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1 Introduction

1.1 Background

The objective of this project is to, on behalf of WALGA, compile a document of Standard Guidelines for the Planning, Design and Construction of domestic crossovers in residential areas.

This set of Guidelines is based on the harmonisation of a number of current Local Government and Main Roads practices in the Perth Metropolitan Area to enable a seamless delivery of infrastructure across Local Governments.

This document comprises guidelines for planning and design of residential crossovers, including an example construction specification in Appendix A.

1.2 Methodology

Crossover design is largely governed by a combination of engineering limitations with respect to disabled access, drainage, sightlines and other safety impacts, as well as the general geometric and construction requirements.

This Guideline provides for crossover design that references Statutory and best-practice guidance documentation which includes the following:

- Austroads Guide to Road Design
- State Planning Policy 3.1 - Residential Design Codes (R-Codes)
- WAPC Liveable Neighbourhoods

The Guideline will be most applicable in greenfield developments, where lot layout and access configuration can be controlled to a higher degree, however the principles remain valid for brownfield development, and efforts should be made to maximise adherence to the Guidelines to support safe and effective function.

Information from Local Governments has been obtained to determine standard requirements for driveway construction and location, through reference and comparison to existing Local Government Crossover Standards.

Consultation with Local Government representatives has allowed the integration of practical concerns and issues into the development of these Guidelines.
2 Planning Guidelines

2.1 Crossover Density
The design principle for designing crossovers in Western Australia is to design for the least amount of crossovers in a given area where possible (R-Codes). This improves the safety of path users and lowers costs associated with constructing and maintaining crossovers. Minimising the number of crossovers also reduces the level of conflict and friction along busier roadways, and creates additional space for street trees, pedestrian crossing and on-street parking.

The R-Codes specify a maximum density of 1 crossover per 20m of frontage, where housing density is greater than R30. Crossovers to be provided where required for housing density less than R30. Narrow lots shall be constructed with paired crossovers to minimise conflict and retain verge space for street trees, lighting, overhead power and on-street parking.

All residential lots are entitled to access irrespective of the constraints of location and sightlines (AS2890.1: Clause 3.2.3a).

2.2 Crossover Location and Position
Crossover location shall be determined and crossovers designed to address the following issues and criteria:

2.2.1 Prohibited Locations
Australian Standards (AS2890.1: Figure 3.1) sets out exclusion zones for access driveways related to the proximity of adjacent intersections (see Figure 1 below). Additional restrictions are placed on non-domestic driveways and should be discussed with Local Government.

Figure 1 Permitted Locations for Crossovers
2.2.2 Sightlines to path users

Crossovers are to be positioned such that sight lines between path users and vehicles are unobstructed by permanent fixtures (fences, trees, etc).

AS2890.1: Figure 3.3 defines a sight triangle of 2.0 x 2.5m at the intersection of the driveway and path edge, within which walls, fences and other structures are to be truncated or reduced to no higher than 0.75m.

![Figure 2 Minimum pedestrian sightlines](image)

2.2.3 Distance to obstructions

Crossovers shall be located at a minimum distance to obstructions as follows:

- Side-entry pits: 1.0m
- Street trees: 1.5m
- Utility boxes: 1.0m
- Street Lights: 1.0m (as required by Western Power’s Guidelines for Placement of Power Poles within Road Reserves in Built-Up Areas, 2006)

If crossovers must be constructed within this distance, the obstruction shall be relocated wherever possible.
2.2.4 Sight distance to roadway traffic

The requirements for minimum sight distance at the road interface are defined by Australian Standards (AS2890.1: Figure 3.2), see Figure 3 below.

![Figure 3: Sight distance calculation geometry](image)

The distance $Y$ is determined according to the prevailing speed along the adjoining roadway, chosen as the greater of posted speed limit or observed 85th percentile speed, shown in Figure 4:

![Figure 4: Minimum sight distance requirements](image)

<table>
<thead>
<tr>
<th>Frontage Road Speed (km/hr)</th>
<th>Domestic Property Absolute Minimum (m)</th>
<th>Minimum SSD (m)</th>
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<td>110</td>
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</table>

Wherever practical, a domestic property access shall satisfy the Desirable 5 Second Gap or Minimum SSD (Stopping Sight Distance) values defined above.

To ensure adequate sight distance, all visually impermeable walls, fences, vegetation and other obstructions shall be maintained no higher than 1.2m within the identified area.
2.3 Paired Crossovers
Paired crossovers are recommended for narrow lots. Where residential properties are located along a Neighbourhood Connector streets with between 5,000 to 7,000 vehicles per day, paired driveways with the ability to reverse into a parking lane are recommended (*R-Codes and Liveable Neighbourhoods*).

2.4 Geometry
Crossovers shall be aligned at right angles to the street alignment, wherever possible.

2.5 Assessment Criteria
A list of criteria for crossover designs are provided below:

- Crossovers shall be adequately paved and drained in accordance with Local Government requirements
- Appearance and character of the crossover to be clear to vehicle drivers that pedestrians have the right of way
- Crossovers shall provide unobstructed vehicle access to the individual lots and motorists must be able to enter or reverse from the lot in a single movement
- If the frontage road is two-way, has more than two lanes and there is a provision for right turns either into or out from the crossover, then additional consultation with Local Government is required

Figure 5 Example of Good Design
3 Design Guidelines

3.1 Geometry

3.1.1 Width
Sufficient width and an adequate splay configuration must be provided for the safe turning movement of vehicles both from and onto the carriageway.

The requirements of AS2890.1 have precedence with respect to minimum design requirements and are replicated as follows for residential crossovers under the following classification:

> User Class 1A: Residential domestic and employee parking (AS2890.1: Table 1.1)
> Access facility Category 1: <25 bays (AS2890.1: Table 3.1)

A single driveway width is defined to be a minimum of 3.0m and a maximum of 6.0m (AS2890.1 Table 3.2). Liveable Neighbourhoods (2015) and R Codes recommend a maximum driveway width of 4.5m where it meets the street.

Main Roads defines a minimum driveway radius of 1.5m (Main Roads WA: Urban Driveway Setout – Light Vehicles Drawing No. 200431-0198-1).

Many Local Government Guidelines allow for apron widening ‘wings’ rather than radii at the road boundary. The width requirements for these wings is related to the swept path of the entering and egressing vehicle as well as the need to maintain an effective transition where a path is located at the back-of-kerb.

Comparison of ‘wing’ dimensions across a variety of Western Australian Local Governments suggests an appropriate standard width is 1.5m, consistent with the general intent of Main Roads WA recommendations.

Where paired driveways are provided, combined driveway width shall be 6m (Liveable Neighbourhoods 2009: Clause R51).

3.1.2 Length
Sufficient storage length must be provided (crossover length) for a vehicle to stand clear of the carriageway. Where the entrance has a gate, the set back from the edge of the carriageway to the gate shall be a minimum of 6m to allow for this (Main Roads Driveways Design Guide).

3.1.3 Pedestrian Interface
Crossovers are defined to be ‘Road-Related Areas’ under the Road Traffic Code 2000. Pedestrians and cyclists in these areas have priority over vehicles. For this reason it will be recommended that the pedestrian infrastructure be provided in a continuous manner across all residential driveways, maintaining path crossfall and material in preference to the crossover construction. Therefore, the ultimate crossover must be designed to match path levels, where applicable.

Pedestrian paths are recommended not to be placed at the property boundary due to comprised sightlines and potential conflicts with reversing vehicles issues. This is particularly important given the recent amendment to the Road Traffic Code 2000 allowing cyclists of all ages on all footpaths.

Pedestrian/cycling infrastructure in residential streets should be located near to the kerb, with an appropriate separation to maintain a safe distance to traffic.

The following design standard for grades and levels is considered in the context of this path position, which represents the most constrained option for crossover construction, as shown below in Figure 7.
3.1.4 Grades and Levels

> Path construction guidelines dictate a maximum crossfall of 2.5% to cater for people who have a disability (Austroads Guide to Road Design 6A, Clause 7.6). To allow the path to shed water and to avoid ponding, a crossfall of 2.0-2.5% is recommended.

> The maximum longitudinal gradient of a crossover at the property boundary is defined by Australian Standards to be 5% (AS2890.1:2004, Clause 2.6.2 and Clause 3.3a). This allows safe Disability Access from the footpath to the property boundary.

> Main Roads advises that at a point 1.5m into a crossover there shall be a vertical rise of at least 100mm from the invert of the kerb (Main Roads, Driveway D12#57413).

> The maximum gradient of a crossover is defined in IPWEA’s Subdivision Guidelines as 1 in 8 (12.5%).

> Austroads’ Guide to Road Design - Part 6A: Pedestrian and Cyclist Paths recommend that shared paths (i.e. paths intended to be used by both cyclists and pedestrians) be an absolute minimum of 2.0m and a desirable minimum of 2.5m in width. They should be located at least 500mm, and preferably 1.0m from any significant obstruction or hazard, including the roadway, to provide sufficient separation and safety.

It is therefore advised that the most constrained design for residential crossovers consists of a 2.5m shared path, located 500mm from the edge of kerb, as shown below in Figure 8.
In the absence of a pedestrian path, the maximum grade for a crossover is defined to be 12.5%, noting that the grade at the property boundary must be a maximum of 5% (AS2890.1: Clause 2.6.2, see Appendix A: Crossover – Cross Section and Grades).

3.2 Kerbing and Edging

Existing semi-mountable and barrier kerbing shall be removed from the crossover location, and replaced by the crossover kerb defined below. The kerb is to be cut with a concrete saw and removed without damaged to road pavement.

3.2.1 Crossover Kerb Design

To provide smooth transition from the road edge to the crossover and particularly to the pedestrian path in the most highly constrained situation, the kerb profile must provide 160mm vertical rise from the invert of the kerb, over a 500mm distance.

The profile of the recommended crossover kerb is consistent with an extended version of IPWEA Mountable Kerb Detail (IPWEA Subdivision Guidelines Figure 3.2: Kerbing Profiles), as shown in Figure 9 and Figure 10.

Figure 7 Longitudinal Driveway and Verge Section Design

*A 2.5m width may not be achievable in all cases

Figure 8 IPWEA Subdivision Guidelines Standard Mountable Kerb Detail
To achieve the required height at 500mm, it is recommended that a standard mountable kerb profile is installed and in-situ concrete poured to fill the gap (200mm) at the same grade as the mountable kerb. Alternatively, a Crossover Kerb profile could be used to improve constructability, with dimensions shown in Figure 11.

The use of keyed kerbing is recommended on sweeping bends and may be a requirement of Local Government. Figure 12 provides an example of best practice alignment and construction of crossover kerbs.
3.2.2 Edging

A restraining edge is required for Bitumen/Asphalt and Block paving residential crossovers, as follows:

3.2.2.1 Edge Restraint for Block Paved Crossovers

Rigid block or concrete edging is to be provided at the perimeter of all block paved crossovers to prevent lateral movement of the header course.

Restraints shall be robust enough to withstand vehicle impact and prevent the lateral movement of the paving blocks. Edge restraints shall be installed to the same level as the crossover.
3.3 Block Pavement Structures

Applicable block paving patterns for driveway crossover are stretcher bond and 45 or 90 degree herringbone pattern as shown in Figure 13. The most preferred pattern is 45 or 90 degree herringbone because the pattern tightly interlocks the bricks and it can handle significant weight, which is ideal for driveways.

![Block Pavement Patterns](image126x328.png)

Figure 12 Residential Block Paving Patterns
3.4 Existing Footpaths

The path shall be kept in a safe condition at all times, with appropriate signage installed, in accordance with the relevant Australian Standards, warning pedestrians of construction works until reinstatement work is completed.

Where the existing footpath or shared path is in-situ concrete, in good condition and is over 100mm thick adjacent to the lot boundary or kerb line, the crossing shall be constructed either side of the concrete path and matched up with it (see Section 2).

The existing footpath shall be removed and replaced where it:

> Is damaged or less than 100mm thick for residential crossovers;
> Has an incorrect gradient;
> Is immediately behind the kerb and is required to be reconstructed to accommodate construction of the new crossover.

3.5 Culverts

Where a residential crossover traverses an open drain or swale, a culvert will be required. This situation is common in regional and rural developments, with design highly dependent on the local environment. Refer to Local Government Specifications for culvert design.
4 References

Austroads Guide to Road Design - Part 3: Geometric Design
Austroads Guide to Road Design - Part 6A: Pedestrian and Cyclist Paths
Guidelines for Placement of Power Poles within Road Reserves in Built-Up Areas
IPWEA Local Government Guidelines for Subdivisional Development
Main Roads WA Driveways Design Guide
Main Roads WA Standard Drawings for Driveways
Main Roads WA: Urban Driveway Setout – Light Vehicles Drawing No. 200431-0198-1
Road Traffic Code 2000 (WA)
State Planning Policy 3.1 - Residential Design Codes (R-Codes)
WAPC Liveable Neighbourhoods
APPENDIX A
EXAMPLE CROSSOVER SPECIFICATIONS
CONSTRUCTION OF STANDARD RESIDENTIAL CROSSOVER

1 General

1.1 Boundary Clearance
   a) Minimum 1.0m from the side property line.
   b) Minimum 1.0m from the corner truncation peg.
   c) Minimum 0.5m to the side property line where a battle-axe driveway services a subdivided block.

1.2 Street Furniture Clearance
   a) Side-entry pits - 1.0m.
   b) Street trees - 1.5m.
   c) Utility boxes - 1.0m.
   d) Street Lights - 1.0m.

2 Schedule of Requirements
   a) Minimum width – 3m
   b) Maximum width – 6m
   c) Maximum width for paired crossover – 6m
   d) Minimum length – 6m
   e) Depth –
      a. Concrete: 100mm minimum
      b. Bitumen/asphalt: 25mm minimum
      c. Brick paving: paver depth to be 60mm minimum
   f) Crossover Splays – The width of ‘wings’ or crossover splays on the apron at kerb line shall be minimum 1.5m. If kerb radii is used instead of wings, the radius shall be 1.5m.
   g) Gradient and Levels – Maximum crossover gradient from the kerb line to the property boundary is 2.5% when a pedestrian path is present. When pedestrian path is absent, maximum crossover grade is 12.5%. At the property boundary, the maximum grade is 5%.
   h) Levels – Contact the Local Government for the required crossover levels. Main Roads 1.5m into a driveway there should be a vertical distance of at least 100mm from the invert of the kerb. As a general guide, the crossover shall match up with:
      a. The existing verge level if it is of uniform height with the adjacent verges.
      b. The average level of the two adjacent crossovers or verge levels where there are no crossovers.
   i) Crossover shall not be constructed closer than 6m, measured from the crossover splay, to the intersection of property lines at street corners as per AS 2890.1. For crossover located near traffic lights, Main Roads Western Australia guidelines and standards apply. Additional restrictions are placed on non-domestic driveways and should be discussed with Local Government.
j) Crossovers shall be constructed at right angles (90 degrees) to the street alignment, wherever possible.

k) Surface finish shall provide a non-slip surface.

3 Construction

3.1 Excavation

Excavation for the crossover shall be taken to the levels, lines and grades as set by the Local Government. All excavations shall be executed cleanly and efficiently to provide for a consolidated sound base free of depressions, soft spots or any deleterious materials.

a) The contractors shall be responsible in ensuring that all excavated material is removed from the site at the same time as the excavation is carried out. No excavated material shall be stockpiled on site or buried in the verge.

b) Existing barrier or mountable type kerbing is to be cut with a concrete saw and removed without damage to road pavement, remaining kerbing or services. To facilitate neat removal and subsequent reinstatement, the concrete or bitumen to be removed shall be completely separated from the adjoining concrete or bitumen by means of a concrete or bitumen saw.

c) When an existing concrete footpath has thickness of 100mm or more, in good condition, and adjacent to the lot boundary or kerb line, the crossing shall be constructed either side of the concrete path.

The existing footpath shall be removed where it is damaged, less than 100mm thick, has an incorrect gradient, and/or where the removal of the footpath is necessary for the construction of the crossover to take place.

d) An existing asphalt footpath shall be rectified when it is damaged, less than the nominal thickness by more than 10%, has an incorrect gradient, and/or where the removal of the footpath is necessary for the construction of the crossover to take place.

3.2 Concrete Crossover

a) Excavation – The excavation for the crossover shall be taken to the levels, lines and grades as set by the Local Government. All excavations shall be executed cleanly and efficiently to provide for a consolidated sound base free of depressions, soft spots or any deleterious materials.

   a. The subgrade shall be compacted to a minimum of 95% MMDD in accordance with AS1289 clause 5.4.1 or AS1289 clause 5.4.2.

b) Concrete – All concrete used shall develop compressive strength of 25 MPa at 28 days. The concrete to be used shall be composed of a mixture of sand, cement, aggregate and water to give strength specified with a maximum slump of 90mm. Concrete and its placement shall conform to AS 1379 (1991) and AS 3600 (1988) respectively.

c) Placing concrete – The base shall be thoroughly and evenly moistened, but not saturated, prior to placing concrete. All stones or other deleterious materials shall be removed from the base prior to pouring concrete. Concrete shall be evenly placed to the depth specified and shovelled into position continuously and spaded, especially at all edges, to give maximum density. No concrete shall extend on the road surface. No break in operation shall be permitted from time of placing concrete to finishing.

l) Kerbing – To provide smooth transition to the verge level and particularly to the pedestrian path in the most highly constrained situation, the kerb profile must achieve 160mm vertical height from the invert of the kerb, over a 500mm distance. To achieve the required height at 500mm, it is recommended that an IPWEA standard mountable kerb profile (of 300mm width) is installed and in-situ concrete poured to fill the gap (200mm) at the same grade as the mountable kerb. Alternatively, a Crossover Kerb profile (shown in the attached drawings) could be used instead.
d) **Finishing** – Surface finish shall be obtained by screeding to the correct levels and finished with a transverse brooming tool to provide a non-slip dense surface, free of any depressions, float marks, irregularities, honeycomb sections or slurry likely to cause excessive surface wear.

e) **Jointing** – Expansion joints shall be full depth joints and filled with bitumen-impregnated canite or similar approved material and butyl mastic sealer. Expansion joints should be located at:

   a. The lot boundary and both sides of a path where there is a path and also at the back of the kerb section adjoining the crossing.

   b. Where it adjoins rigid structure or any public utility structure.

   c. The ends of the existing kerbing where kerbing has been removed.

   d. 6m maximum spacing on long crossings.

Contraction joints shall be made with an approved jointing tool with 2m maximum spacing either laterally or longitudinally.

### 3.3 Bitumen/Asphalt Crossover

a) **Asphalt** – Black asphalt shall be type AC10 with 50 Marshall Blow, red asphalt shall be type AC10 Laterite with 50 Marshall Blow in accordance with IPWEA/AAPA specification for supply and installation of asphalt road surfacing.

b) **Laying** – Asphalt work should not be done in cold, windy or wet conditions as thin layers of asphalt (30mm or less) cool rapidly in these situations and will not be compacted adequately. The finishing work shall be undertaken while the material is hot, to produce a fine, dense, smooth surface, free of surface voids.

c) **Base** – Base course material is to have a total consolidated thickness of not less than 100mm for residential crossover. Material to be spread, rolled, water-bound and corrected as necessary to shape, grade, etc. Base course material shall have a minimum CBR of 80 with a MMDD of 95%.

d) **Edging** – The edges of the crossover are to be formed using a flexible 30mm deep steel border pegged to shape (to be removed on completion), to provide a symmetrical and uniform shape and appearance. A gravel shoulder, 500mm wide and 100mm thick, should be provided at the edges of the crossover to finish flush with the top of the asphalt surface.

Concrete kerb laid to finish flush with the final surface of the crossover may also be used as edge restraints.

e) **Kerbing** – To provide smooth transition to the verge level and particularly to the pedestrian path in the most highly constrained situation, the kerb profile must achieve approximately 160mm vertical height from the invert of the kerb, over a 500mm distance. To achieve the required height at 500mm, it is recommended that an IPWEA standard mountable kerb profile (of 300mm width) is installed and in-situ concrete poured to fill the gap (200mm) at the same grade as the mountable kerb. Alternatively, a Crossover Kerb profile (shown in the attached drawings) could be used instead.

f) **Compaction** – The base course shall be placed in layers and compacted to 98% of the maximum dry density when tested in accordance with AS1289 E2.1-1977. The subgrade shall be compacted to a minimum of 95% MMDD in accordance with AS1289 clause 5.4.1 or AS1289 clause 5.4.2.

g) **Surface** – The surface is to be again reshaped and gravel added where required to give correct shape. The surface is to be well watered and rolled with a vibrating roller, slurried and swept clean of any loose material.
3.4  Block Paved Crossover

a)  **Base Course** – Base material (crushed limestone of 50mm maximum particle size) shall be compacted to give a 100mm thickness, having a density of at least 95% of the Modified Maximum Dry Density determined in accordance with AS128EZ.1.1977.

b)  **Bedding layer** – The bedding layer shall have a pre-compact depth of 20mm to 40mm, such that the final compacted thickness is within a tolerance of 25mm ± 10mm. The bedding layer shall be well-graded concreting sand, free of deleterious soluble salts and other contaminants. The sand should be of uniform moisture content, and is to be spread over the compacted base course and screeded in a loose condition.

c)  **Laying** – The paving units shall be laid onto the loose bedding sand with a gap of approximately 2mm – 4mm between adjacent bricks. Part bricks shall be neatly cut to size with hydraulic guillotine, bolster or saw.

d)  **Compaction** – The pavement should be compacted and brought to level by not less than three passes of the vibrating plate compactor. Plywood of 12mm thickness shall be used either attached to the base of the compactor or laid on the bricks as a cushion to prevent damage to the surface.

e)  **Joint filling** – The sand used for joint filling should be finer than the bedding layer. As soon as possible after compaction, dry sand for joint filling shall be broomed over the pavement and into the joints. Excess sand shall be removed as soon as the joints are filled.

f)  **Edge restraint** – Edge restraint shall be provided to withstand vehicle impact and prevent lateral movement of the paving bricks. Edge restraint can be provided by placing at least 100mm wide (preferably 250mm wide) and 100mm deep minimum cast in-situ concrete strip or precast concrete kerb along both sides of the crossover.

g)  **Kerbing** – To provide smooth transition to the verge level and particularly to the pedestrian path in the most highly constrained situation, the kerb profile must achieve approximately 160mm vertical height from the invert of the kerb, over a 500mm distance. To achieve the required height at 500mm, it is recommended that an IPWEA standard mountable kerb profile (of 300mm width) is installed and in-situ concrete poured to fill the gap (200mm) at the same grade as the mountable kerb. Alternatively, a Crossover Kerb profile (shown in the attached drawings) could be used instead.

3.5  Innovation in Construction Methods

The above recommendations do not preclude the application of innovative construction methods, such as permeable pavements or recycled materials. However, any such departures from standard design methods should be discussed with Local Government through the crossover application process.
Table 1-1 Schedule of Requirements

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<td>Bituminous Concrete</td>
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<td>100mm</td>
<td>Sand Bedding</td>
<td>25mm</td>
<td>Bituminous Concrete</td>
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4 Contractor Responsibilities

a) Cutting existing barrier kerbing with a concrete saw and removing the same without damage to pavement or remaining kerbing or services.

b) Removal and disposal of all surplus material from the site and leaving the site in a clean and tidy condition at all times.

c) Removal of all formworks without damage to concrete or pavement or existing kerbing.

d) Reinstatement to kerbing, concrete or brick paving or bituminous road surfaces damaged during the course of the works.

e) The identification, notification and protection of all services.

f) The repair of any damage to Public Utility Service or any other thing damaged during the course of works.

g) The protection of private property from damage and the new crossover surfaces from the rain damage or vandalism.

h) Liaison with the ratepayer to provide for access and egress and notification of intention to commence works.

i) Good public relations being retained with the Local Government and ratepayers generally.

j) Cutting of all bitumen where removal is specified.

k) To pay all fees charged by Waste Disposal Sites in respect of excavated material.

l) Reinstatement of existing slab footpaths to abut newly constructed crossover.

m) Traffic management and the safety of vehicles and pedestrians affected by the works.

n) Notification and compliance with all the requirements of the relevant local government or road authority.
**CROSSOVER - CROSS SECTION AND GRADIENT**

- Transition Zone
- Property Boundary
- Garage Slab
- Garage

**CROSSOVER - PLAN LAYOUT**

- Expansion Joints (to be placed around footpath if present)
- Construction Joints
- 300 mm Road Reserve
- Kerb (refer to kerb profile details)

**TECHNICAL NOTES:**

1. Refer to AS 2890.1 Figure 3.1 for crossover location and positioning.
2. Refer to AS 2890.1 Figure 3.3 for pedestrian sightlines.
3. Crossovers should be located at a minimum distance to obstructions as follows:
   - 3.1. Side-entry pits: 1.0m
   - 3.2. Street trees: 1.5m
   - 3.3. Utility boxes: 1.0m
   - 3.4. Street lights: 1.0m

**GENERAL NOTES:**

- Refer to A301-7.1.1 for crossover location and paving.
- Refer to A1000.8.1 for pavement material expansion joints.
- Refer to A1000.8.1 for pavement material construction joints.
- 300 mm spacing.
CROSSOVER - CROSS SECTION AND GRADINGS

TRANITION ZONE

CROSSOVER - PLAN LAYOUT

TECHNICAL NOTES:

1. REFER TO AS 2890.1 FIGURE 3.1 FOR CROSSOVER LOCATION AND POSITIONING.

2. REFER TO AS 2890.1 FIGURE 3.3 FOR PEDESTRIAN SIGHTLINES

3. CROSSOVERS SHOULD BE LOCATED AT A MINIMUM DISTANCE TO OBSTRUCTIONS AS FOLLOWS:
   3.1. SIDE-ENTRY PITS: 1.0M
   3.2. STREET TREES: 1.5M
   3.3. UTILITY BOXES: 1.0M
   3.4. STREET LIGHTS: 1.0M

EXPANSION JOINTS (TO BE PLACED AROUND FOOTPATH IF PRESENT)

CONSTRUCTION JOINTS

1500 mm TO 3000 mm SPACING

300 mm ROAD RESERVE

KERB (REFER TO KERB PROFILE DETAILS)

REFER TO CONSTRUCTION MATERIAL SPECIFICATIONS

PAVEMENT MATERIAL