1 The clean-up of a job site is the responsibility of the property owner including the removal and responsible disposal of all spoil generated by the works.

3.10.2 Clean-up shall be undertaken immediately on completion of works, or if works continue for more than one (1) day, on a daily basis.

3.10.3 If clean-up work is not to the City's satisfaction, the City may make good the site and charge the property owner accordingly.

4.0 CONCRETE SPECIFICATIONS

4.1 PLACING CONCRETE IN BAD WEATHER CONDITIONS

4.1.1 Concrete to be placed when the ambient temperature is between 10 - 36 degrees in Celsius and when the weather is dry.

4.1.2 The concrete is to be mixed, transported, placed and finished as rapidly as possible to avoid the risk of reworking the concrete during the curing period. The concrete surface is to be covered to prevent excessive dehydration and the resultant loss of strength of the crossover.

4.2 CONCRETE THICKNESS AND DIMENSION TOLERANCES

4.2.1 The following dimensions and tolerances are required:

4.2.1.1 The thickness of the finished concrete for residential crossover to be a minimum of 100 mm and for commercial crossovers to be a minimum of 150 mm.

4.2.1.2 F82 streel mesh reinforcement to be used for commercial crossovers.

4.2.1.3 Crossover surfaces deviation shall not exceed 10 mm in 3.0 meters.

4.2.1.4 Surface consistency, including joining to authority services such as manholes, etc. will not exceed 5 mm.

4.3 EXCAVATION

4.3.1 Excavation work shall:

4.3.1.1 Be carried out to the levels, lines and grades set out on site.

4.3.1.2 Be executed cleanly and efficiently to produce a sound base, free of depressions or soft spots or any deleterious materials to give the minimum required depth of concrete.

4.3.1.3 Ensure the reticulation in proximity to the site is either removed or capped prior to construction, and reinstated prior to backfill operation.

4.3.1.4 Ensure the excavated materials are removed from the site and the site is left in a clean and tidy condition.

4.4 COMPACTION

4.4.1 All excavation shall be thoroughly compacted to produce a minimum Perth penetrometer reading of seven (7) blows per 300 mm.

4.5 FORMWORK

4.5.1 Formwork will be of such cross-section and strength, so secured to resist the pressure of the concrete when placed.

4.5.2 The method of connection between sections will be such that the joints will not move in any direction.

4.5.3 The maximum deviation of the top surface of the form will not exceed 4mm in 3 metres of the inside face and not more than 4 mm in 3 metres longitudinally.

4.6 SETTING FORMS

4.6.1 When set, the form will be uniformly supported for its entire length at the specified elevation.

4.6.2 All forms will be clean prior to use and treated such that when stripped, concrete will not adhere to the form.

4.6.3 Forms are only to be removed from the concrete after a period of at least twelve (12) hours from time of placement.

4.7 CONCRETE

4.7.1 Only commercial pre-mixed concrete that complies with Australian Standard AS1379 is to be used.

4.7.2 Concrete must have a minimum compressive strength of 25 MPa at 28 days.

4.7.3 The maximum aggregate size must be 20 mm.

4.7.4 The slump at the point of delivery shall be 75 mm.

4.8 PLACING AND FINISHING

4.8.1 Placing:

4.8.1.1 All work performed will be of the highest quality, uniform appearance and executed in a tradesman-like manner.

4.8.1.2 Concrete is to be placed by shovelling, or alternative suitable placement methods to ensure maximum density.

4.8.1.3 The concrete is to be placed evenly to the specified depth.

4.8.1.4 The whole area being constructed in one continuous pour.

4.8.2 Finishing:

4.8.2.1 The final finishing is not to be undertaken until the bleed water has disappeared from the surface.

4.8.2.2 Finish concrete surfaces to be obtained by screeding to correct levels and floating to provide a non-slip dense surface.

4.8.2.3 The overall preferred final surface is to be a broom (scarification approximately 2mm deep) with a picture-framing finish. This is mandatory in the footpath alignment of the crossover.

4.8.2.4 The final surface finish is to be free of depressions, float marks, air voids, dust and deleterious material.

4.8.2.5 Care is to be taken to ensure that concrete slurry is not retained on manhole covers, utility boxes, the road and adjoining footpaths, etc.

4.9 EXPANSION / CONTRACTION JOINTS

4.9.1 Once laid, concrete can expand or contract and control joints are required to make allowance for this movement. Cracking will eventually occur and the joints are placed to accommodate these.

4.9.2 The required joints and their maximum spacing's are as shown on the sketch below.

4.9.3 When paths are repaired any existing joints are to be reinstated.

4.9.4 Proprietary concrete edging and jointing tools are to be used on all joints and edges.

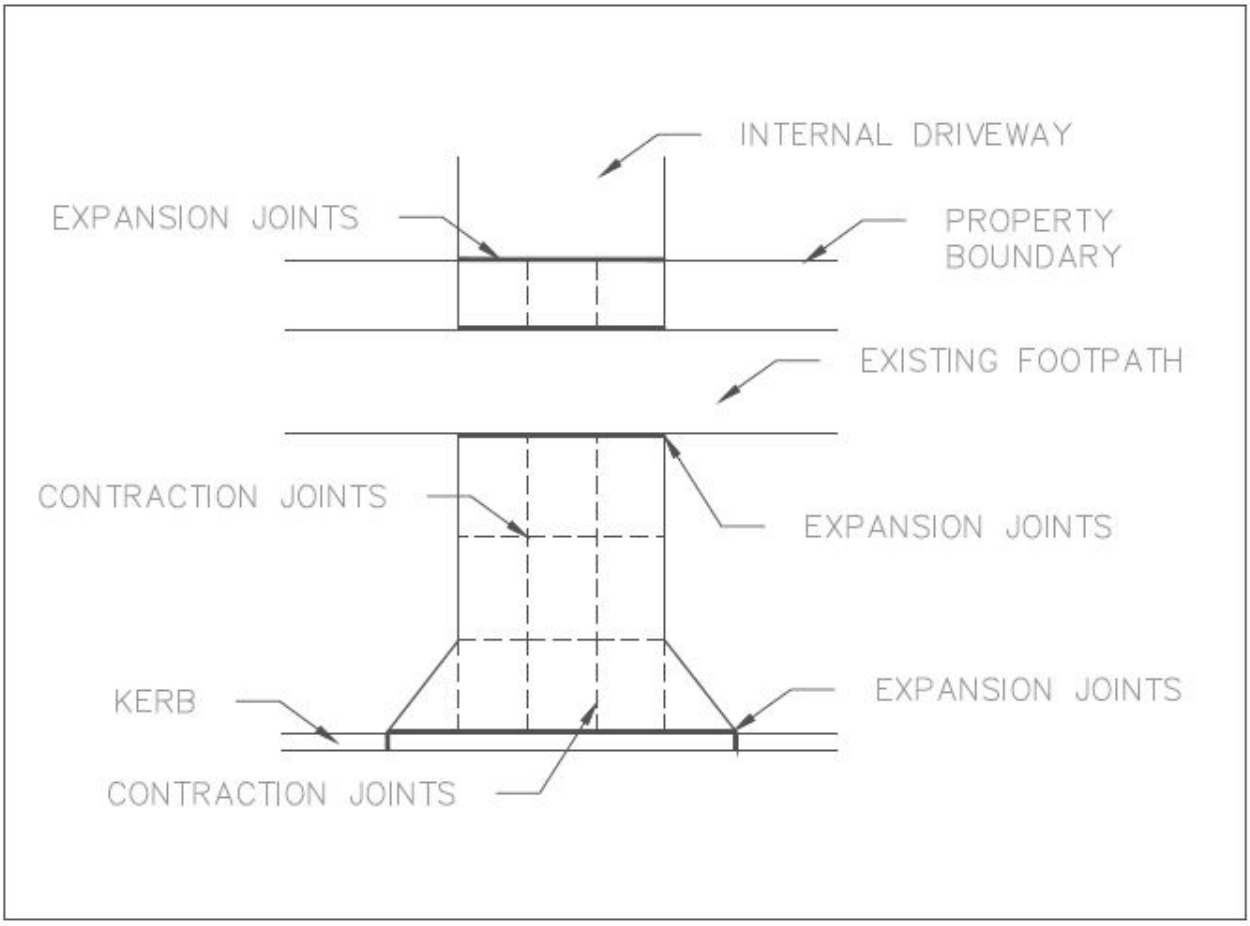
4.9.5 Expansion Joints:

- Constructed using "Meljoint" or similar materials that are commonly used for the construction of concrete footpaths and crossovers.
- Constructed at 12 mm wide for the full depth of concrete.
- Are required at the property boundary line between the inner driveway and the new crossover.
- Are to be installed at the junction of the crossover splay and the road side kerb.
- The joint material shall at no point protrude above the surface of the concrete.
- Constructed at right angles to the centre line of the footpath or crossover.

4.9.6 Contraction Joints:

- Shall be made in the form of straight-line dummy construction joints in the surface of the concrete.

- To match those existing on the adjoining internal driveway.



4.10 BACKFILL

4.10.1 Clean sand is to be used for backfill and uniformly compacted and levelled out to merge in with the existing verge.

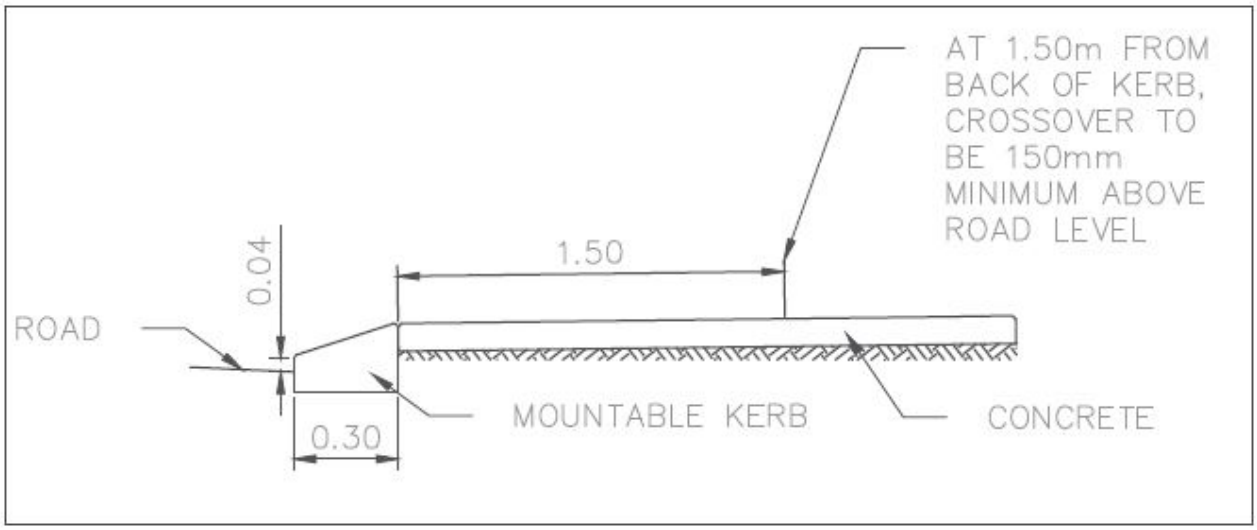
4.11 KERBING

4.11.1 Crossover splays / wings shall be formed to rise gradually to blend into the existing adjoining kerb.

4.11.2 Existing kerbing in the alignment of the proposed concrete crossover is to be removed as part of the excavation works.

4.11.3 The kerbs are to be cut at full depth using a concrete cutting saw prior to its removal.

4.11.4 Existing pre-cast kerbing shall be removed in a manner not to cause damage to existing kerbs or road pavement.



4.12 SPECIALISED MATERIALS

4.12.1 Crossovers constructed with other materials such as washed aggregate concrete or liquid limestone must be installed to the manufacturer's specifications for heavy vehicular traffic and comply with Australian Standards AS1379.

4.12.2 Thickness of washed aggregate and liquid limestone shall be as specified by the manufacturer, however no less than 100 mm for residential and 150 mm for commercial crossovers.

5.0 BITUMEN SPECIFICATIONS

Bitumen (asphalt) is not permitted for residential crossover. Any existing bitumen crossovers should be redesigned and upgraded to either a concrete or paved crossover.

Commercial bitumen crossovers shall be designed to meet the requirements of the specific traffic loads and vehicle access requirements.

5.1 SUB-BASE COURSE

5.1.1 Consist of crushed limestone compacted to the required 200 mm thickness.

5.1.2 Density of limestone at least 95% as determined in accordance with AS1289 "Method of testing Soils for engineering Purposes".

5.2 BASE COURSE

5.2.1 Consist of road base, compacted to give the minimum required 75 mm thickness.

5.2.2 Density of road base of at least 98% as determined in accordance with AS1289.

5.3 ASPHALT

5.3.1 Consist of 7 mm aggregate and minimum thickness of 25 mm.

5.3.2 Only to be laid upon dry and clean base.

5.3.3 No mixture shall be laid when the air temperature is below ten (10) degrees Celsius.