Penrith CBD

Public Domain Technical Manual

Prepared for Penrith City Council
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8th October 2010

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Revision	Date	Notes/ Description
A	08.10.10	Issue complete document
B	29.04.11	Reissue whole document
C	25.02.13	Incorporate Access Audit recommendations (PCC)
D	10.01.14	Changes to kerb design (by CLOUSTON Associates at the request of PCC)

contents

contents

1.0 INTRODUCTION

1.1 Background

In 2006, the NSW Department of Planning identified Penrith as a regional city and subsequently worked with Penrith City Council to develop a City Vision, LEP, DCP and a Civic Improvement Plan. Since 2006, Council staff have continued to refine these documents.

1.2 Purpose

The technical manual will support the DCP that will guide both Council and Developers in the implementation of the Public Domain in the Penrith CBD.

The Technical Manual aims to:

- Clearly define new standards for the Public Domain.
- To enable consistent streetscape treatments to reinforce the character of Penrith.
- Provide the design requiremetns to facilitate a built environment that is inclusive participation of all people including people with disabilities.
- To implement council's sustainability principles in the selection of materials and processes.
- To standardise construction methods through standard drawings and specifications relating to the Public Domain.

1.3 Structure

The Technical Manual covers design and layout principles for streets. The main section is comprised of standard details and performance criteria to be used as a guideline for design and construction for streets and squares within the study areas. This includes a standard range of street furniture, lighting, paving and surface treatments to ensure continuity of maintenance practices, and to unify the Public Domain.

1.4 Use of the Manual

The Technical Manual is intended to guide and coordinate the design and construction of improvements to the public domain. It provides a coordinated approach to design, construction and maintenance of the public domain. It is intended for use by:

- The general public in understanding the process for developing strategies to upgrade the area,
- Developers, designers, and consultants preparing proposals affecting the public domain and its components,
- Consent authorities assessing and approving the proposed development; and
- Council officers, in preparation of developed designs for the CBD.

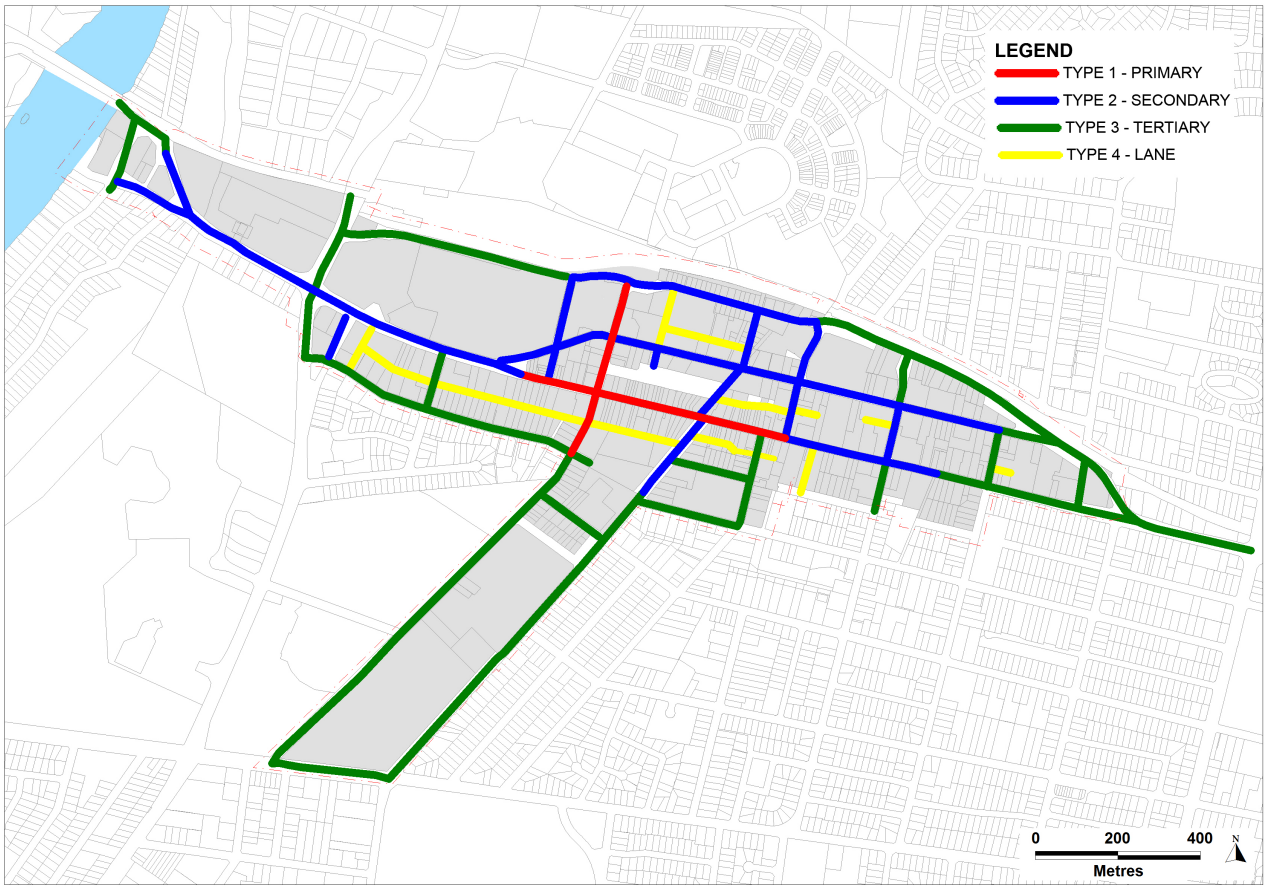
The Technical Manual will be a controlled document that will be periodically updated in line with changes in maintenance requirements and construction technology, and also as designs for each area are developed.

1.5 Related Documents

Readers should refer to the following documents for development of designs for upgrading the public domain:

- LEP - 2008 - Penrith City Centre
- DCP Penrith City Centre - 2010
- Penrith City Centre Strategy - July 2006
- All references to Australian Standards to be current
- Disability Discrimination Act and DDA Standards for Public Transport
- Penrith Inclusion Plan - People with Disabilities 2009-2013

2.1 STREET HIERARCHY



2.2 LAYOUT PRINCIPLES

Street character types have been determined for the layout, paving type and level of provision for furniture and lighting. The types are based on the street hierarchy that forms part of the Public Domain Plan. The accompanying diagram is coloured to reflect the street types outlined below.

Within each category, individual streets will vary in dimension of carriageway and footpath, intensity of use, edge condition and parking provision. The siting guidelines and paving layouts (Section 2 & 3) are indicative, to be adapted to suit the varying conditions.

Primary Streets - the major urban streets of the retail core, forming the east west and north south axis. This street type includes a section of High Street adapted for outdoor dining.

Secondary Streets - these core streets define the remainder of the core retail and commercial centre of the city. This type includes Shareways.

Tertiary Streets - this classification includes a wide range of streets - differing in function, traffic conditions, scale and character. This type includes laneways.

This section gives guidelines for the layout of pavements, trees, lighting and furniture for each street type, and includes a typical design for the intersection of street types.

There are basic principles that apply to all street types in the city centre, with variation in detail applying for each street type, according to location and intensity of use.

The layout of kerbs, pavement extensions, kerb ramps and furniture should:

- Reinforce the orthogonal geometry established by the built edge;
- Create a formal geometry at the pavement edge, and for kerb extensions;
- Establish a clear line of travel for pedestrians separate from the carriageway;
- Promote accessibility and comfort through provision of kerb ramps at all street corners, regular placement of seating, continuous access paths of travel from accessible parking and public transport nodes to the Public Domain and a generous clear path of travel without furniture and fixtures;
- Prioritise pedestrian movement through a tighter kerb radius at corners to slow turning traffic; and
- Minimise clutter to facilitate “shorelining”, orientation and mobility of people who are vision impaired.

2.3 PRIMARY STREET - AXIS

Paving: Paving Type 1
Fully paved from kerb to building edge. Allow a minimum of 2.4m clear passage between property/building edge and any street elements. Note: 1.8m would be satisfactory in lower volume pedestrian areas and potentially 1.5m for short distances of a few metres.

Lighting (refer 5.1)
Street lights located 10m from the face of kerb at corner and spaced evenly along dimension of block as per lighting engineers details. Distance may vary if lights are staggered on either side of the street.

Pedestrian lighting under awnings, or fixed to street light poles where awnings are absent. Aim to maintain continuity of lighting condition along the street - do not vary within the block.

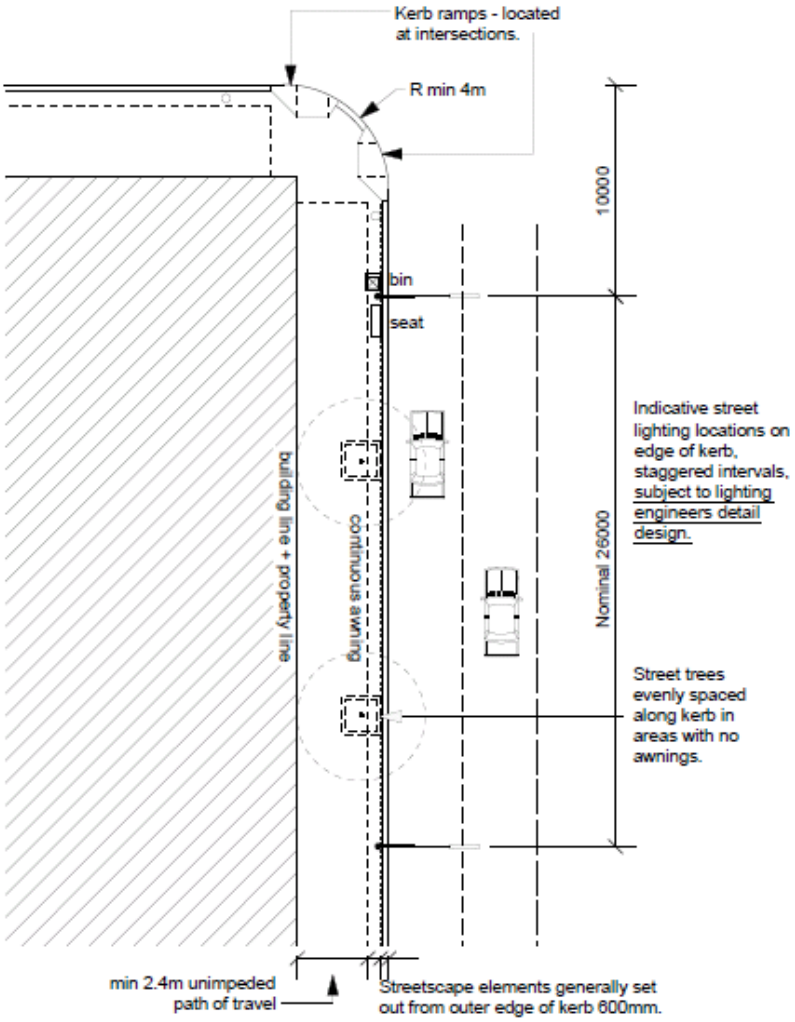
Seating: Seat Type 1 or 2
Seats at minimum of 200m intervals, located at bus stops and pick up points, and at points of high use - outside community facilities, entrances to shopping centres etc. Locate seats in areas with high activity and good surveillance. Orientation to suit site conditions.

Bins: Bin Type 1
Located at specific use areas, e.g. at railway stations, bus stops, park entrances, fast food shops, and high use pedestrian crossings. If light poles or other furniture present, locate bins in proximity to form a cluster.

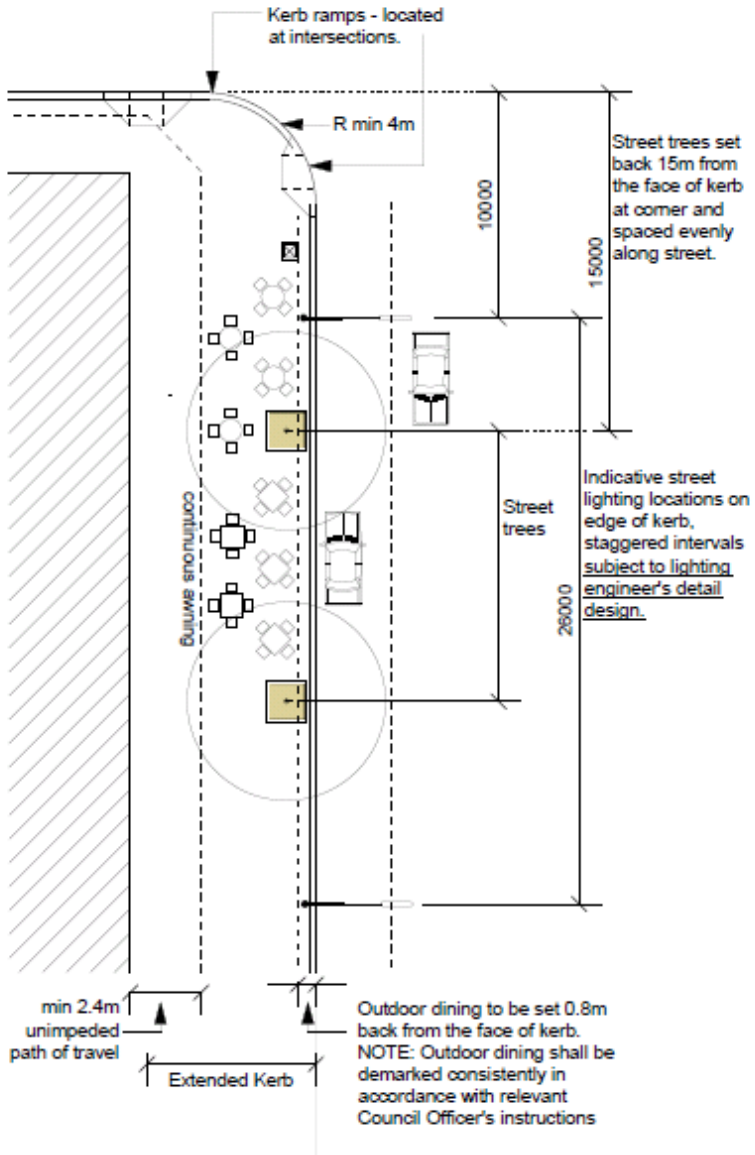
Bike racks: Bike Rack Type 1
To be located at entrance to specific use areas - railway stations, parks, community buildings and facilities.

Street Trees: Where width and awnings allow
Generally located 15m from face of kerb at corner, and generally evenly spaced along dimension of block equidistant from street lights. Centre line of trunks minimum of 600mm from face of kerb. The spacing of trees will depend on species, built infrastructure, paving layout and street lighting.
Ensure on-street accessible parking spaces and access to kerb ramps are not impaired by street trees.
Refer to Council's Street Tree Masterplan for species and locations.

TYPICAL LAYOUT - AXIS



TYPICAL LAYOUT - OUTDOOR DINING STREET



2.4 PRIMARY STREET - OUTDOOR DINING

Paving: Paving Type 1
Fully paved from kerb to building edge. Allow a minimum of 2.4m clear passage between property/building edge and any street elements. Note: 1.8m would be satisfactory in lower volume pedestrian areas and potentially 1.5m for short distances of a few metres.

Standard paving should continue across kerb extension.

Lighting (refer 5.1)
Street lights located 10m from the face of kerb at corner and spaced evenly along dimension of block as per lighting engineers details. Distance may vary if lights are staggered on either side of the street.

Pedestrian lighting under awnings, or fixed to street light poles where awnings are absent. Aim to maintain continuity of lighting condition along the street - do not vary within the block.

Seating: Seating Type 1 or 2
Seats at minimum of 200m intervals, located at bus stops and pick up points, and at points of high use - outside community facilities, entrances to shopping centres etc. Locate seats in areas with high activity and good surveillance. Orientation to suit site conditions.

Bins: Bin Type 1
Located at specific use areas, e.g. at railway stations, bus stops, park entrances, fast food shops, and high use pedestrian crossings. If light poles or other furniture present, locate bins in proximity to form a cluster.

Bike racks: Bike Rack Type 1
To be located at entrance to specific use areas - railway stations, parks, community buildings and facilities.

Street Trees:
Generally located 15m from face of kerb at corner, generally evenly spaced along dimension of block and equidistant from street lights. Centre line of trunks minimum of 600mm from face of kerb. The spacing of trees will depend on species, built infrastructure, paving layout and location of lights.
Ensure on-street accessible parking spaces and access to kerb ramps are not impaired by street trees.
Refer to Council's Street Tree Masterplan for species and locations.

2.5 SECONDARY STREET-CORE

Paving: Paving Type 2
Fully paved from kerb to building edge. Allow a minimum of 2.4m clear passage between property/building edge and any street elements. Note: 1.8m would be satisfactory in lower volume pedestrian areas and potentially 1.5m for short distances of a few metres.

Standard paving should continue within colonnades or within setback plazas or private courtyards.

Lighting (refer 5.1)
Street lights located 10m from the face of kerb at corner and spaced evenly along dimension of block as per lighting engineers details. Distance may vary if lights are staggered on either side of the street.

Pedestrian lighting under awnings, or fixed to street light poles where awnings are absent. Aim to maintain continuity of lighting condition along the street - do not vary within the block.

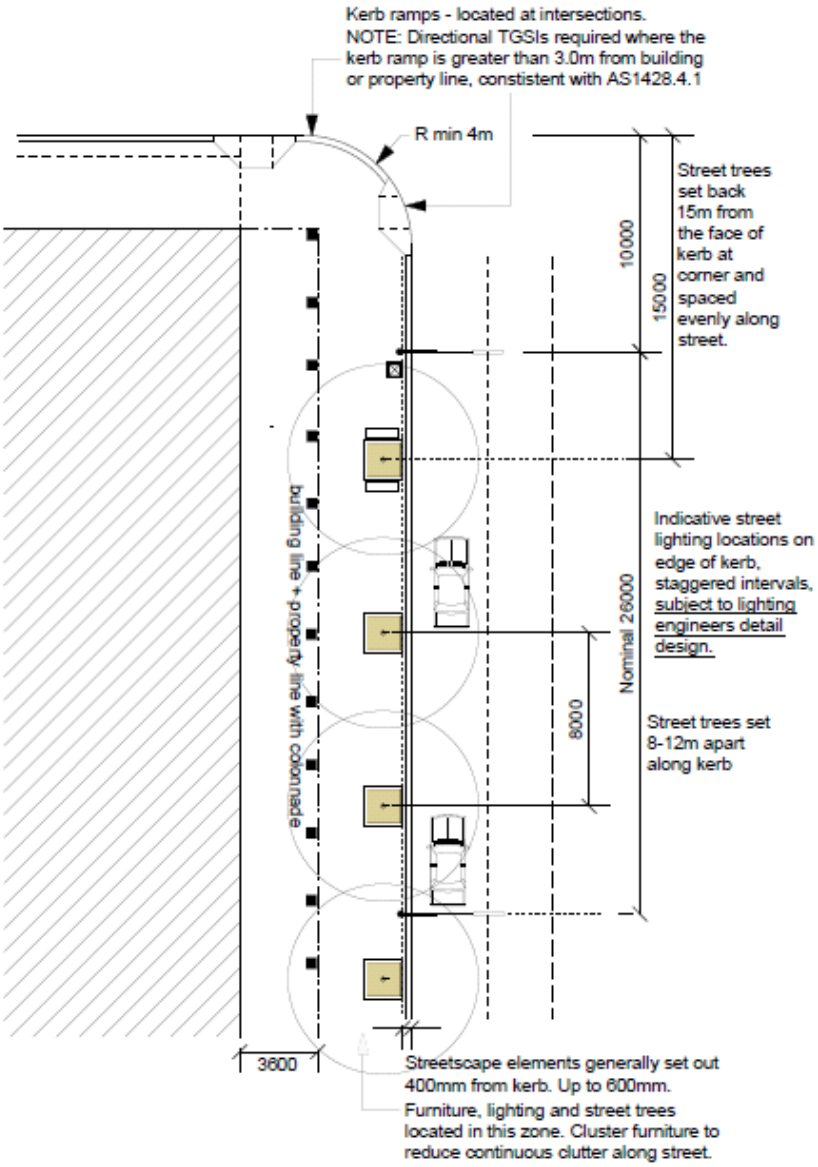
Seating: Seating Type 1 or 2
Seats at minimum of 200m intervals, located at bus stops and pick up points, and at points of high use - outside community facilities, entrances to shopping centres etc. Locate seats in areas with high activity and good surveillance. Orientation to suit site conditions.

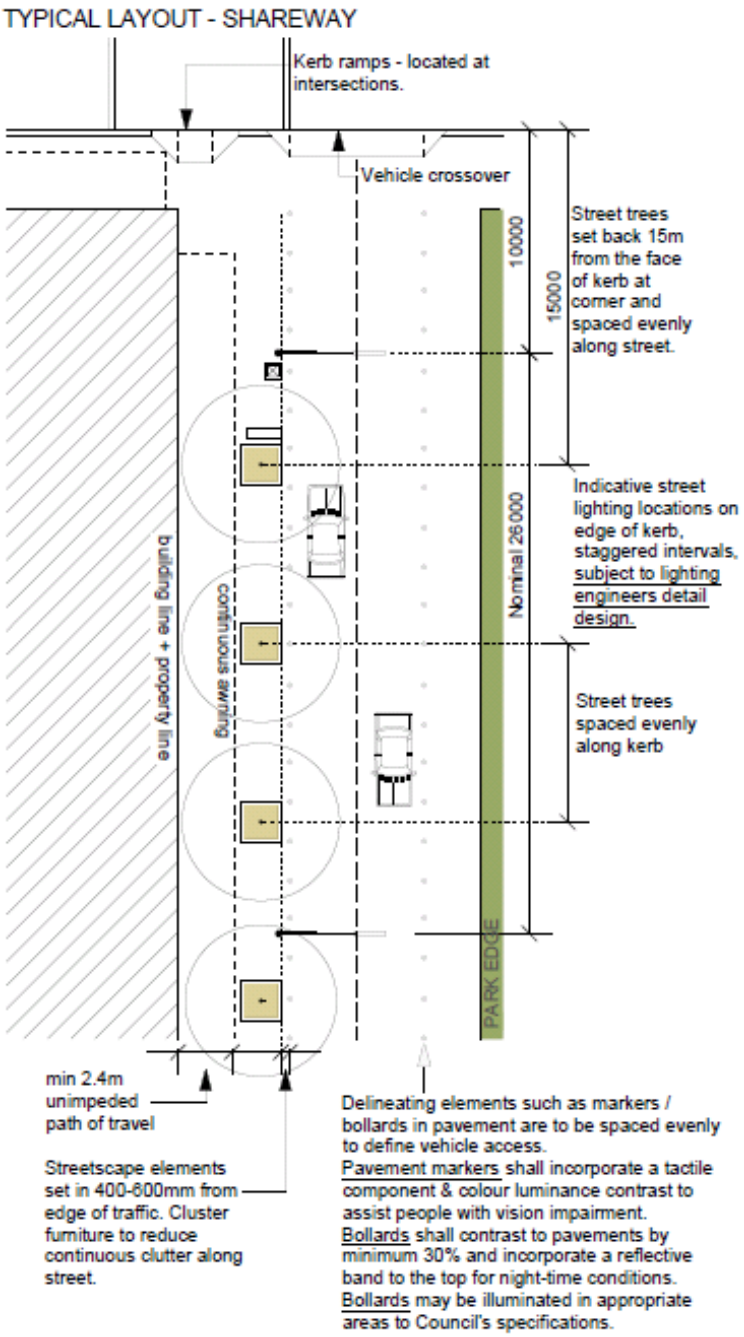
Bins: Bin Type 1
Located at specific use areas, e.g. at railway stations, bus stops, park entrances, fast food shops, and high use pedestrian crossings. If light poles or other furniture present, locate bins in proximity to form a cluster.

Bike racks: Bike Rack Type 1
To be located at entrance to specific use areas - railway stations, parks, community buildings and facilities.

Street Trees:
Generally located 15m from face of kerb at corner, generally evenly spaced along dimension of block and equidistant from street lights. Centre line of trunks minimum of 600mm from face of kerb. The spacing of trees will depend on species, built infrastructure, built infrastructure, paving layout and location of lights.
Ensure on-street accessible parking spaces and access to kerb ramps are not impaired by street trees.
Refer to Council's Street Tree Masterplan for species and locations.

TYPICAL LAYOUT - CORE STREET





2.6 SECONDARY STREET - SHAREWAY

Paving: Paving Type 2
Fully paved from boundary to boundary. Allow a minimum of 2.4m clear passage between property/ building edge and any street elements. Note: 1.8m would be satisfactory in lower volume pedestrian areas and potentially 1.5m for short distances of a few metres.

Standard paving should continue across entire shareway.
Deliniating elements such as markers and bollards in paving should be evenly spaced and delineate vehicle access zone.

Lighting: (refer 5.1)
Street lights located 10m from the face of kerb at corner and spaced evenly along dimension of block as per lighting engineers details. Distance may vary if lights are staggered on either side of the street.

Pedestrian lighting under awnings, or fixed to street light poles where awnings are absent. Aim to maintain continuity of lighting condition along the street - do not vary within the block.

Seating: Seating Type 1 or 2
Seats at minimum of 200m intervals, located at bus stops and pick up points, and at points of high use - outside community facilities, entrances to shopping centres etc. Locate seats in areas with high activity and good surveillance. Orientation to suit site conditions.

Bins: Bin Type 1
Located at specific use areas, e.g. at railway stations, bus stops, park entrances, fast food shops, and high use pedestrian crossings. If light poles or other furniture present, locate bins in proximity to form a cluster.

Bike racks: Bike Rack Type 1
To be located at entrance to specific use areas - railway stations, parks, community buildings and facilities and away from general pedestrian zones.

Street Trees:
Generally located 15m from face of kerb at corner, generally evenly spaced along dimension of block and equidistant from street lights.
Centre line of trunks minimum of 600mm from face of kerb. The spacing of trees will depend on species, built infrastructure, paving layout and location of lights.
Ensure on-street accessible parking spaces and access to kerb ramps are not impaired by street trees.
Refer to Council's Street Tree Masterplan for species and locations.

2.7 TERTIARY STREET

Paving: Paving Type 3
Park edge and residential areas - verge consisting of paved and landscape strip. Adjacent to retail, commercial- fully paved from built edge to kerb

Lighting: (refer 5.1)
Street lights located 10m from the face of kerb at corner and spaced evenly along dimension of block as per lighting engineers details. Distance may vary if lights are staggered on either side of the street.

Pedestrian lights dimensions relating to traffic lights, supplement street lighting with pedestrian lights at park edges.

Seating:
Generally specifically located on tertiary streets.
Orientation to suit site conditions.

Bins:
Located at specific use areas. e.g. at railway stations, park entrances, community building or facility.

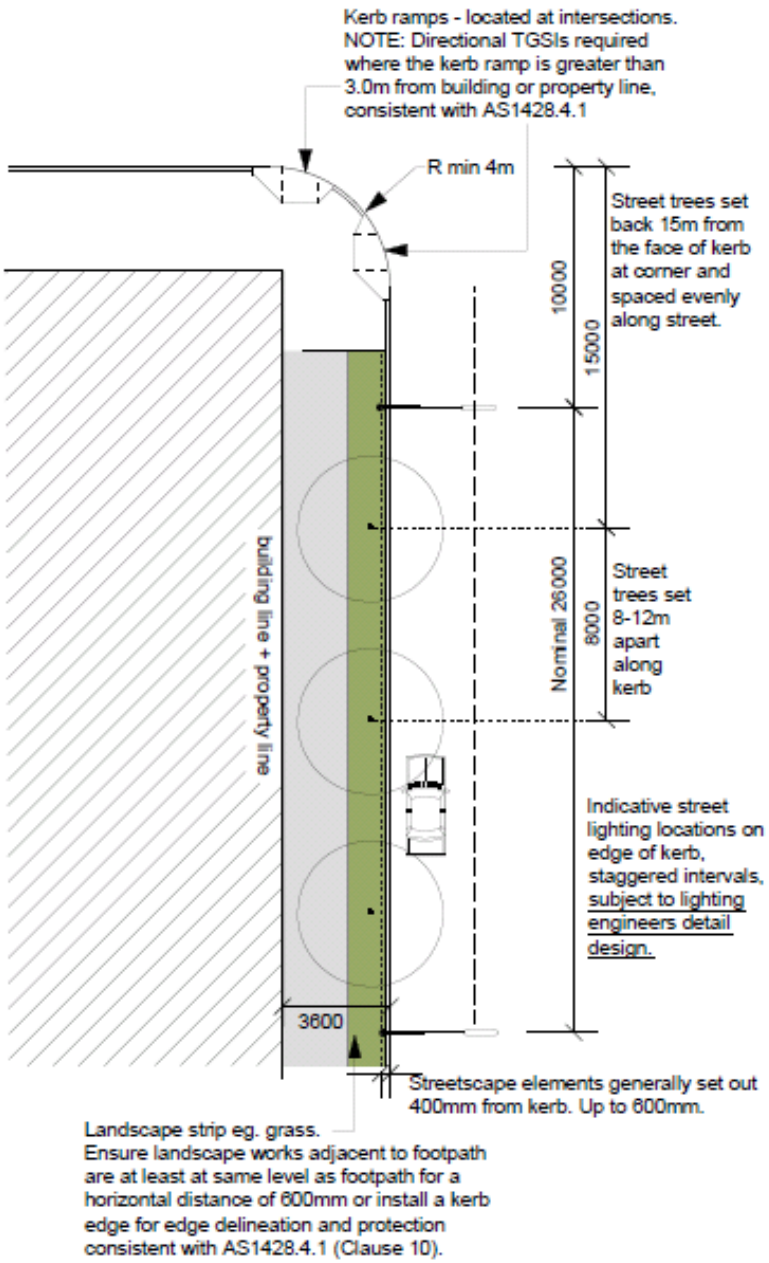
Bike racks:
To be located at entrance to specific use areas,
eg. railway stations, parks, community building or facility.

Street Trees:
Generally located 15m from face of kerb at corner, generally evenly spaced along the block and equidistant from street lights. Centre line of trunks minimum of 600mm from kerb.

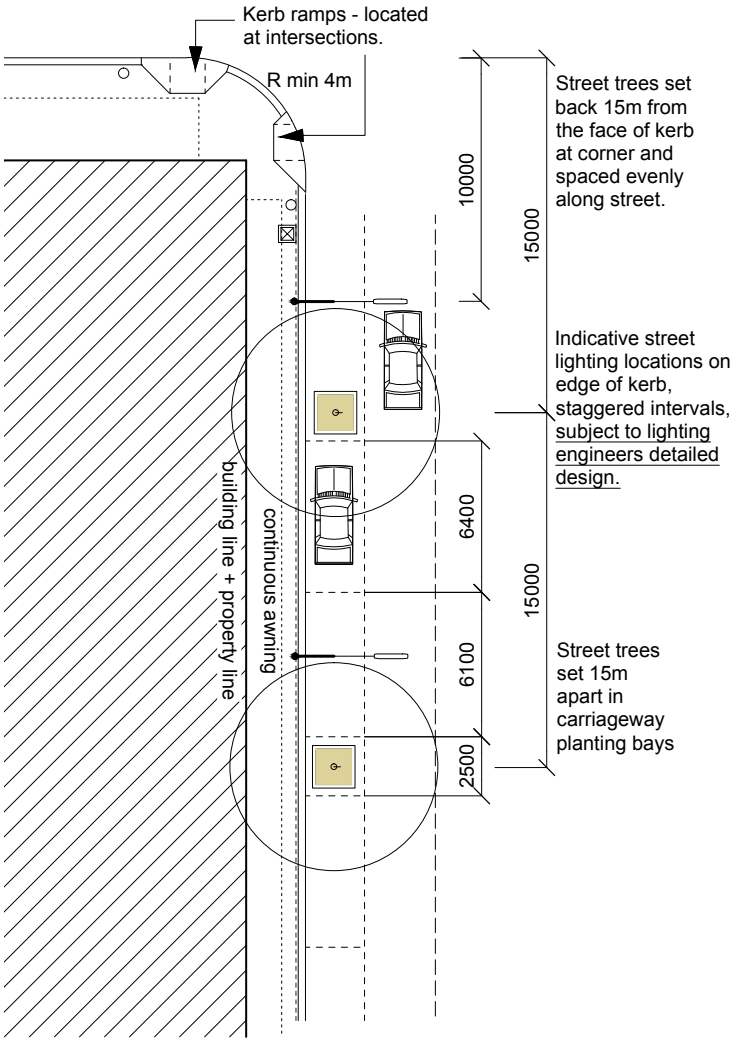
The spacing of trees will depend on species, placement of awnings, paving layout and location of lights. Refer to Council's Street Tree Masterplan for species and locations.

Explore opportunities for water sensitive urban design in peripheral streets where pedestrian traffic is low and where generous landscape strips are possible.

TYPICAL LAYOUT - TERTIARY STREET



TYPICAL LAYOUT - LANEWAY WITH TREES



2.8 LAYOUT PRINCIPLES FOR LANEWAYS

Laneways shall provide clear paths of travel and large commercial garbage bins and other objects shall be located in managed areas.

Paving: Paving Type 3
Area between kerb and building alignment fully paved.

Kerb ramps
Where the width of a laneway prevents a kerb ramp and landing in a conventional design the footpath shall provide “in-line” kerb ramps and landings consistent with fig 24C of AS 1428.1.

Lighting:
Street lights located 10m from the face of kerb and spaced evenly along dimension of block as per lighting engineers details. Distance may vary if lights are staggered on either side of the street.

Pedestrian lights to be fixed to street lights.

Seating:
Seats at minimum of 200m intervals, at bus stops and pick up points, and located at points for high use - community facilities etc. Orientation to suit site conditions.

Bins:
Located at specific use areas, e.g. at railway stations, bus stops, park entrances, fast food shops, and high use pedestrian crossings.

Bike racks:
To be located at entrance to specific use areas, eg. railway stations, parks, community buildings and facilities.

Street Trees:
Generally located 15m from face of kerb at corner, generally evenly spaced along dimension of block and equidistant from street lights. Planting bays spaced in carriageway depending on configuration of parking bays and location of lights.

Refer to Council’s Street Tree Masterplan for species and locations.

2.9 INTERSECTION LAYOUT WITH KERB RAMPS

Design Intent:
To maximise pedestrian safety at intersections and crossing points.

Performance Criteria:
Locate kerb ramps as close as possible to the line of pedestrian travel- minimise offsets.

Maintain a tight kerb radius to slow turning traffic, prioritise pedestrian movement and provide a more formal appearance.

Minimum radius for local traffic streets should be 4 metres, depending on requirements for buses.

Radius of up to 6 metres allowed where heavy vehicles and buses use intersections, to allow for delivery of heavy goods.

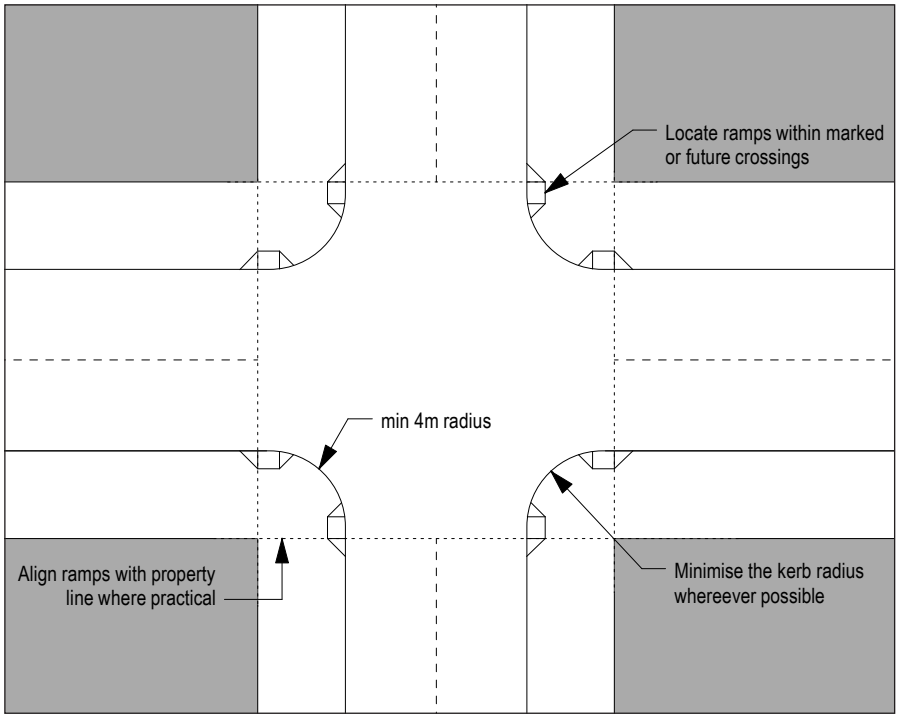
Design and construct kerb ramps in pairs opposite to create direct pedestrian crossings.

Position kerb ramps along the direction of travel, ideally at 90 degrees to the carriageway.

Locate kerb ramps also at accessible car and community bus parking spaces, and at taxi drop off zones, as required.

Kerb ramps at obtuse / acute angled intersections, in-line kerb ramps, attached kerb ramps and raised at-grade crossings should be designed as outlined in AS1428.1 and be signed off by Council's compliance officer prior to construction.

All kerb ramps to conform to AS 1428.1



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3.1 PAVING PRINCIPLES

3.1.1 Paving and Surface Treatment

Materials used in the public domain should be durable, robust, and easily maintainable and should meet as far as possible the requirements of environmental sustainability. Selection of paving materials and surface treatments is particularly important in coordination of the public domain to ensure consistency and continuity. Appropriate design of surfaces in streets and open spaces is essential in meeting the access needs of all pedestrians.

It is envisaged that the standardisation of paving for the City Centre will occur over time, as streetscape works associated with building developments, and to replace existing paving at the end of its current lifecycle.

3.1.2 Streets

Footpaths should be a unifying element in the streetscape where buildings, signs objects and people provide constant variation and change. They are to give a clear expression of pedestrian priority, and this message must be obvious to pedestrians and drivers. Continuity of footpath dimensions, levels, materials and edges are therefore important. Permanent and semi permanent objects such as kerb ramps, footpath crossings, pedestrian refuges and street furniture are to appear as occasional interruptions in the overall pattern rather than as dominant elements of the streetscape.

All footpaths must provide ease of movement for everyone, including people with different degrees of disability. Visual simplicity and observation of pedestrian desire lines is important as is the use of even paving surfaces, contrasting pavement textures and markings to alert street users to potential hazards such as intersections and footpath crossings.
Minimise and restrict the use of textural changes for hazard warnings to maximise the effectiveness of the warning (Refer Appendix C3 AS1428.4.1).
Pavement treatments that clearly define pedestrian areas and level of priority should be used throughout.

Penrith City Council has selected a range of materials based on conformance with specific selection criteria including availability, performance, management, aesthetics, sustainability and cost.

Stone has been traditionally used for paving in many cities, including Central Sydney, along with composite concrete. These are appropriate materials that provide a neutral setting for architecture. Both these materials are relatively long lasting, and can be easily recycled.

It is essential that each street is considered as a whole in design development, to ensure consistency along each street, and throughout the centre.

3.2 STANDARD PAVING RANGE

A range of paving treatments has been proposed that responds to the hierarchy of streets in the city centre. Highest profile 'Primary' streets with high intensity use have high quality stone paving with wide concrete kerbs, and a greater degree of detail in layout. The other important city centre 'Secondary' streets have a composite concrete paver in a similar though lighter tone to the stone, using the same dimension, paving pattern and wide concrete kerbs. Low profile tertiary streets utilise ordinary paving treatments with simple detailing and regular concrete kerbs.

Paving Type 1
Material: Austral Black granite paver or equivalent
Sizes: 900 x 450mm
600 x 450
300 x 450
Pavers 50mm thick, or 60mm thick at vehicle crossovers and zones subject to vehicle traffic.
Finish: Exfoliated finished.
Slip Resistance: Stone paving is to be tested to achieve a 'w' classification when wet to AS/NZS 4586-2004.
Testing: Refer appendix # for natural stone tests schedule.
Origin: The granite shall be of Australian origin and shall be handled and processed in Australia. Certification confirming origin of stone shall be required.
Setout: Refer detail 3.7

Paving type 2
Material: Composite concrete paver - 'Pebblecrete PPX 1201:120'
Sizes: 900 x 450mm
600 x 450
300 x 450
Pavers 50mm thick, or 60mm thick at vehicle crossovers and zones subject to vehicle traffic.
Finish: Honed.
Setout: Refer detail 3.8

Paving Type 3
Material: Concrete - integrally coloured with Concrete Colour Systems (CCS) "Onyx 21" 3% in grey cement.
Finish: Broom finish, at right angles to the kerb by means of fine broom(s) with bristles of nylon or flexible wire.
Setout: Refer detail 3.9

PAVING TYPE 1:
Equal to Austral Black granite paver

PAVING TYPE 2:
Composite concrete paver

PAVING TYPE 3:
In-situ concrete

3.3 STANDARD PAVING LAYOUT

Primary Street

Design Intent:
To provide an integrated surface treatment to create a high quality, homogenous appearance to prominent, high profile streets.

East west streets will be dominant - continue paving pattern from east west streets around corners of north south streets.

Installation
Create an even fall from the building line to back of kerb. Cross fall on the pavement should be not more than 1:40, to suit disability standards.

Set out paving pattern from the back of kerb, with whole pieces at kerb. This is particularly important at corners where paving is parallel to kerb. Cut pavers at building edge to maintain a consistent dimension and alignment at outer (kerb) edge.

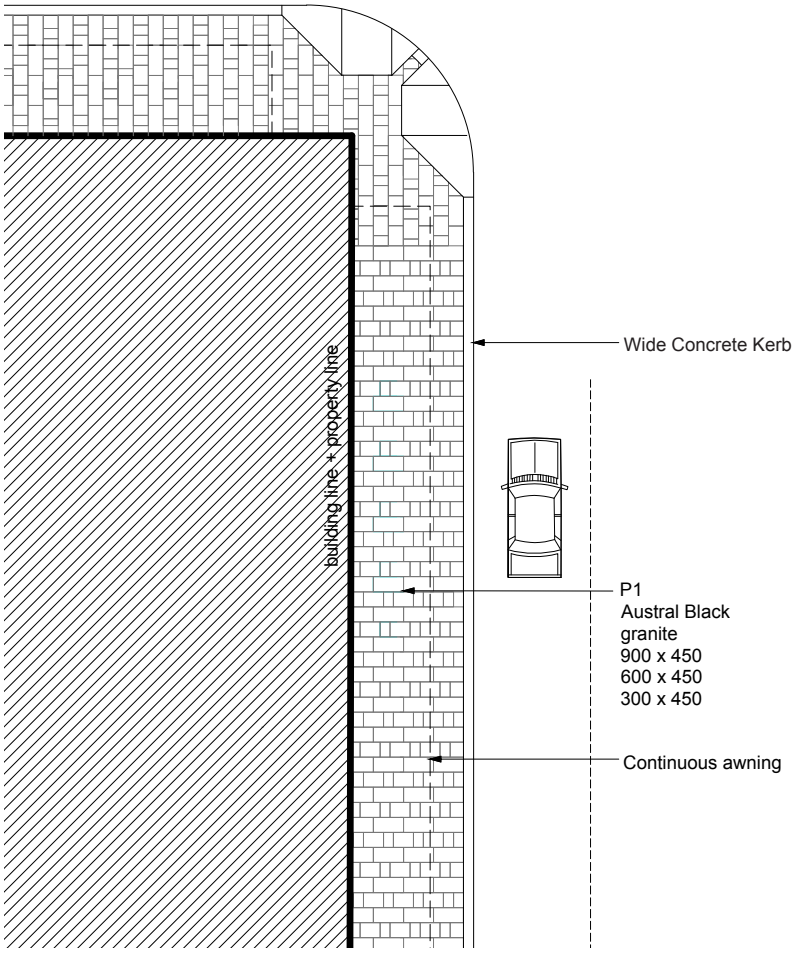
Avoid cutting pavers less than one third of length.

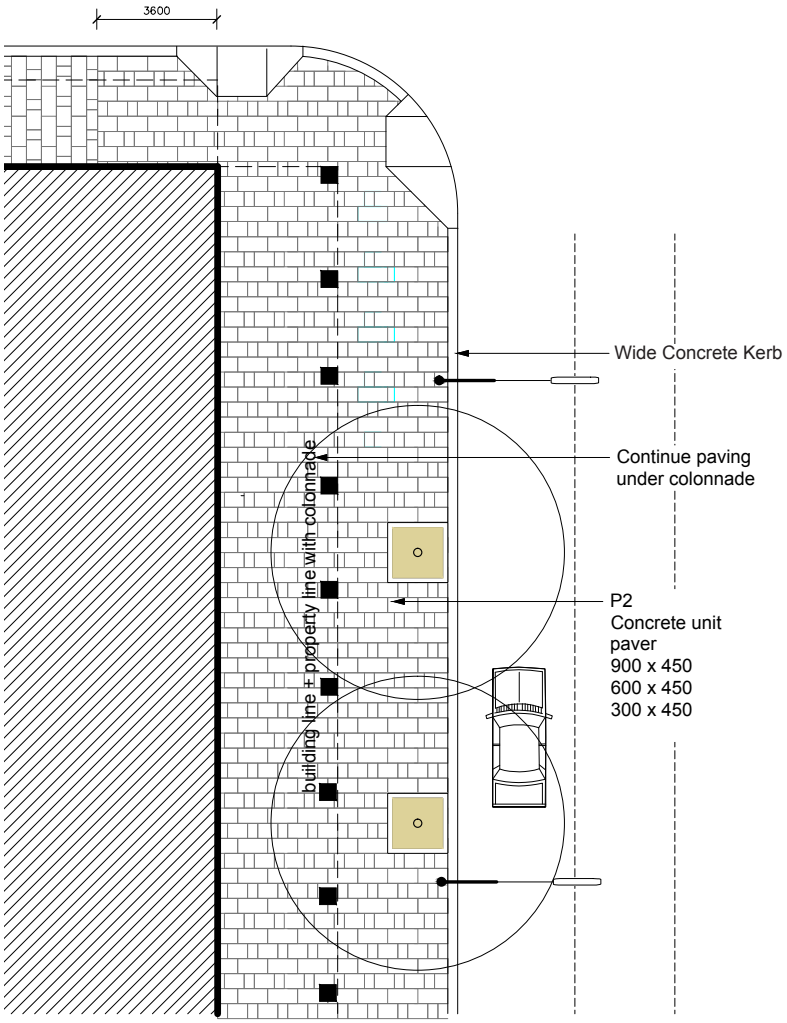
See also details 3.7

Materials:
Paving type 1 (refer 3.2)
Austral Black Granite paver -
900 x 450mm
600 x 450
300 x 450

Wide Concrete Kerb - (refer detail 3.10)

Infill pavement service covers for all service openings - (refer Detail 3.17)





3.4 STANDARD PAVING LAYOUT

Secondary Street

Design Intent:
To provide an integrated surface treatment to create a high quality, homogenous appearance to prominent, high profile streets.

East west streets will be dominant - continue paving pattern from east west streets around corners of north south streets, except where north south streets are a higher pavement order.

Installation
Create an even fall from the building line to back of kerb. Cross fall on the pavement should be not more than 1:40, to suit disability standards.
Note: absolute minimum 1:100.

Set out paving pattern from the back of kerb, with whole pieces at kerb. This is particularly important at corners where paving is parallel to kerb. Cut pavers at building edge to maintain a consistent dimension and alignment at outer (kerb) edge.

Avoid cutting pavers less than one third of length.

See also details 3.8

Materials:

Paving type 2
Composite concrete paver -
'Pebblecrete PPX 1201:120'
900 x 450mm
600 x 450
300 x 450

Wide Concrete Kerb - (refer detail 3.10)

Infill pavement service covers for all service openings. - (refer Detail 3.17)

3.5 STANDARD PAVING LAYOUT

Tertiary Street

Design Intent:
The scale, function and character of the tertiary streets varies widely throughout the centre. The treatment of these streets aims to provide a simple and robust finish that reflects the relatively low use/low profile of these streets.

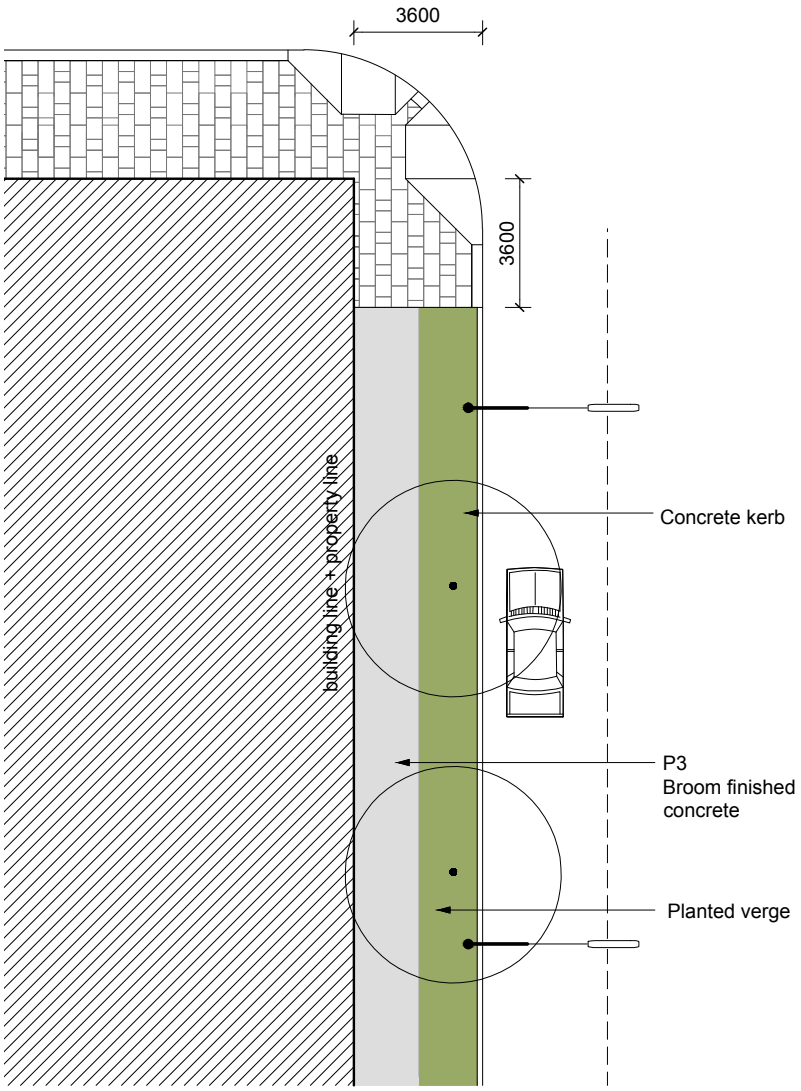
Paving layout will vary between the urban condition of laneways and the peripheral, higher traffic streets.

See details 3.9 & 3.15

Materials:
Paving Type 3 - refer 3.2
Insitu concrete, broom finish
tinted to approval of relevant Council officer.

Concrete kerb - (refer also detail 3.12)

Infill tinted concrete service covers for all service openings. - (refer Detail 3.17)



3.6 LAYING PAVING

The following section gives guidelines for installation of paving and associated details, to achieve a consistent and high quality finish. Appropriate installation of paving is essential in meeting the access needs of all pedestrians. Establish a smooth, non slip, durable and even surface with a continuous crossfall (maximum 1:40). Crossfalls should generally direct surface stormwater flow to the kerb; where kerb extensions don't allow flow to the kerb, ensure that drainage details are integrated with the materiality and geometry of street paving generally.

Installation – unit paving
Paving units are to be set out perpendicular to and from the kerb line. Paving units to be utilised in pattern as detailed 3.8 and 3.9.

Pavers are to be laid with mortar bedding on a reinforced concrete slab. Separation joints of 10 – 12 mm are to be created against the kerb and site/building boundaries with filler board and sealant bead to match paver colour.

All mortar for the stone pa ver mortar bed is to comply with AS3700 Masonry Structures, in particular sections 4,5 and 10.

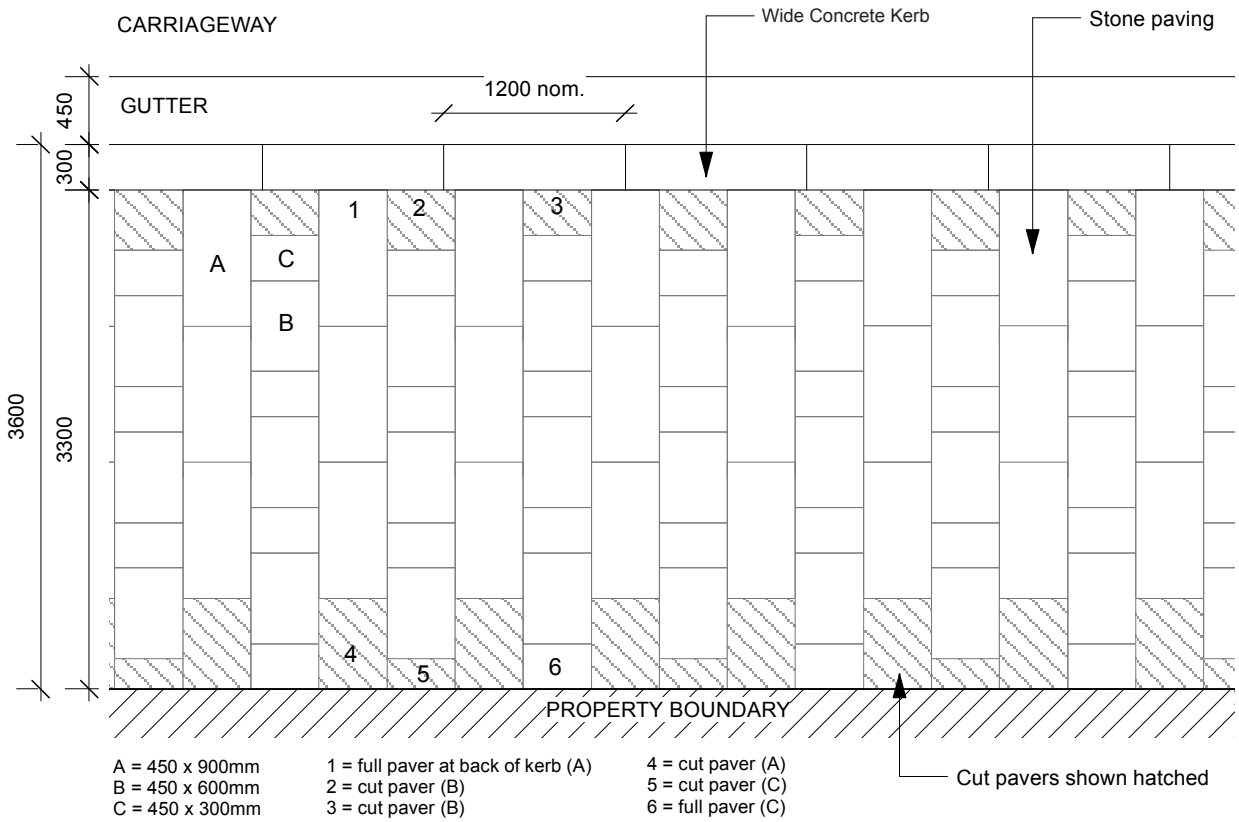
The sand and cement shall comply with AS3700 and clause 3.6 of Pavements – Section 03. All material used in the mortar bed will be of good quality, be free of deleterious soluble salts or other contaminants which may cause or contribute to efflorescence.

The slurry mix water and mortar mix water shall be clean and free from oil and from injurious amounts of acids, alkali, organic or other deleterious substances and shall be neither brackish nor salty.

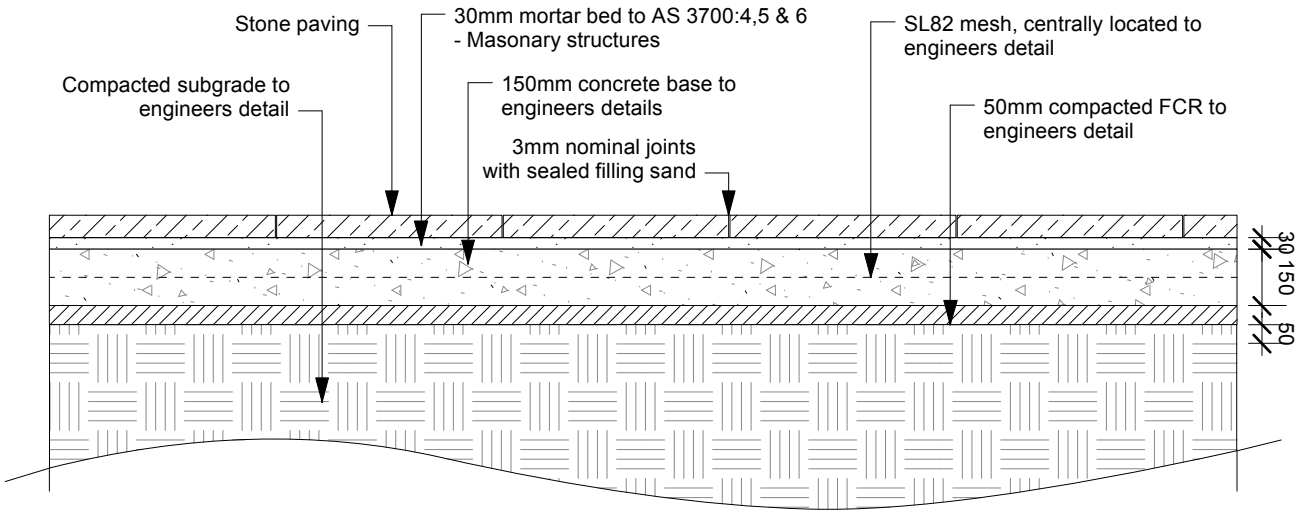
The minimum compressive strength of the mortar mix shall be 4MPa at 7 days.

Tamp down paving units into position ensuring full contact with the mortar bed with minimum deviation between edges of adjacent pavers.

3.7 TYPICAL PAVING DETAIL TYPE 1 - STONE (per AS 1428.1 2009)

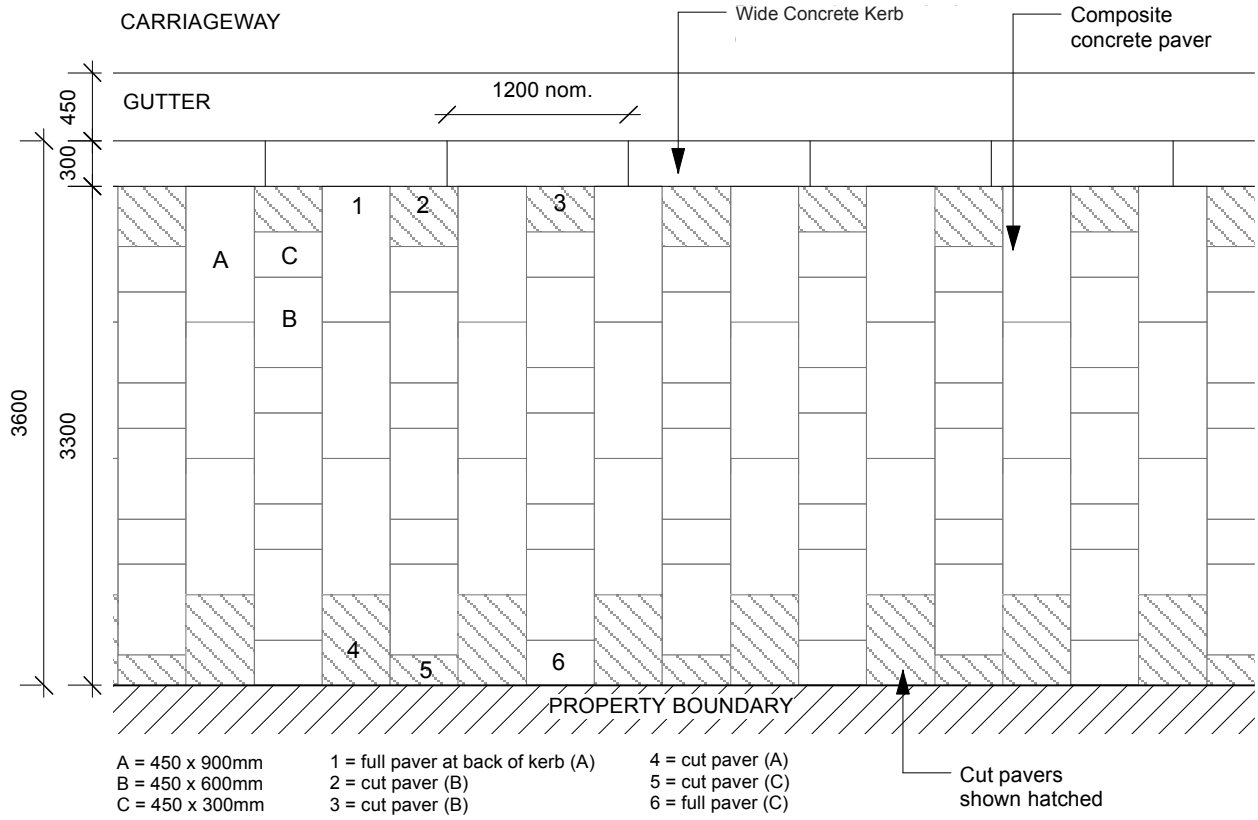


PLAN - SCALE 1:50

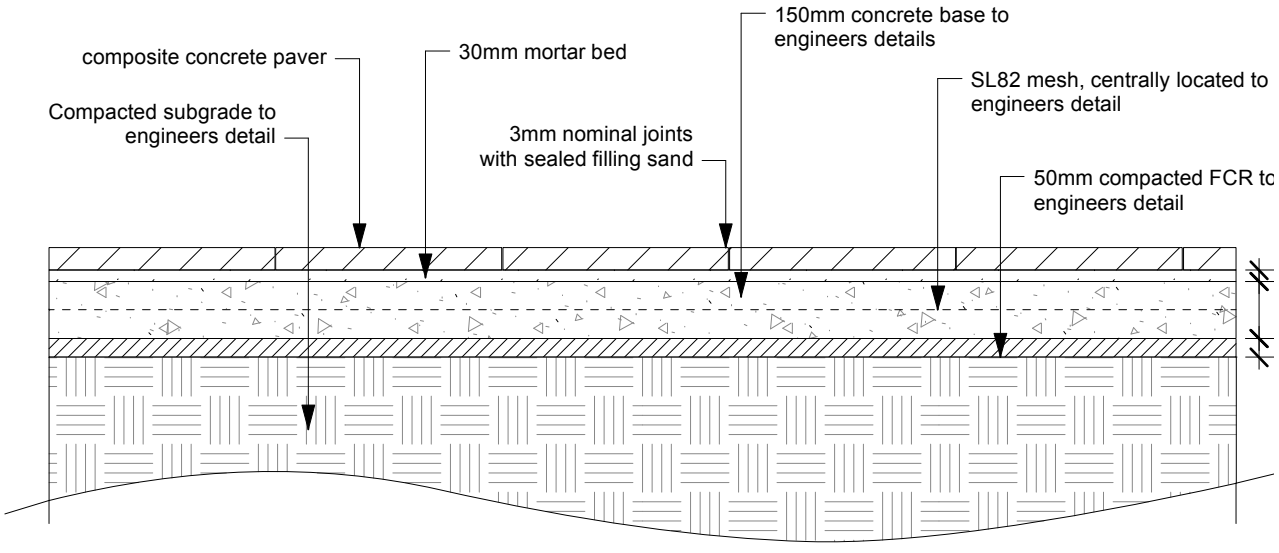


SECTION - SCALE 1:20

3.8 TYPICAL PAVING DETAIL TYPE 2 - COMPOSITE CONCRETE PAVER (per AS 1428.1 2009)

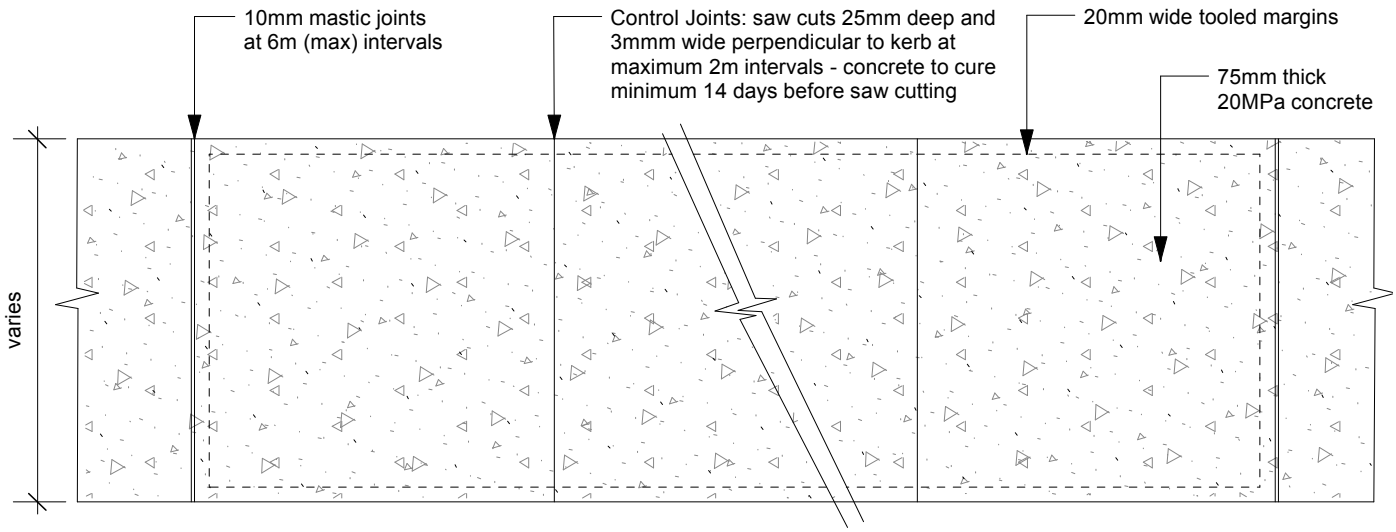


PLAN - SCALE 1:50

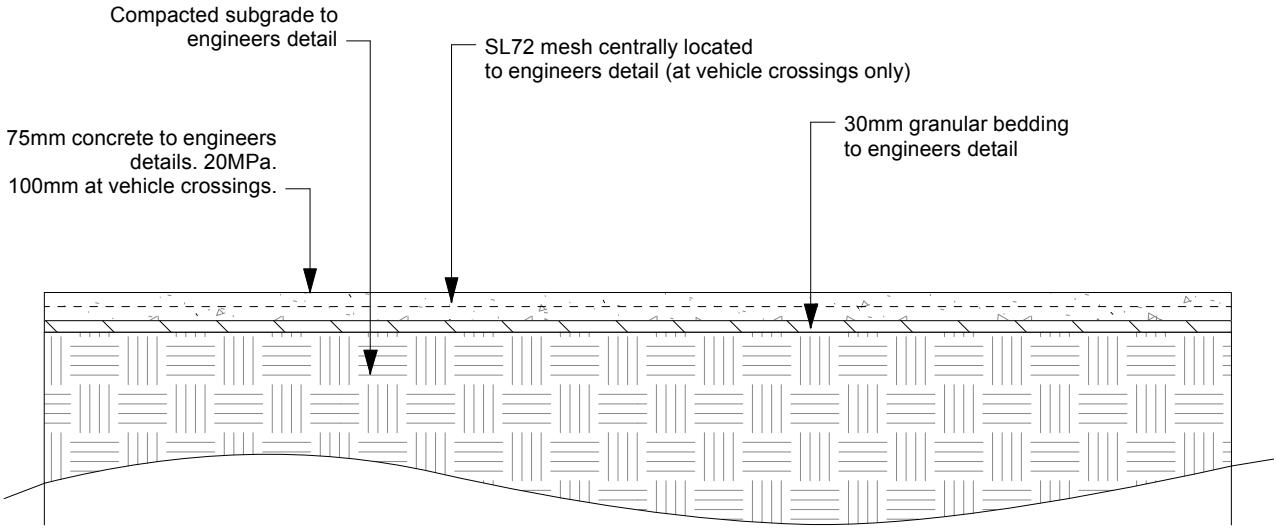


SECTION - SCALE 1:20

3.9 TYPICAL PAVING DETAIL TYPE 3 - IN-SITU CONCRETE (per AS 1428.1 2009)



PLAN- SCALE 1:25



SECTION - SCALE 1:20

3.10 DETAIL - WIDE CONCRETE KERB

Design Intent:
Wide concrete kerbs are to be used on all primary and secondary streets, to provide a robust and attractive edge to the main city streets. Kerbs should be installed in conjunction with new paving in these areas.

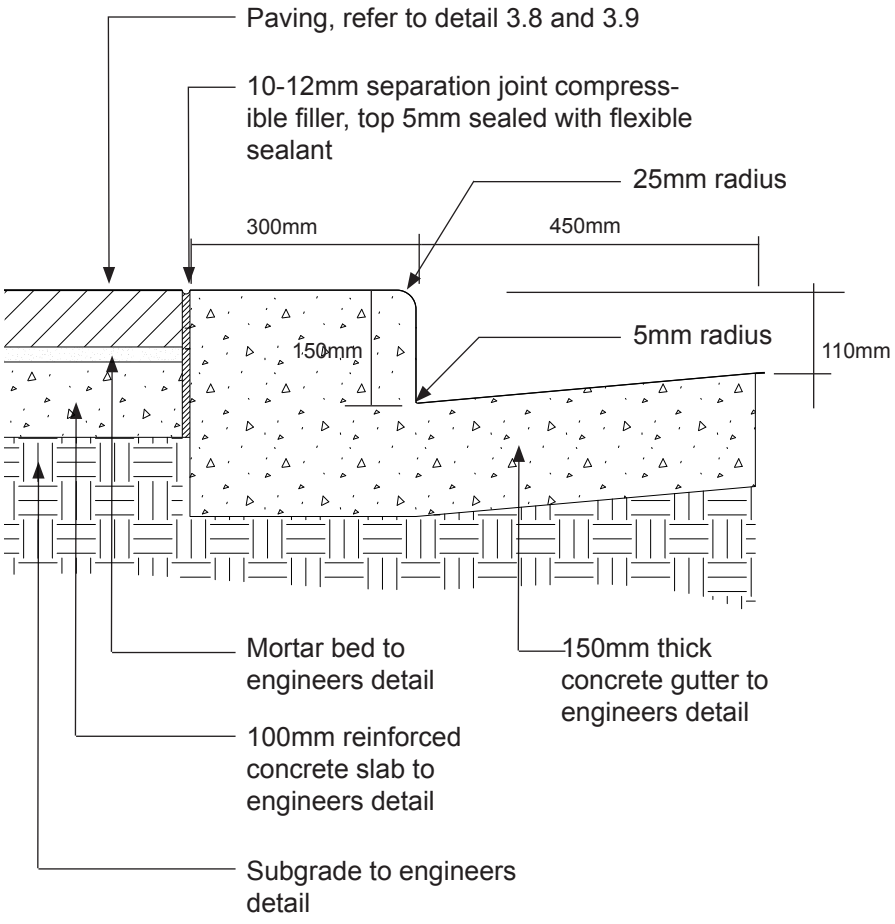
Performance Criteria:
Concrete compressive strength to be 20MPa for kerb and gutter.

Laybacks to be 20MPa, reinforced with SL72 mesh.

Road sub-base to be extended 150mm behind rear of kerb & gutter.

Thickness to be not less than the road pavement sub-base thickness.

Refer Council's engineering guidelines and drawings for further detail.



TYPICAL WIDE CONCRETE KERB DETAIL - SCALE 1:10

3.11 DETAIL - CONCRETE KERB & GUTTER (Regular Width)

Design Intent:
Concrete kerbs are to be used for all tertiary streets, including laneways and peripheral streets.
A single concrete kerb edge is suited to use in urban lanes, for its more formal appearance. Integrated kerb and gutter units are more suited to peripheral streets.
150mm min kerb height at bus stops required for compliance with the DDA Transport Standard.

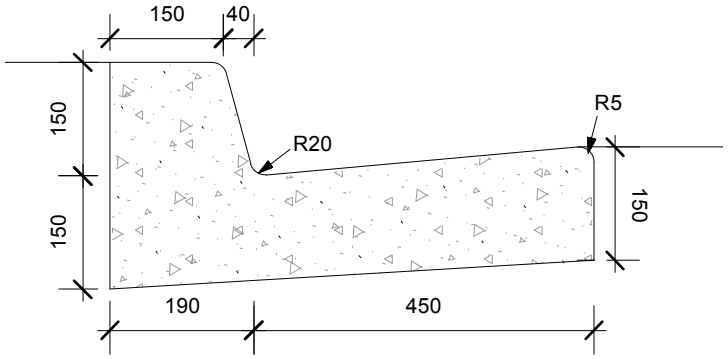
Performance Criteria:
Concrete compressive strength to be 20MPa for kerb and gutter.

Laybacks to be 20MPa, reinforced with SL72 mesh.

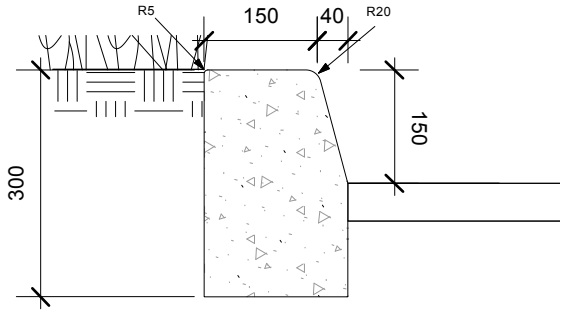
Road sub-base to be extended 150mm behind rear of kerb & gutter.

Thickness to be not less than the road pavement sub-base thickness.

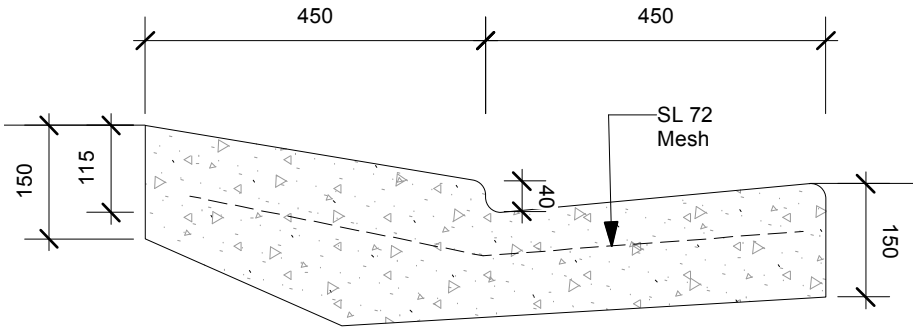
Refer Council's engineering guidelines and drawings for further detail.



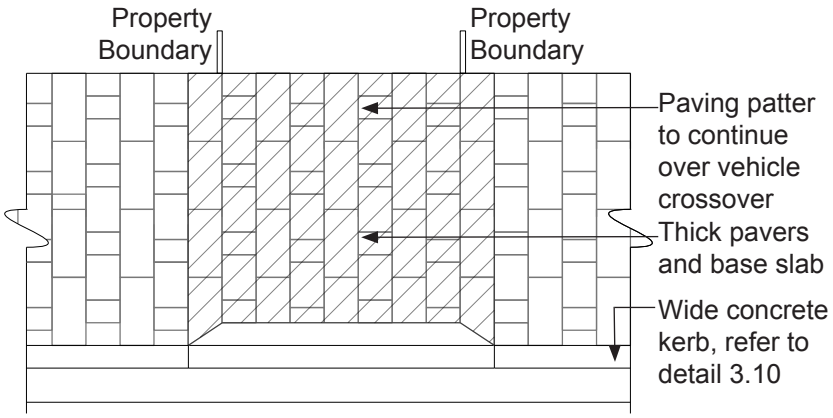
CONCRETE KERB & GUTTER - SCALE 1:10



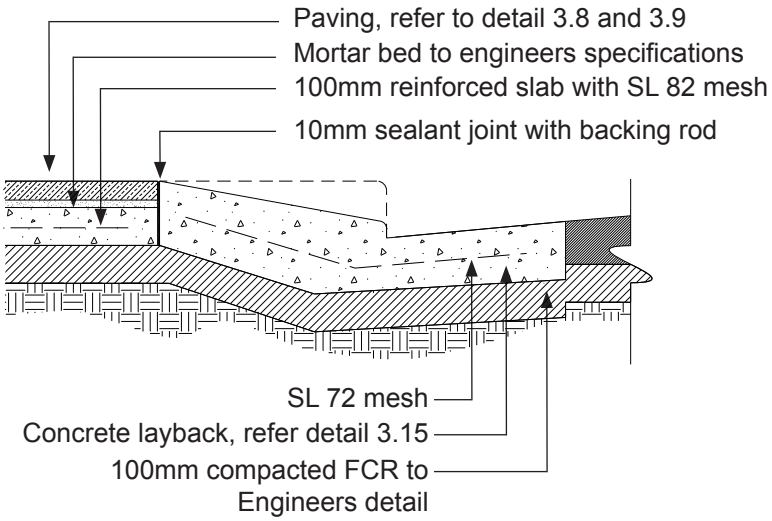
CONCRETE KERB EDGE - SCALE 1:10



CONCRETE LAYBACK - SCALE 1:10



STONE VEHICLE CROSSOVER, PLAN - SCALE 1:100



CONCRETE LAYBACK TO PAVING SECTION - SCALE 1:20

3.12 VEHICLE CROSSOVERS

Design Intent:
To emphasise pedestrian circulation patterns over driveways and other pavement interruptions, and provide a consistent cross fall to footways.

To be used for primary and secondary streets where there is a higher volume of pedestrian traffic.

Performance criteria:
Continue standard paving and kerb across driveways, with kerb transition pieces and flush kerb at the carriageway edge.

Maintain a minimum crossing width of 3m.

Limit the transition in levels to 40mm at the kerb, and maintain the standard footpath gradient up to the transition.

Mark the edge of the driveway where necessary only - where high vehicle use is expected.

The pedestrian portion of the footpath shall provide a 1:40 maximum slop (crossfall) from the property boundary to the layback for a minimum of 1200mm width.

3.12 VEHICLE CROSSOVERS (continued)

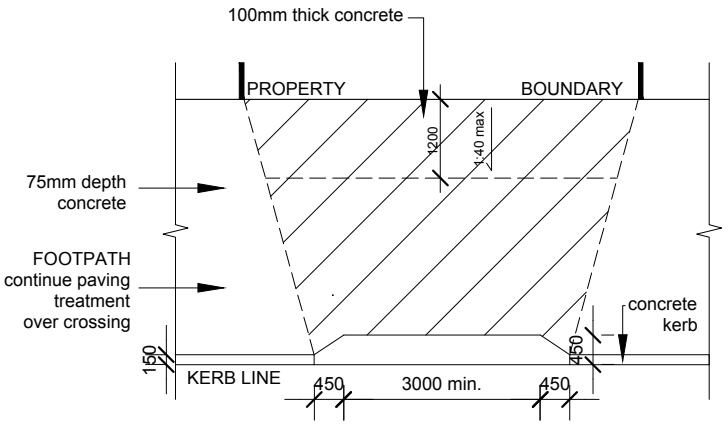
Design Intent:
Concrete vehicle crossovers are to be used for all tertiary streets, including laneways and peripheral streets, where the verge is not fully paved, and there are lower volumes of pedestrian traffic.

Performance Criteria:
Concrete compressive strength to be 20MPa for vehicle crossover. Sub-base from kerb line to boundary to Council engineering requirements for vehicle load bearing.

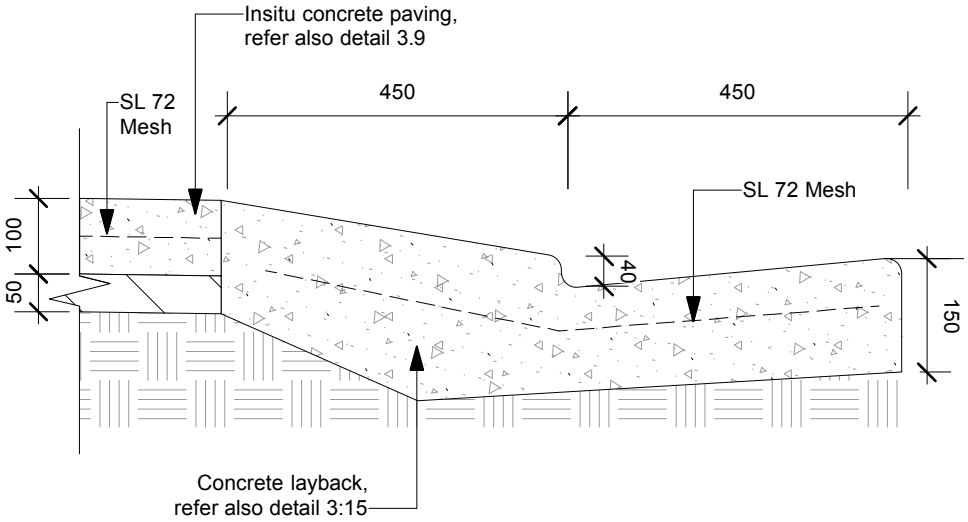
Laybacks to be 20MPa, reinforced with SL72 mesh.

Road sub-base to be extended 150mm behind rear of layback. Thickness to be not less than the road pavement sub-base thickness.

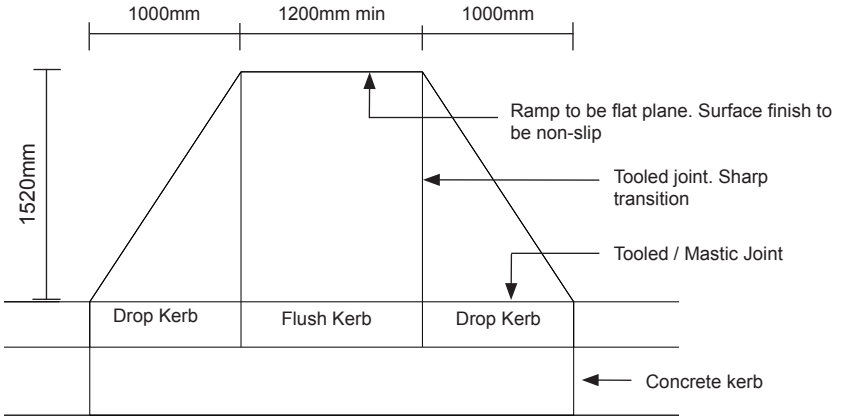
Refer Council's engineering guidelines and drawings for further detail.



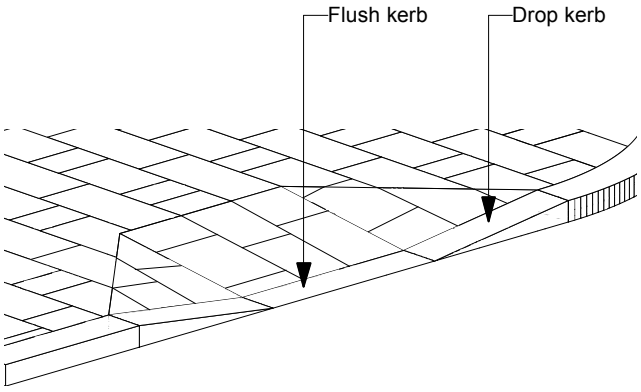
INSITU CONCRETE VEHICLE CROSSOVER PLAN - SCALE 1:100



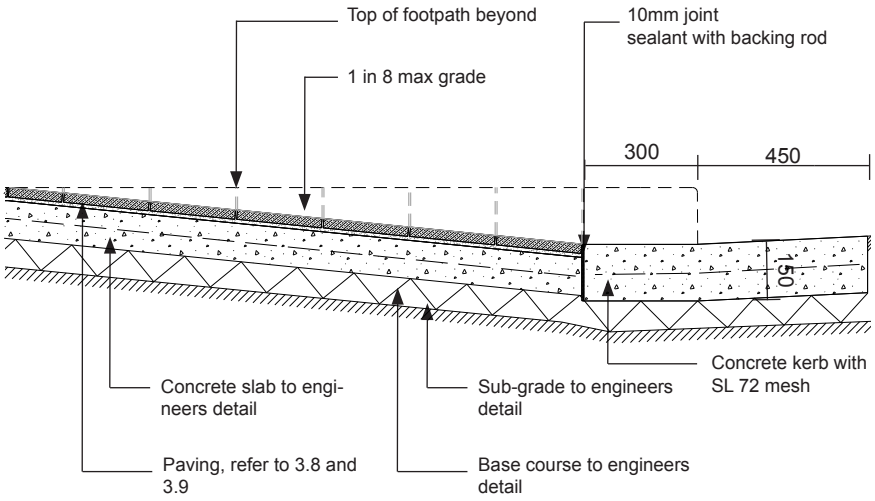
CONCRETE VEHICLE CROSSOVER SECTION - SCALE 1:10



PLAN - SCALE 1:50



ISOMETRIC VIEW - SCALE 1:50



SECTION - SCALE 1:20

3.13 PAVING AT KERB RAMPS

Design Intent:
To maximise pedestrian safety and convenience for all users, particularly at crossing points and intersections, and to integrate the design of crossings into the general street geometry.

Performance Criteria:
Kerb ramps shall be installed in compliance with AS1428.
Provide a ramp at all points where pedestrians need to cross the road and at accessible drop off points.

Provide generous width pedestrian kerb ramps wherever possible, with a minimum width of 1200mm. At marked foot crossings, the sloping face of the ramp should be along the inside edge of the paint lines. Where this is not possible, locate ramp close to the post with a push button on it.

At zebra crossings the sloping face of the ramp should be along the outside edge of the zebra stripes.

Construct ramps of materials and colours consistent with adjoining footpath - concrete for concrete paths, stone unit paver in paved areas etc, to meet AS1428.

Maintain kerb lines with generously proportioned drop kerbs at ramps.

Consider the use of hazard warning tactiles at high volume driveway crossovers and cycleway crossovers.

Meet all necessary Australian Standards for ramp gradient and width.

Pedestrian crossings are to be designed in accordance with relevant RTA standards and to the satisfaction of Council's Traffic Engineer.

3.14 TGSI - TACTILE GROUND SURFACE INDICATORS

Design Intent:
To enhance safety and orientation of people with vision impairment to safely and independently navigate the built environment.

Tactile indicators shall be considered at kerb ramps where the top of the kerb ramp is more than 3.0m from a building or property line, consistent with AS1428.4.1

Where non-conventional kerb ramp installations occur then consider the use of tactile indicators to facilitate safe access for people with vision impairment, consistent with AS1428.4

Tactile indicator colours shall provide a luminance contrast to the colour of the background paving in accordance with AS1428.4.1

Performance Criteria:
Indicators and installation of indicators to conform with AS 1428.4.1

Indicators to be slip resistant and of a material that has 30% contrasting luminescence to the base surface for integrated tile form tactiles.

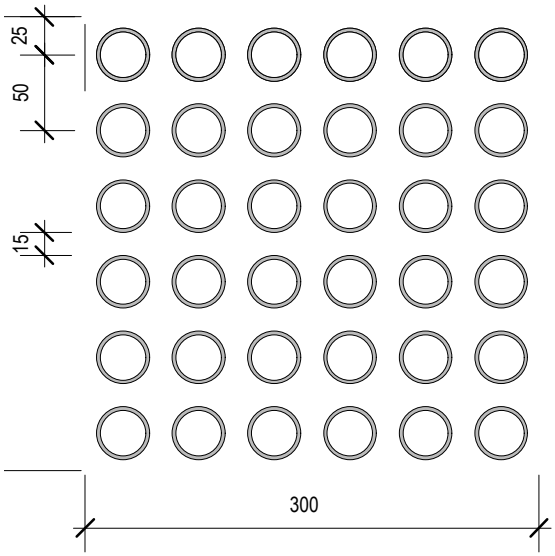
Each type and colour of paving as described in Section 3.2 shall provide a corresponding range of tactile indicators in type and colours to achieve the required luminance contrast for:

integrated tile form tactiles;
discrete single colour tactiles

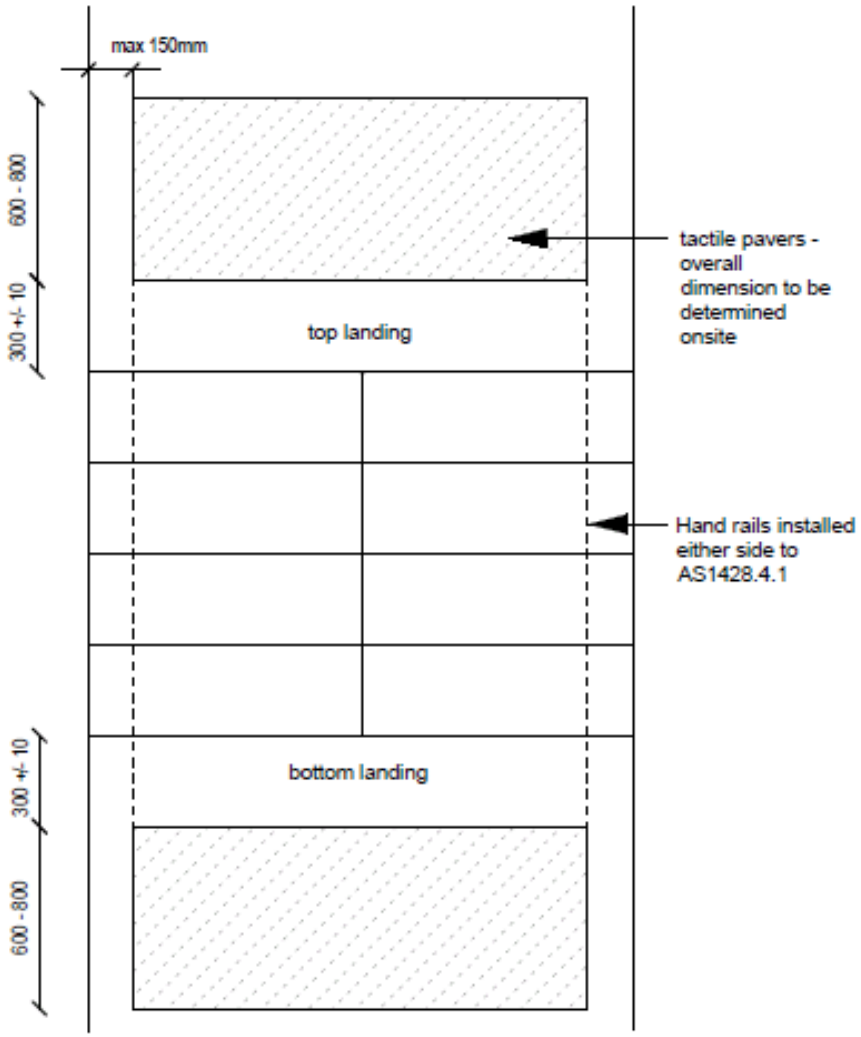
Indicators shall have the top surface no more than 4-5mm above the base surface and laid so there is no likelihood of the edges lifting.

Indicators shall be installed as follows -

For the full width of the path of travel;
Perpendicular to the path of travel;
Set back 300mm from the edge of the hazard.



TGSI SET-OUT - SCALE 1:5



TGSI SET-OUT ON STAIRS - SCALE 1:25

3.15 CHANGE OF LEVEL

There should be very little need for change of level generally in the public domain of the city centre. The footway element of streets should have no intrusions of steps or ramps, in order to provide a consistent path of travel for all users. Any change of level necessary to provide access to buildings should be taken up outside the street boundary.

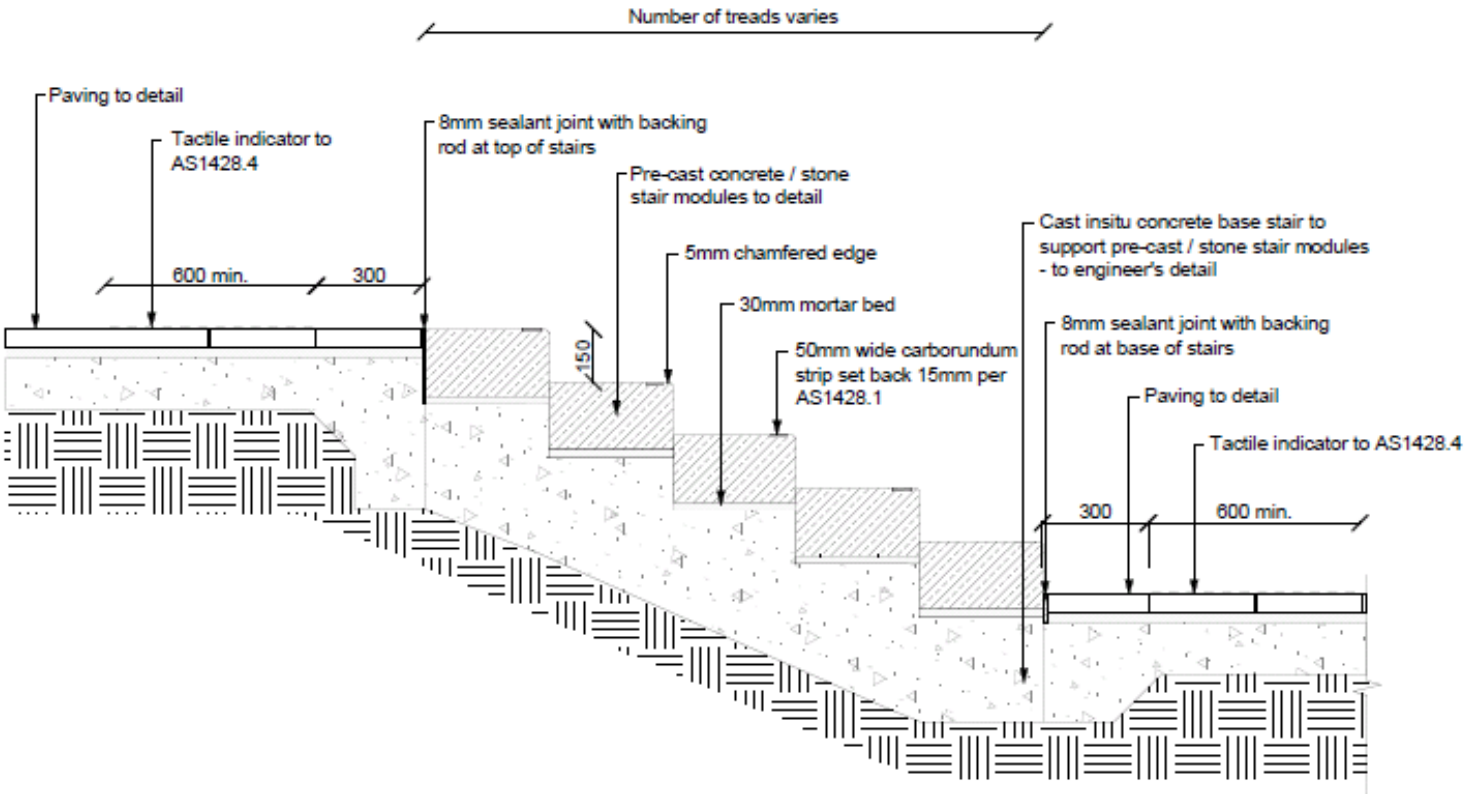
Change of level will most often be necessary in squares, parks and small public spaces. In these cases, change of level should be as generous and comfortable as possible, and integrated into the overall design of the space. Where possible, walkways with a gradient of 1:20 or less are preferable to pedestrian ramps.

The following are key principles and criteria:

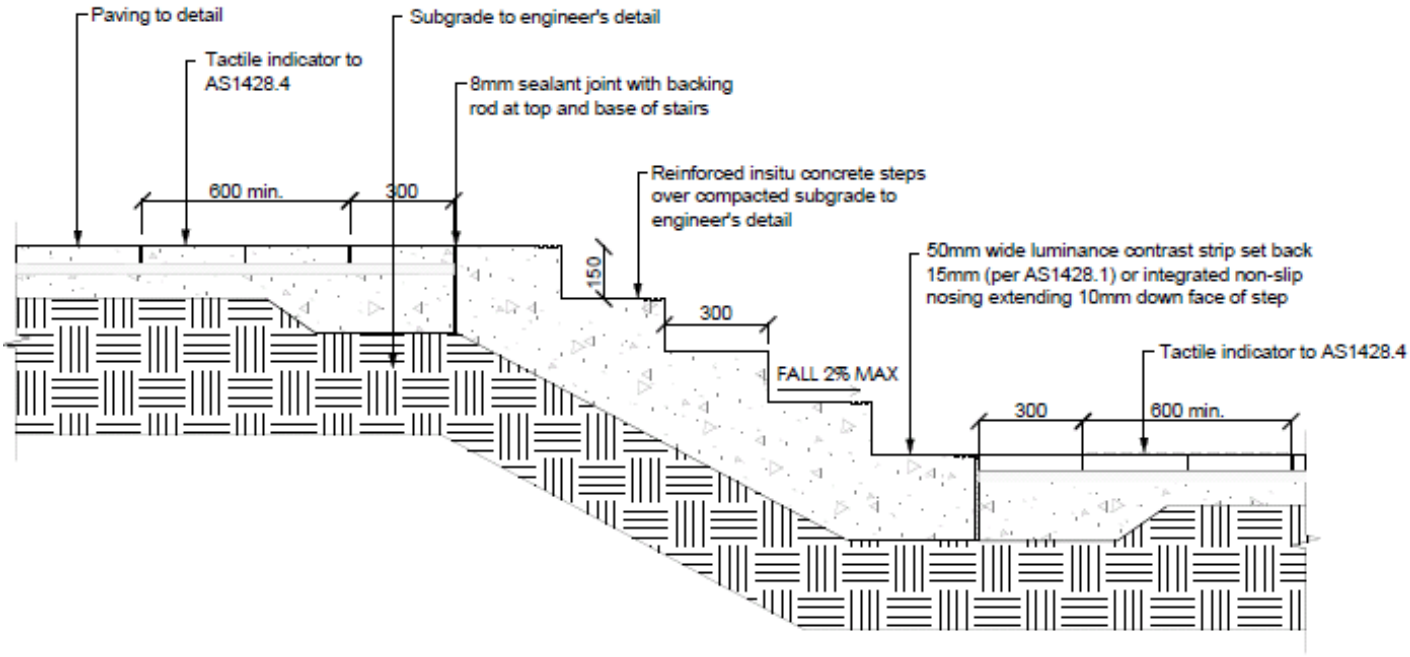
- Establish a design language for steps and ramps that is consistent with the surrounding fabric of the public domain.
- Cast in situ or precast concrete step pieces should have a high quality finish equal to a grade 2 finish (see AS 3610.1-2010).
- Use solid stone step pieces in preference to stone cladding for a more robust finish.
- Edge each step with 50mm width tooled, non slip nosing or a textured carborundum strip to increase grip and to meet standards set out in AS 1428.1
- Dimension and set-out of steps to conform with relevant sections of BCA. Preferred step geometry of 150 - 165mm risers and 275 - 300mm treads.
- Meet all necessary Australian Standards for ramp gradient and width.
- Handrails should conform with relevant standards for access (AS1428.1:2009)

Change of level well integrated into public domain -precast steps, The Rocks

Change of level well integrated into public domain -precast steps, Memory Park, Penrith



STONE/PRE-CAST CONCRETE STEPS - SCALE 1:20



IN-SITU CONCRETE STEPS - SCALE 1:20

example of minimal visual impact service cover design

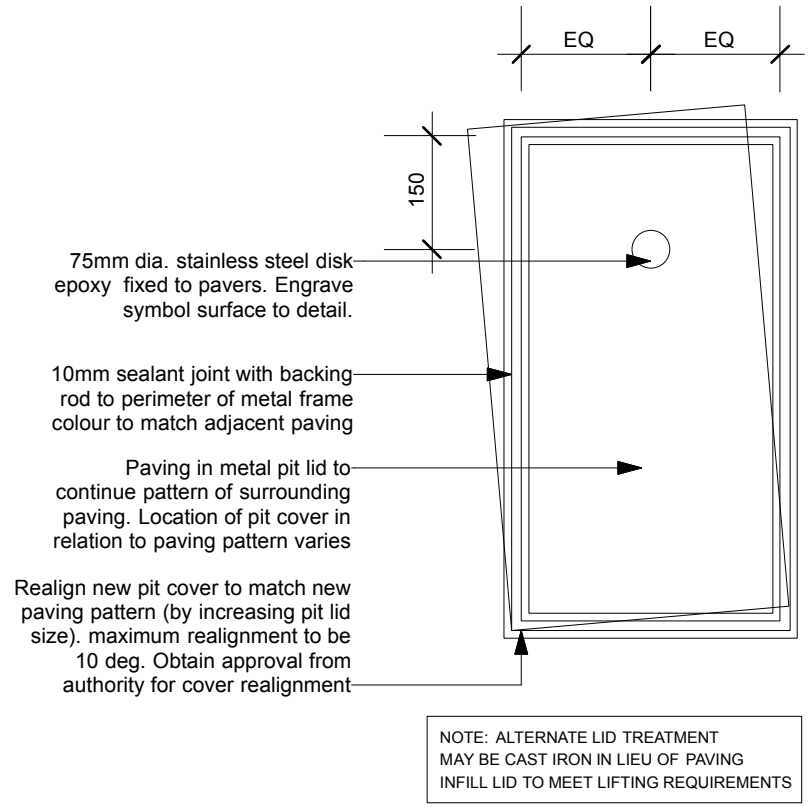
3.16 SERVICES

The provision of services has the potential for major impact on streetscapes, through location and materiality of service covers presence of overhead services and damage to pavements during maintenance of underground services. Consideration of service provision is essential in the design of the streetscape.

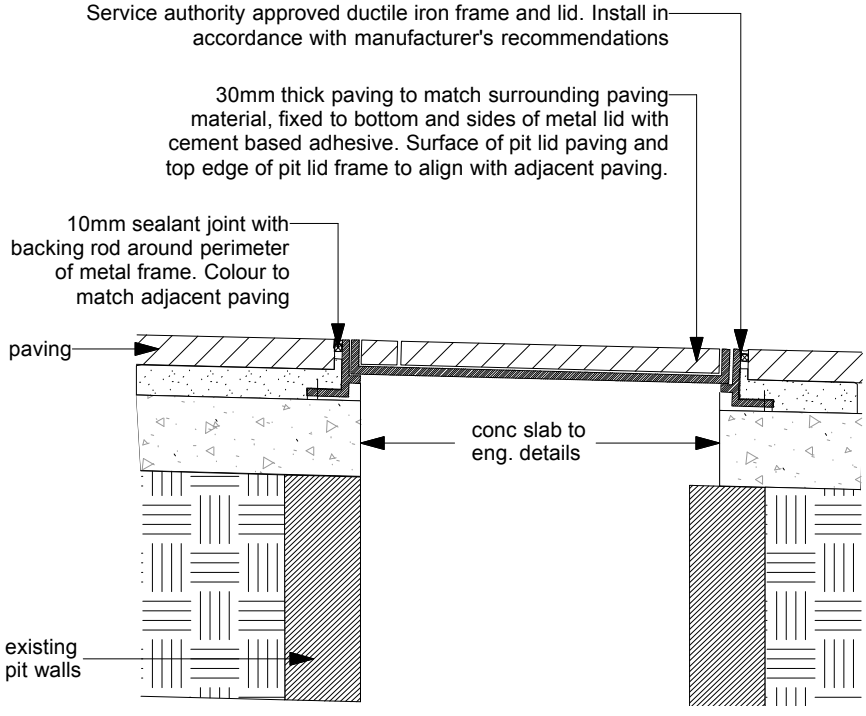
The following are key principles for integration of services into streetscape design:

- Liaise with service authorities to determine future service requirements over full city blocks. Where possible, consolidate services and provide generous conduit trenches for future provision.
- Underground overhead wires as part of streetscape upgrades
- Use infill pit covers for electrical and Telstra service covers, to allow continuity of pavements.
- Use service cover frames that allow for paving to finish flush with frames - there should be no visible concrete edge to any cover.
- Ensure the edges of pit covers do not protrude more than 3mm above or below adjacent paving.

Stormwater
Generally, all stormwater should flow across pavement surfaces to gutters in the road surface. Where pavement widening prohibits flow to gutters, provide stormwater inlets that are co-ordinated with other surface details.



ONE PART PIT COVER PLAN -N.T.S.



ONE PART PIT COVER SECTION -N.T.S.

3.16.1 INFILL SERVICE COVER

Design Intent:
Reduce the intrusion of service covers in the pavement as far as possible by infill paving surfaces of larger covers to match surrounding paving, and by minimising or avoiding concrete surrounds to covers.

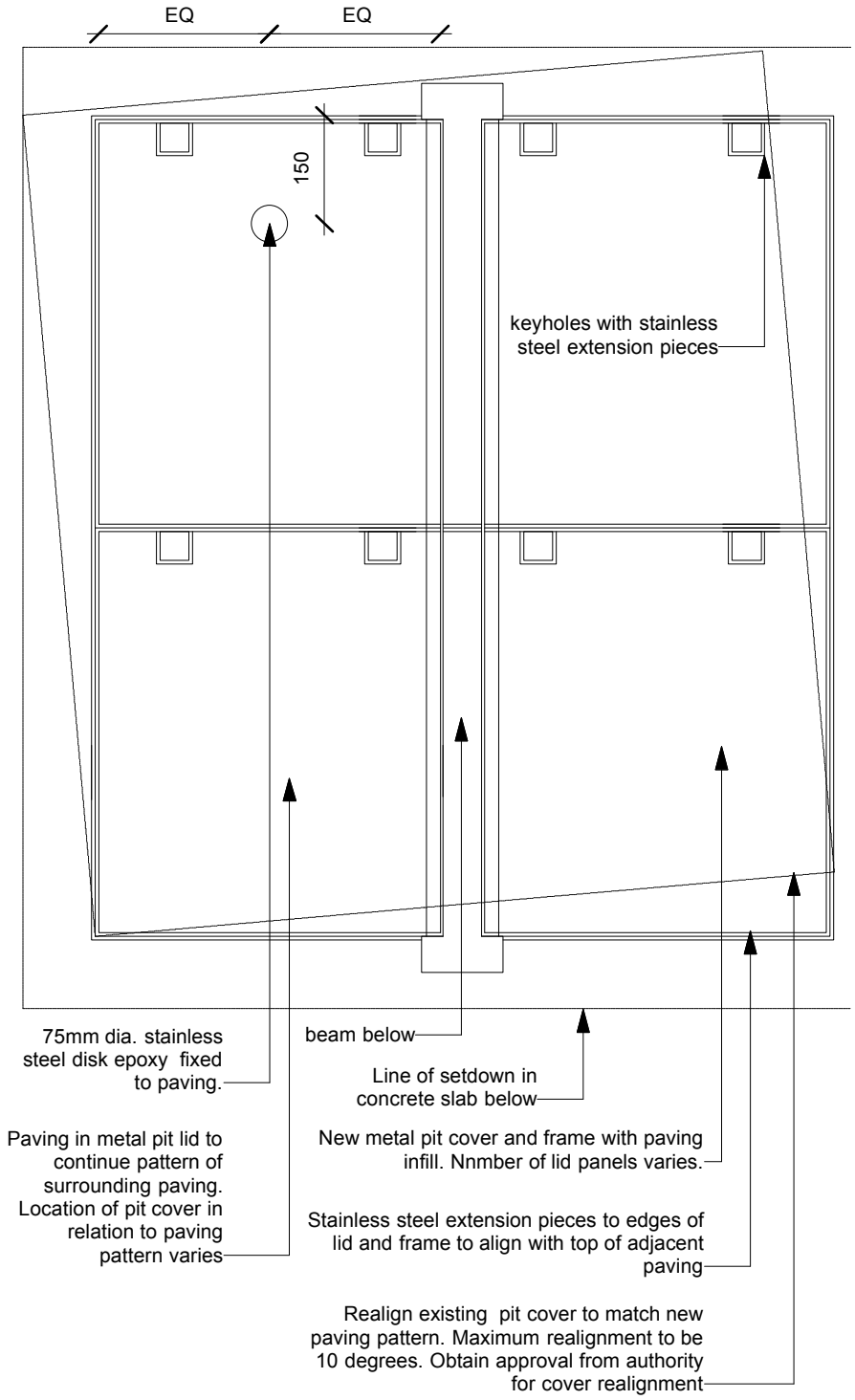
Performance Criteria:
Where possible continue paving pattern and material across service covers. Replace Existing covers as part of paving upgrade.
Where possible realign existing pit covers to match paving pattern and alignment. Maximum realignment to Be 10 degrees. Obtain permission from relevant authority for cover realignment.

Cut stones around the pit cover following the shape of the cover with as close a fit as possible. Minimum size of unit 300mm x 450mm or equivalent in area.

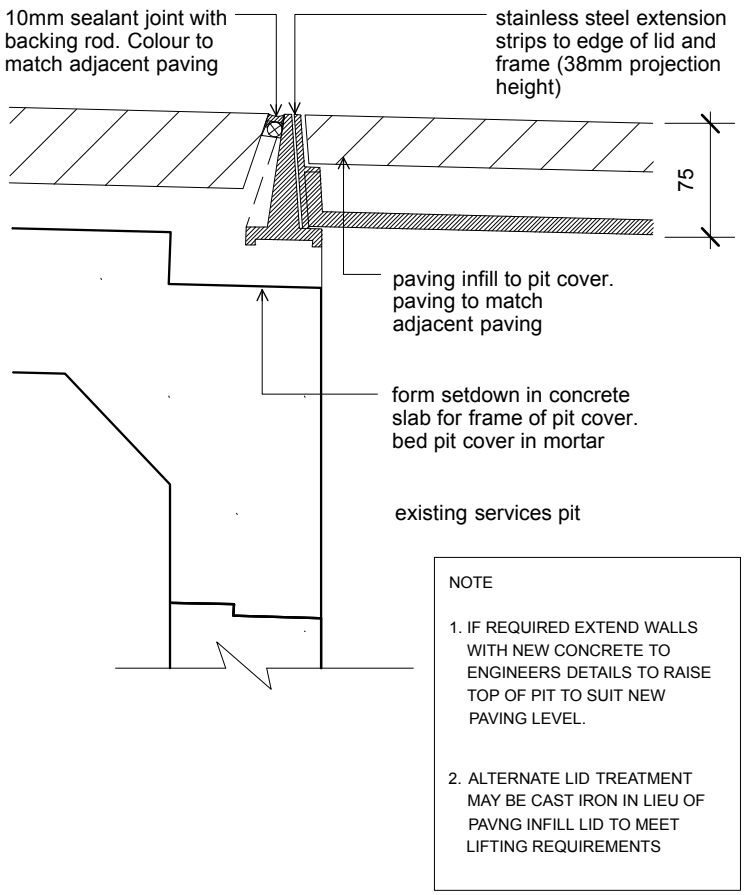
Install all new rectilinear covers parallel to the kerb, or at corners, parallel to the dominant paving pattern. Align small covers with flagstone joints or drill a hole through the paver. Cut circular holes for circular covers.

Take the location of existing pits and covers into account when locating kerb ramps, vehicle crossings, tree pits street furniture etc to minimize conflict and relocation costs.

3.16.2 MULTI-PART INFILL SERVICE COVER

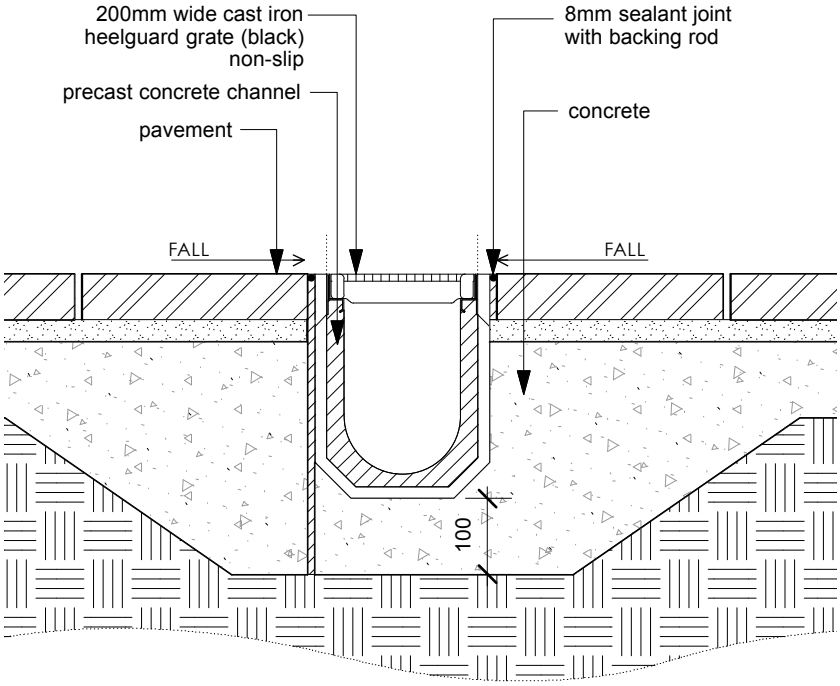


MULTI PART PIT COVER PLAN - SCALE 1:10

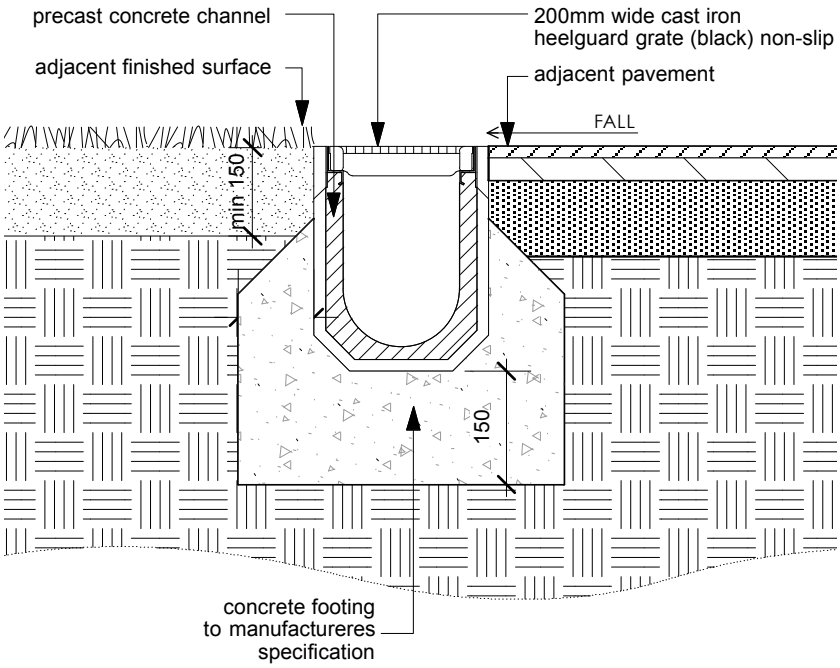


MULTI PART PIT COVER SECTION - SCALE 1:5

3.17 TRENCH GRATE

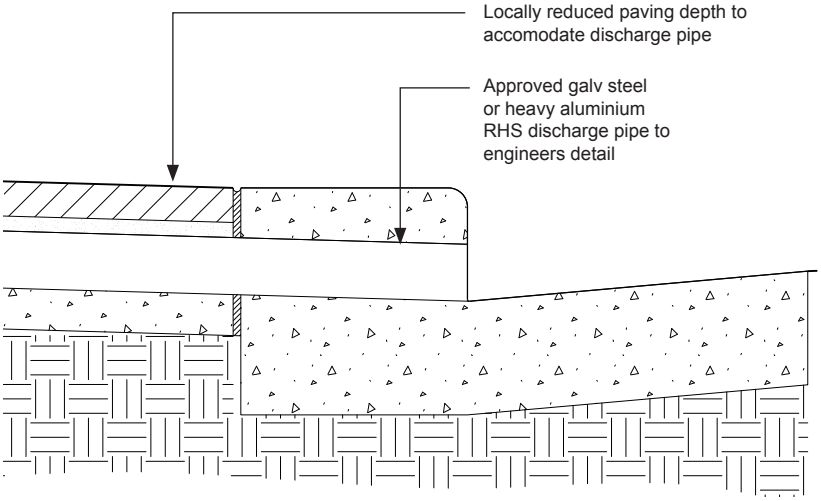


TRENCH GRATE AND CHANNEL IN SLAB SECTION - SCALE 1:20



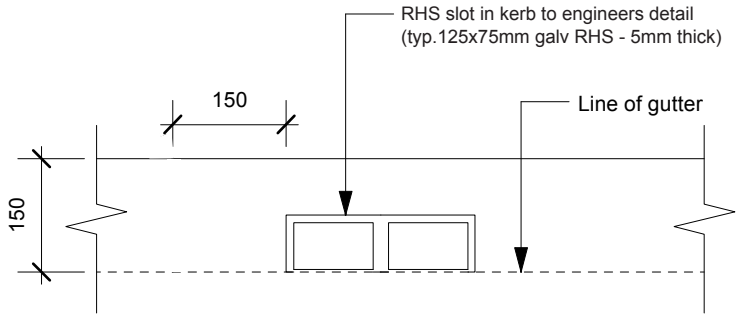
TRENCH GRATE AND CHANNEL IN HAUNCHED FOOTING - SCALE 1:20

3.18 DOWNPIPE CROSSING & KERB OUTLET



REFER TO DETAIL 3.10 FOR KERB INSTALLATION

SECTION - SCALE 1:10



ELEVATION - SCALE 1:10

3.19 KERB INLET PIT

Design Intent:

Performance Criteria:
Pit walls are to be a minimum 150mm thick and shall be formed on both the inside and outside faces.

Pits are to be located and constructed in accordance with Council's drawings. Precast pits are not to be used.

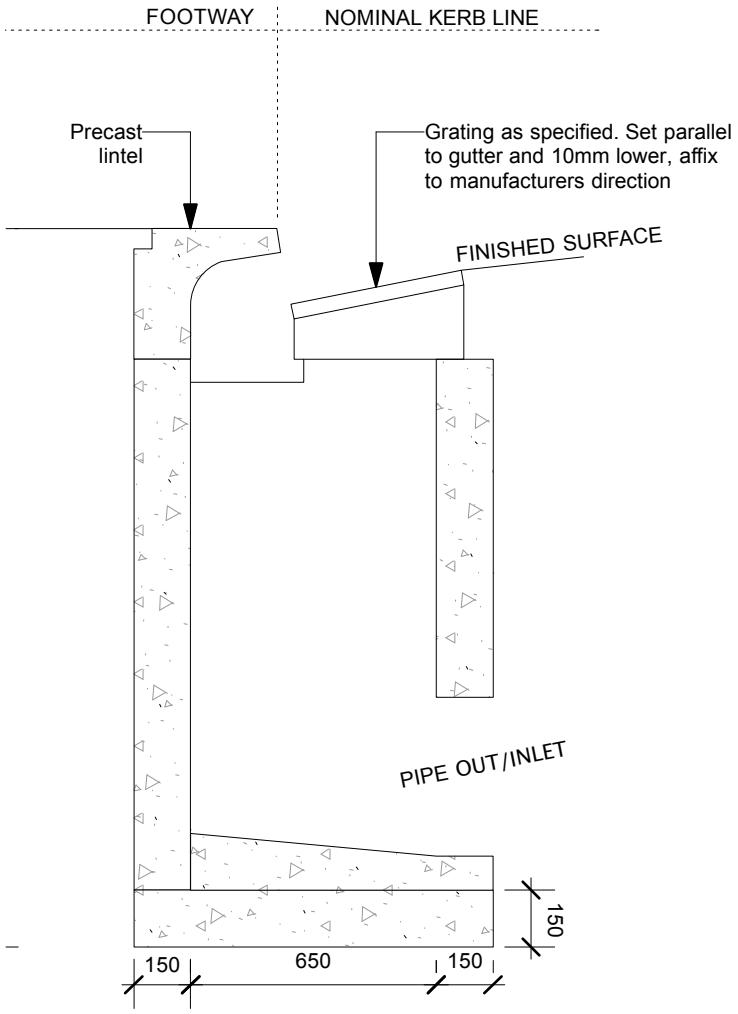
Where pits exceed 1.2 metres in depth galvanised or other approved step-irons are to be provided at a spacing of 300mm to provide access for inspection and cleaning.

Where pits exceed 1.5 metres in depth, the pit shall be constructed of reinforced concrete.

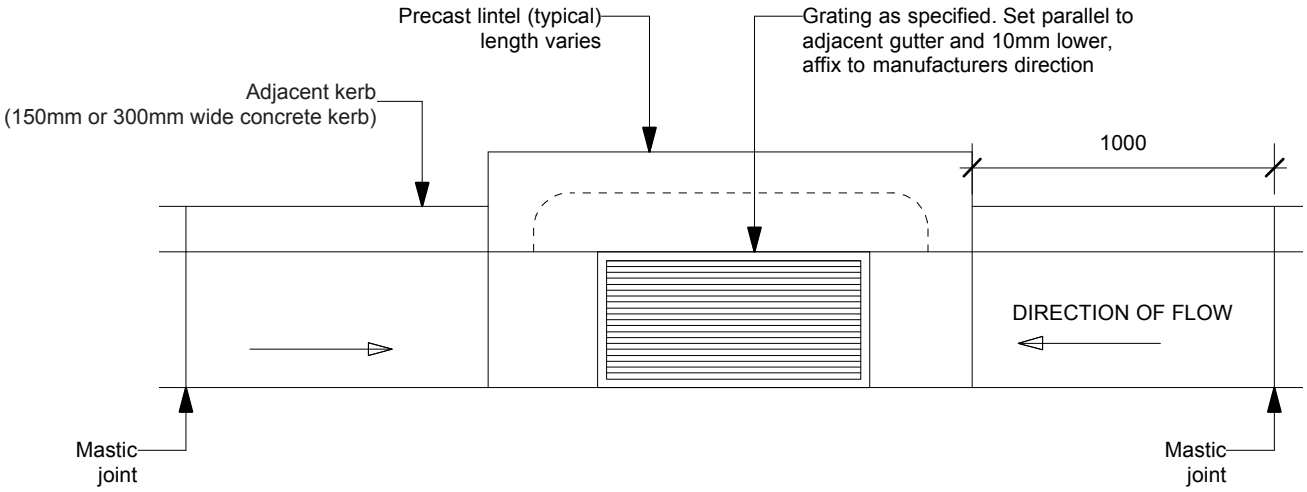
Pit grate shall be 'Weldlok' GG78-51 or approved equivalent with flat skirt base.

All pits shall be provided with a locking clip.

All pits are to be constructed in accordance with Council's Guidelines for Engineering Work.



KERB INLET PIT, SECTION - SCALE 1:20



KERB INLET PIT, PLAN - SCALE 1:20


Tree planting in carriageway with raingarden

4.0 STREET TREES AND PLANTING PRINCIPLES

A number of principles guide the selection of individual specimens, the placement of trees and the preparation of planting holes, namely:

- Super advanced or semi mature specimens should be used at all times for planting in streets and squares. See 'Specifying Trees' [1], relevant Australian Standard and Natspec Worksection 0255b - Landscape-plant procurement for a guide to selection.
- Avoid the selection of trees that have spreading branches that droop below 2m headroom when adjacent to pedestrian pathways.
- Trees that have significant leaf drop and shed large nut-like pods on footpaths should be avoided.
- Care should be taken with underground services. Some existing services may require root protection such as concrete encasement. This requirement will vary depending on specific site conditions. 'Dial before you Dig' assessment must be undertaken.
- Creation of appropriate subsurface conditions for trees, including:
  - Adequate sizing of tree holes to allow a reasonable quantity of soil. Planting holes must be minimum three times the width of the root ball;
  - The use of structural soils under pavements to extend the root zone where detailed;
  - Plants must be deep watered, particularly during the establishment period;
  - Careful specification of suitable growing mixes.
  - Depth of planting hole must be no deeper than height of root ball.
  - Root pruning must be carried out immediately prior to planting.
- Planting must be carried out under the supervision of an AQF 3 or greater arborist/ horticulturalist.
- When planting, trees must be oriented in the same direction as they were in the nursery and/ or consider branching structure and future growth.
- The top of the root ball must be flush with the existing soil level.
- Incorporate water sensitive urban design initiatives where possible into tree planting - to provide passive watering.

1 Clarke, R. (2003). Specifying Trees: a guide to assessing tree quality. Natspec Guide No.2, Construction Information Systems,

4.1 GUIDELINES FOR TREE PROCUREMENT

Planning for tree procurement should be incorporated into the design and documentation of streetscapes. Trees should preferably be pre ordered before the civil works are tendered. This can be in the form of a separate supply contract for the trees. This approach ensures that trees will be available, and that quality of supply can be controlled.

Specifying Trees 1, relevant Australian Standards and Natspec Worksection 0255b - Landscape, have guidelines for specifying growing on and/or supply of advanced trees, for use in procurement contracts. The following information is a brief outline of the guidelines.

Inspection should be made at the nursery, prior to delivery of trees to site, to ensure compliance with the specification and standards.

Tree Inspection at Delivery

- Trees should be inspected at delivery and not accepted if they do not comply with the criteria below and in 'Specifying Trees', Clark, R. 2003.

Tree Size

- Generally 2-5 m tall with tapering stem/trunk;
- Recommended container sizes are 100-300L, sizes no less than 300L to be used for trees in pavement, no less than 100L for other plantings;
- The following table can be used as a guide to selecting properly sized tree

CONTAINER SIZE (L)	HEIGHT (M) 2.0	2.5	3.0	3.5	4.0	4.5	5.0
100	60	50					
200	100	90	70	60	48		
300			100	80	70	65	60

CALIPER (mm)

Tree Health & Vigour

- Foliage size, texture and colour should be consistent with that shown in healthy specimens of the nominated species;
- Trees should be free from damage and from restricted habit due to growth in nursery rows and are exhibiting extension growth consistent with that of vigorous specimens of nominated species;
- Trees should be free from stress resulting from inadequate watering, excessive shade or excessive sunlight experienced at any time during their development;
- Plants need to have been grown and hardened off to suit the conditions that could reasonably be anticipated on site at the time of delivery.

Tree planting in verge

Pests and Diseases

- Trees should have foliage that is free from attack by pests or disease;
- For native species with a history of attack by native pests - restrict plant supply to those with evidence of previous attack to <15% of the foliage and ensure absence of actively feeding insects.

Tree Structure

- Ensure that branch diameter is less than or equal to one half of the caliper immediately above the branch junction;
- Trees should have uniform growth throughout consistent with healthy examples of the species, unless specific form or clean stem height is required (eg. pleached Pears);
- Trees must be self supporting and free of staking (strong trunk/ stem);
- The distance from the centre of the trunk to the extremity of the rootball should not vary by more 10%.

Root System

- Plants should be grown in their final containers for 12 weeks;
- The root system should be well proportioned in relation to size of plant material and conducive to successful transplantation;
- The rootball should be free of any indication of having been restricted or damaged;

The rootball should display adequate soil retention - on shaking or handling the unsupported rootball, at least 90% of the soil volume should stay intact.

4.2 GUIDELINES FOR SOILS

The following is a guide only for soil types in new tree pits. Horticultural testing should be carried out for each street to determine specific soil mixes and nutrient requirements for each location.

Soil mix A, for top layer of tree pits: 7 parts sandy loam, 3 parts peat moss, PH range 5.5 – 7.0, salt content 1% max.
This is equal to Benedict 70% screened topsoil no.2 / 30% compost.

Soil mix B, for bottom layer of tree pits: 8 parts sandy loam, 2 parts coarse river sand, PH range 5.5 – 7.0, salt content 1% max.
This is equal to Benedict 80:20 sand soil mix.

Lightly compact soil mixes in 150mm layers.

Engineered soil solutions (structural soils) are used to provide maximum air water and nutrients to the root zones of trees in pavements. Ideally, 5 cubic metres or more of growing medium should be provide to each street tree. In paved areas, where the surface area of the tree hole must be limited, the use of a zone of structural soil around the root zone may be beneficial to the long term health of the tree. Structural soil is a permeable subgrade that provides a base for paved areas surrounding tree pits, but allows penetration of air and water to the root zone.

The mix is a combination of four parts of aggregate to one part of filler soil.

The recommended mix is Benedict Sand and Gravel Smart Mix 3 (84% nominal 40mm quarried basalt aggregate to 16% filler soil consisting of a screened blend of Virgin Menangle Sandy Loam and a unique Virgin Clay).

The role of filler soil in a structural soil blend is to provide nutrient retention and potential water holding capacity. Typical additives as recommended are:

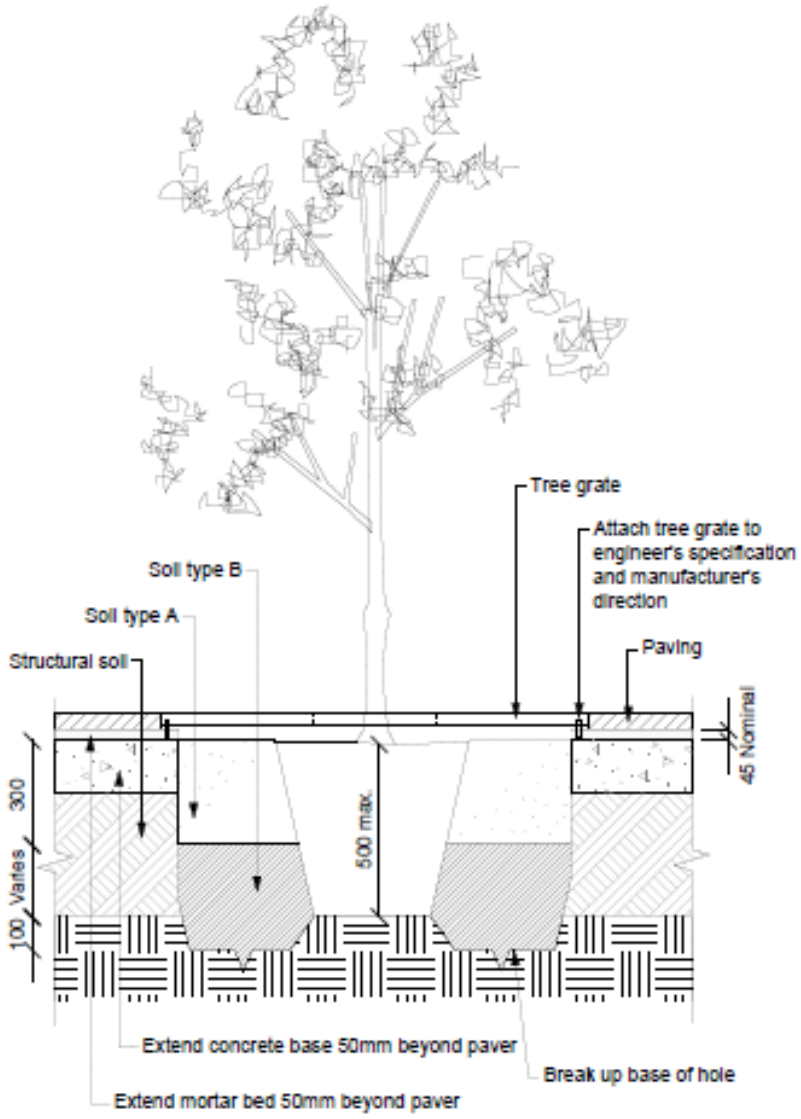
- Superphosphate at 800g/m3
- Potassium Sulphate at 400g/m3
- Complete trace elements at 100g/m3
- Ammonium Sulphate at 400g/m3
- 12 month controlled release fertiliser (18:3:10 NPK or similar) at 2.0kg/m3

Additives should be confirmed by soil testing.

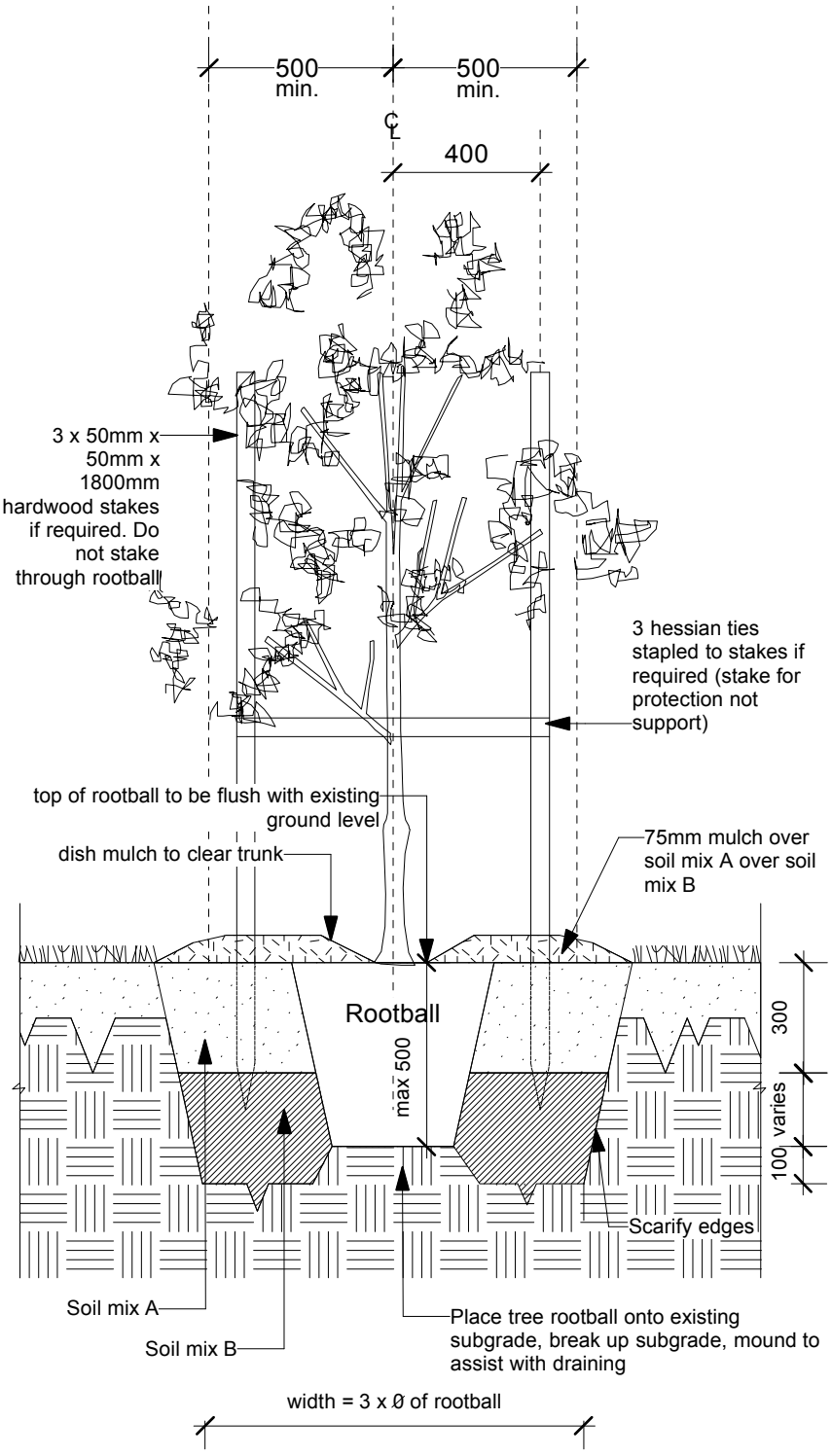
4.3 NEW TREE PLANTING IN PAVEMENT

Design Intent
- To improve pedestrian amenity and visual quality along streets.
- To maximise conditions for tree growth.

Performance Criteria
- Hand excavate around existing trees.
- Employ structural soil beneath pavements to extend root zone.
- Provide adequate tree pit width and depth.



TREE PLANTING IN PAVEMENT - SCALE 1:20



TREE PLANTING IN TURF - SCALE 1:20

4.4 NEW TREE PLANTING IN TURF

Design Intent:

- To improve pedestrian amenity and visual quality along streets.
- To maximise conditions for tree growth.

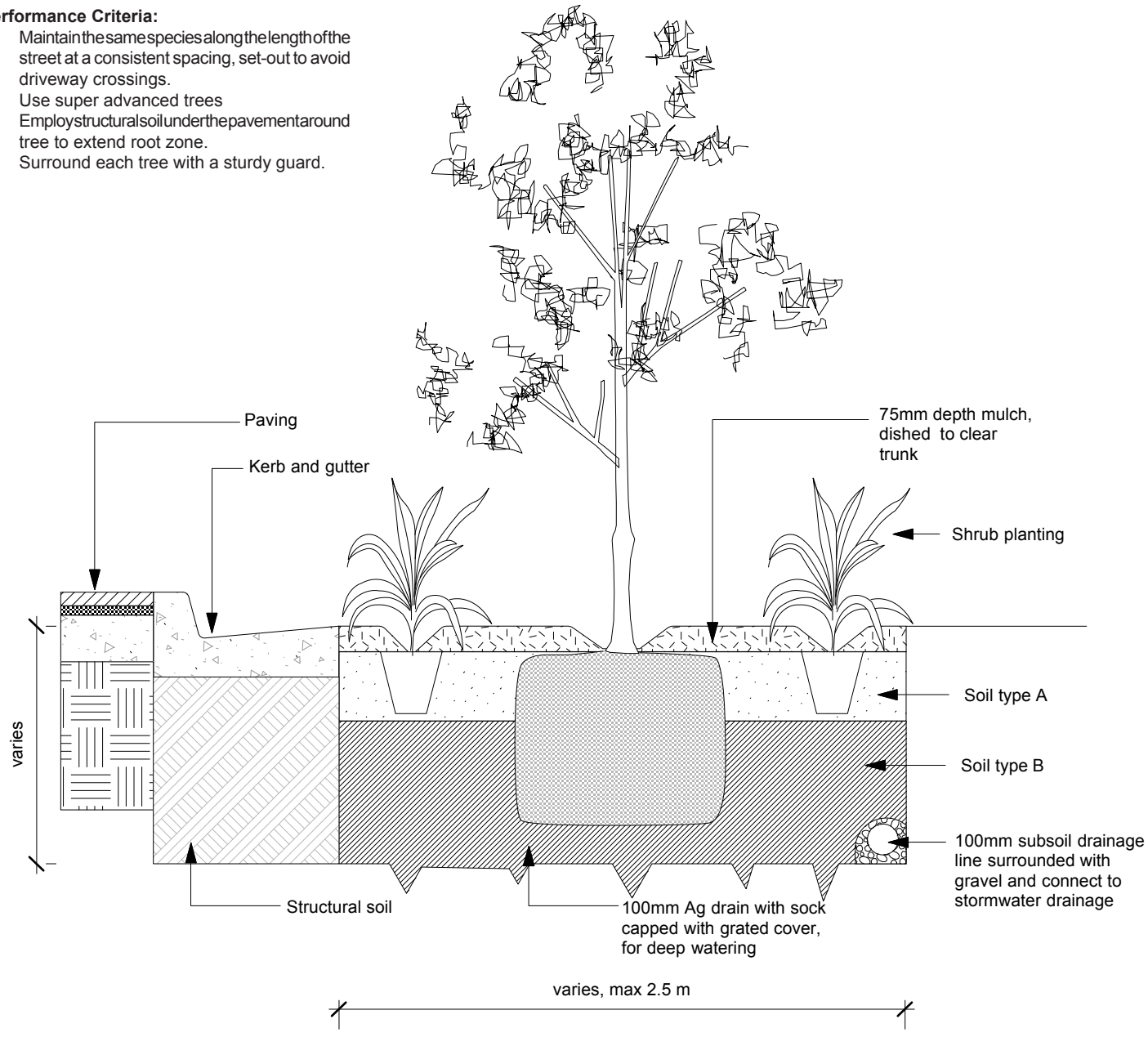
Performance Criteria:

- Hand excavate around existing trees.
- Provide adequate tree pit width and depth.

4.5 NEW TREE PLANTING IN CARRIAGEWAY

Design Intent:
To allow tree planting in the parking lane in narrow streets, to supplement footpath planting and to slow traffic by reducing the perceived width of the carriageway. This is a common detail in suburban Sydney.

Performance Criteria:
- Maintain the same species along the length of the street at a consistent spacing, set-out to avoid driveway crossings.
- Use super advanced trees
- Employ structural soil under the pavement around tree to extend root zone.
- Surround each tree with a sturdy guard.



TREE PLANTING IN CARRIAGEWAY - SCALE 1:20

4.6 TREE PIT SURROUNDS

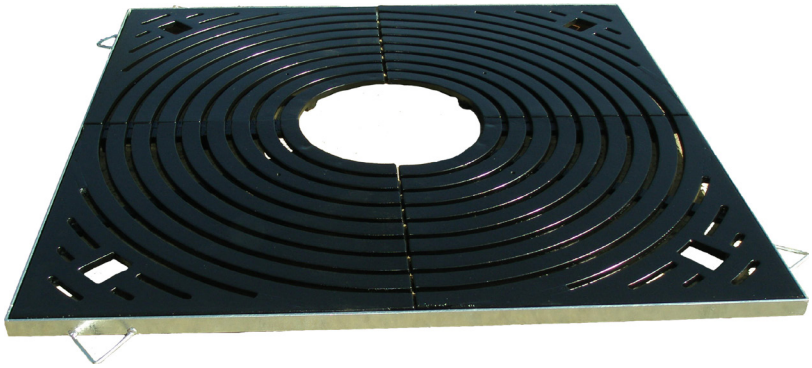
Tree pit surrounds provide a detail in the paving and contribute to the character and quality of the streetscape. Tree pits should be sized to suit the size of paving units in the dominant surrounding paving, to avoid cutting units.

The choice of tree pit surround should respond to the dominant paving condition.

There are two possible standard tree pit surrounds:

- For use in Primary Streets - Cast Iron Tree grate suitable for all areas of high pedestrian use. eg GOV 35B supplied by Furphy Foundry or approved equivalent - plain finish.
- Ensure grates do not have large openings that could cause entrapment of a wheelchair or cane;
- For use in Secondary Streets and lanes - Terrabond surface - 40mm thick 10mm grade granite gravel in light grey colour stabilised with Terrabond over 70mm thick blue metal. Colour to approval of relevant Council officer. Terrabond to be laid in concentric rings to allow for removal with tree growth.

Trees in tertiary streets are generally planted in grassed or planted verges.



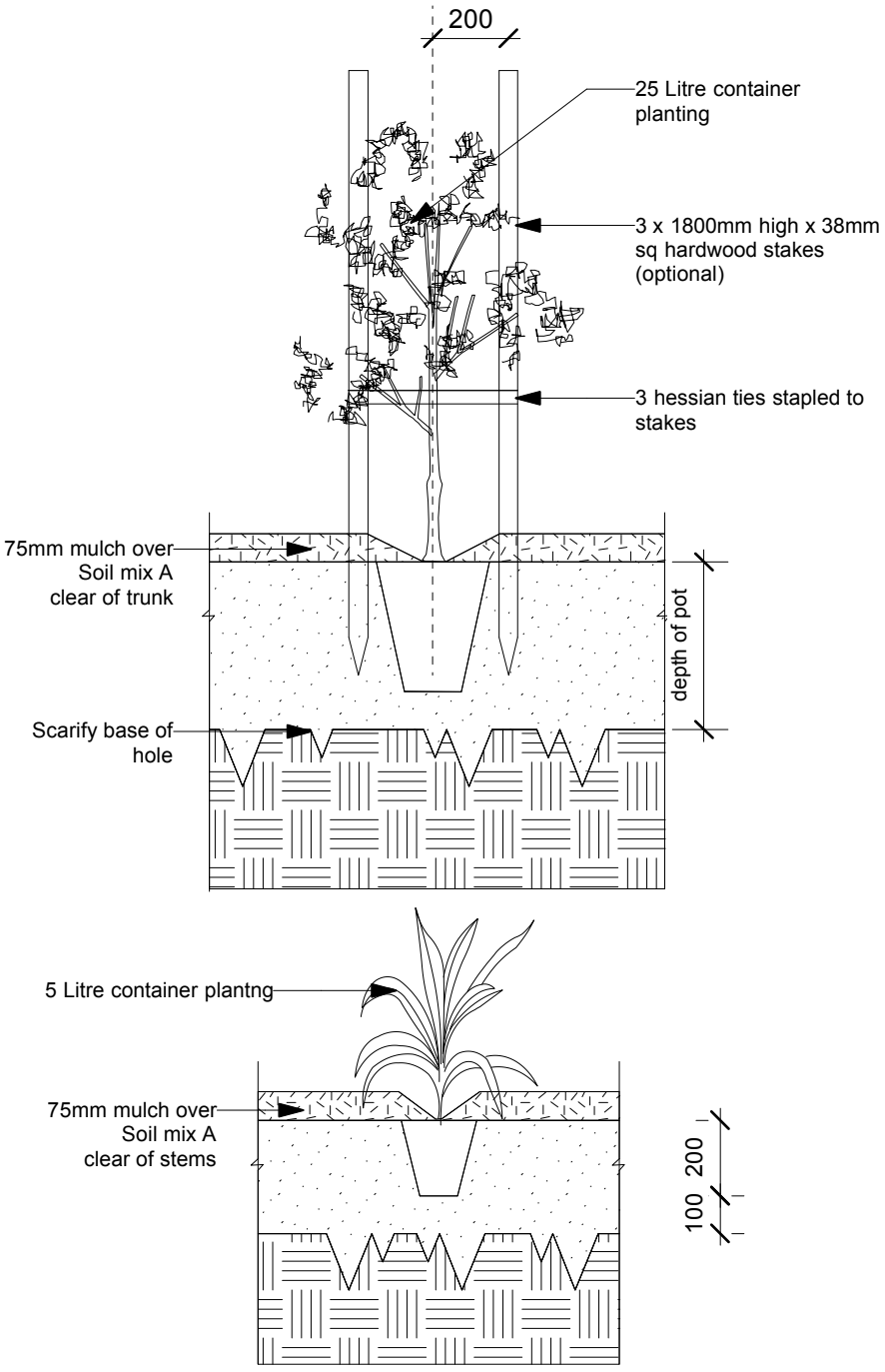
Furphy Foundry Tree Grate

Tree in Terrabond

4.7 PLANTING IN LANDSCAPED BEDS

Design Intent:
Plant selection shall avoid the use of plants that have spreading or decumbant growth when adjacent to pedestrian pathways.

Performance Criteria:
Do not plant in unsuitable weather conditions (extreme heat or cold)
Ensure base of planting hole is broken up.
Apply approved slow release fertiliser when planting.
Thoroughly water in plants after planting.



TYPICAL PLANTING IN GARDEN BED - SCALE 1:20

4.8 GUIDELINES FOR ESTABLISHMENT MAINTENANCE

A planting establishment period of at least 13 weeks should be a part of the streetscape contract, to ensure that the planting contractor is responsible for the quality of the tree at planting and at hand over. A longer period may be required if the tree is planted in conditions that may cause tree stress, such as extreme heat or cold.

During the planting establishment period, regular maintenance should include:

- Regular deep watering of each tree.
- Replacement of failed plants - a system/cost responsibility for replacement of vandalised plants should be agreed with Council at the time of contract;
- Regular removal by hand of rubbish and weed growth throughout the course of the works and the duration of the planting establishment period.
- Monitoring of trees for pests and diseases, and treatment for same;
- Pruning of damaged limbs;
- Top up of mulch where loose material is used;
- Adjustment of stakes and ties.

4.9 GUIDELINES FOR LONG TERM MAINTENANCE

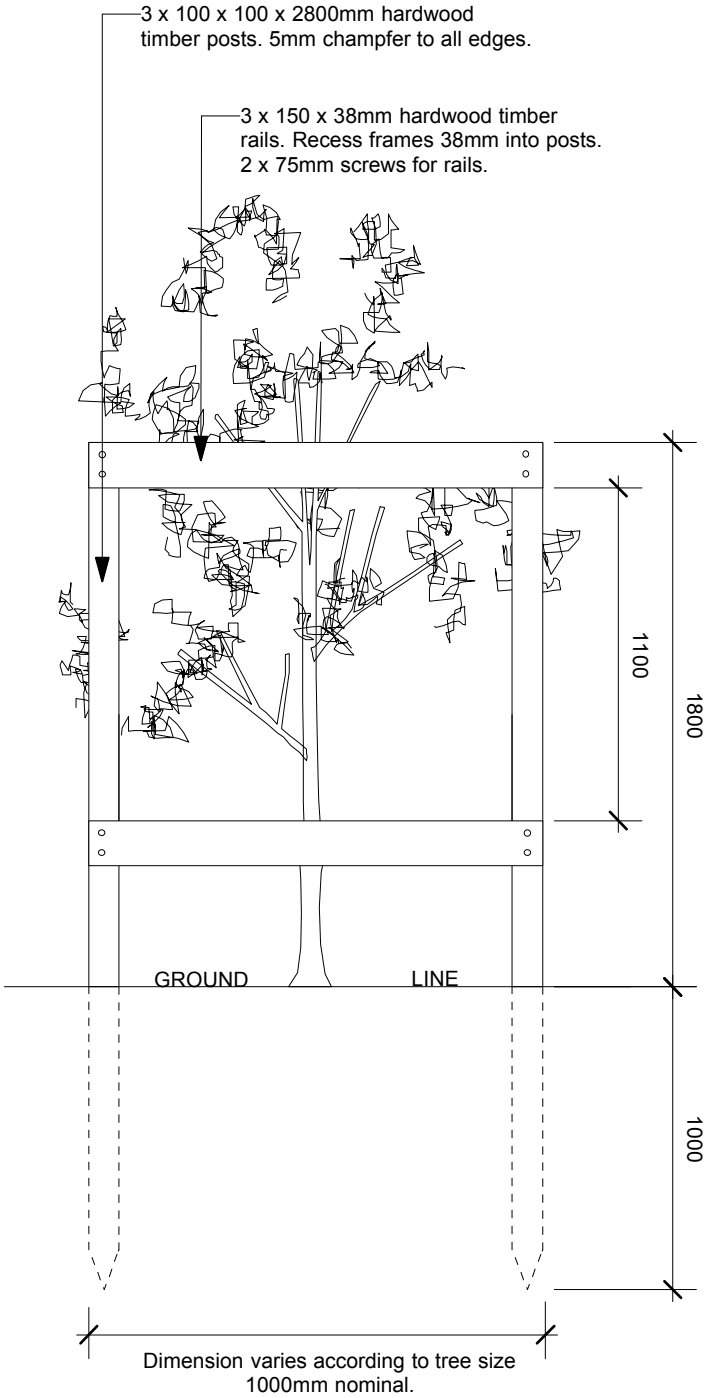
- Water plants adequately in dry periods.
- Formative pruning must be carried out to remove potential growth defects and conflicts with infrastructure. The need for pruning must be assessed and if required, carried out at planting and annually. Pruning must be done by AQF 3 or above Arborist.
- General pruning procedures include:
- Live branches greater than 25mm diameter shall not be removed unless directed by Council arborist.
- Dead branches greater than 25mm diameter (measured at the base of the branch) shall be removed from the canopy.
- Raise crowns, prune back lateral branches or reduce branches of trees where necessary to provide clearance for pedestrians.
- Remove no more than 10 percent of live foliage from trees unless directed by council arborist.
- Remove dead and decayed wood or limbs that have been broken. For deadwood removal, make cuts outside of live wood.
- Adjust stakes and ties, and remove when tree is stable
- Monitor and treat pests and diseases
- All plant growth to be pruned at pathway edges to avoid trip hazards and maintain 2m minimum clear height on footpaths consistent with AS1428.

Quality nursery stock

4.10 TIMBER TREE GUARD

Design Intent:
To protect trees from intentional and accidental damage due to vandalism or traffic.

Performance Criteria:
- Maintain consistency in materials and construction for each street.
- Avoid damage to trees when installing by wrapping branches.



TYPICAL TIMBER TREE GUARD - SCALE 1:20

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5.0 LIGHTING PRINCIPLES

Lighting in this manual includes both the street pole and the light fitting (consisting of the lamp and luminaire). A light fitting may be chosen which is independent of the street pole type.

The location and spacing of street poles shall be determined by qualified lighting engineers.

Multifunctional Poles (MFPs) have been selected for Penrith city centre as they meet the following criteria:

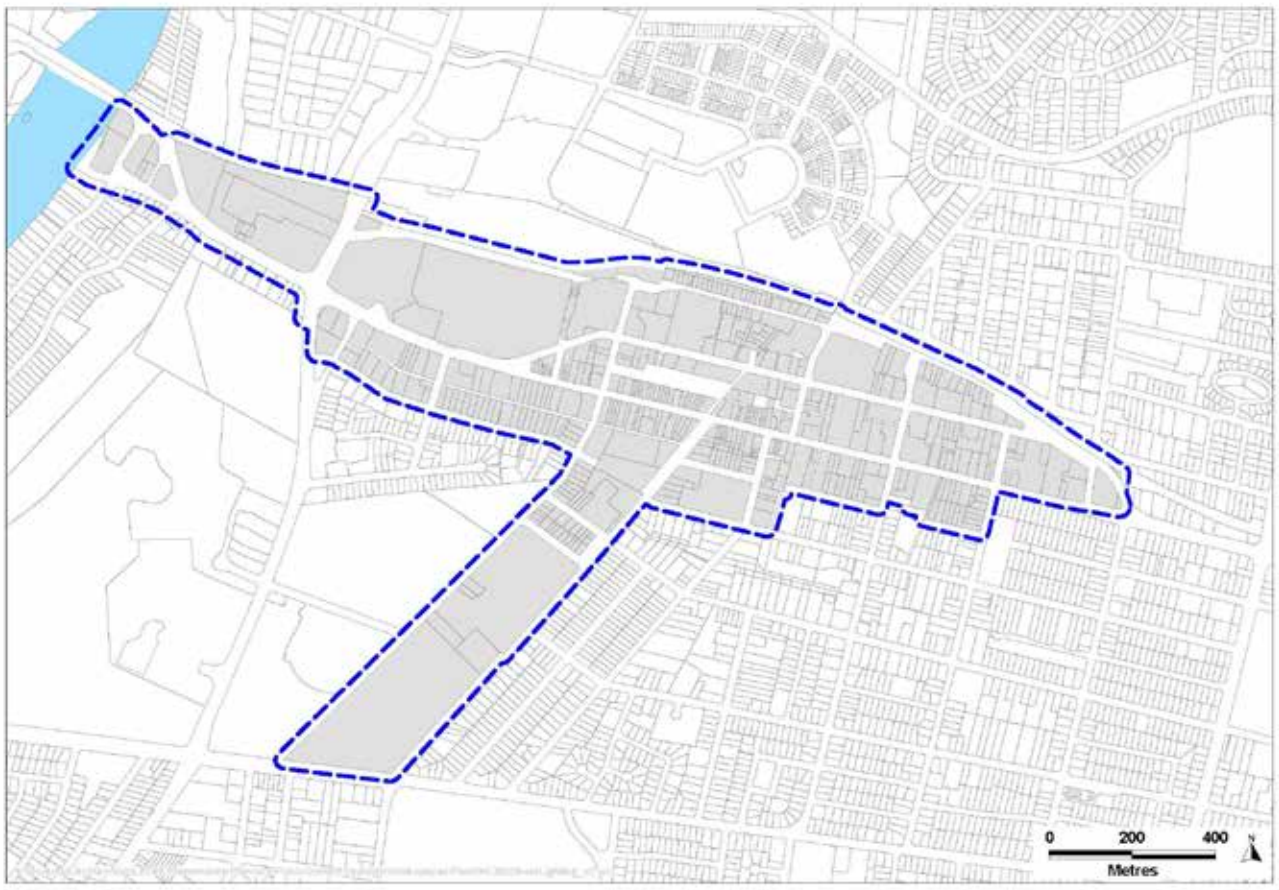
- Reduce street pole clutter within footpaths
- Provide visual uniformity within the streetscape
- Increase sustainability and city branding opportunities
- Minimise maintenance cost by consolidating infrastructure

MFP's are able to accommodate a range of accessories in addition to lighting including banners, CCTV, pedestrian lights and a range of signage types.

Relevant Council Officers and Service Providers must be contacted prior to installation of MFP's to enable consideration of the provision of sub-surface conduits for future services.

5.2 MULTI-FUNCTION POLE LOCATIONS

Multi-function poles are proposed to be located in the Penrith City Centre within the area delineated by the blue dashed line shown in the plan below.



LEGEND

Lighting Type 1: (within box)

Lighting Type 2: (outside box)

5.2 POLES AND LIGHTING

Design Criteria:
Multi-function light poles are to be used within the Penrith City Centre (Refer 5 “Multi-functional pole locations”).

Pole heights shall be according to the following applications:
Street (9m); laneways (6m); Parks/plazas/Special places (4m)

Poles to be aligned and spaced evenly. Details of locations and spacing to be detailed within each street upgrade project.

Performance Criteria:
All lighting to conform with Australian standards (AS/NZS 1158) for road lighting.

Multipole AMAC (Aluminium Macarthur Pole) or approved equivalent to be installed to manufacturers specifications.

Footings to be designed and constructed to Engineers details and specifications.

Rag bolts and connection details to footings to be concealed below finished pavement level.

All cabling to be underground and conform with Penrith City Council standards.

All lighting to conform with Penrith City Council’s requirements & standards.

Consideration to be given to provision of conduits for future services (eg CCTV)

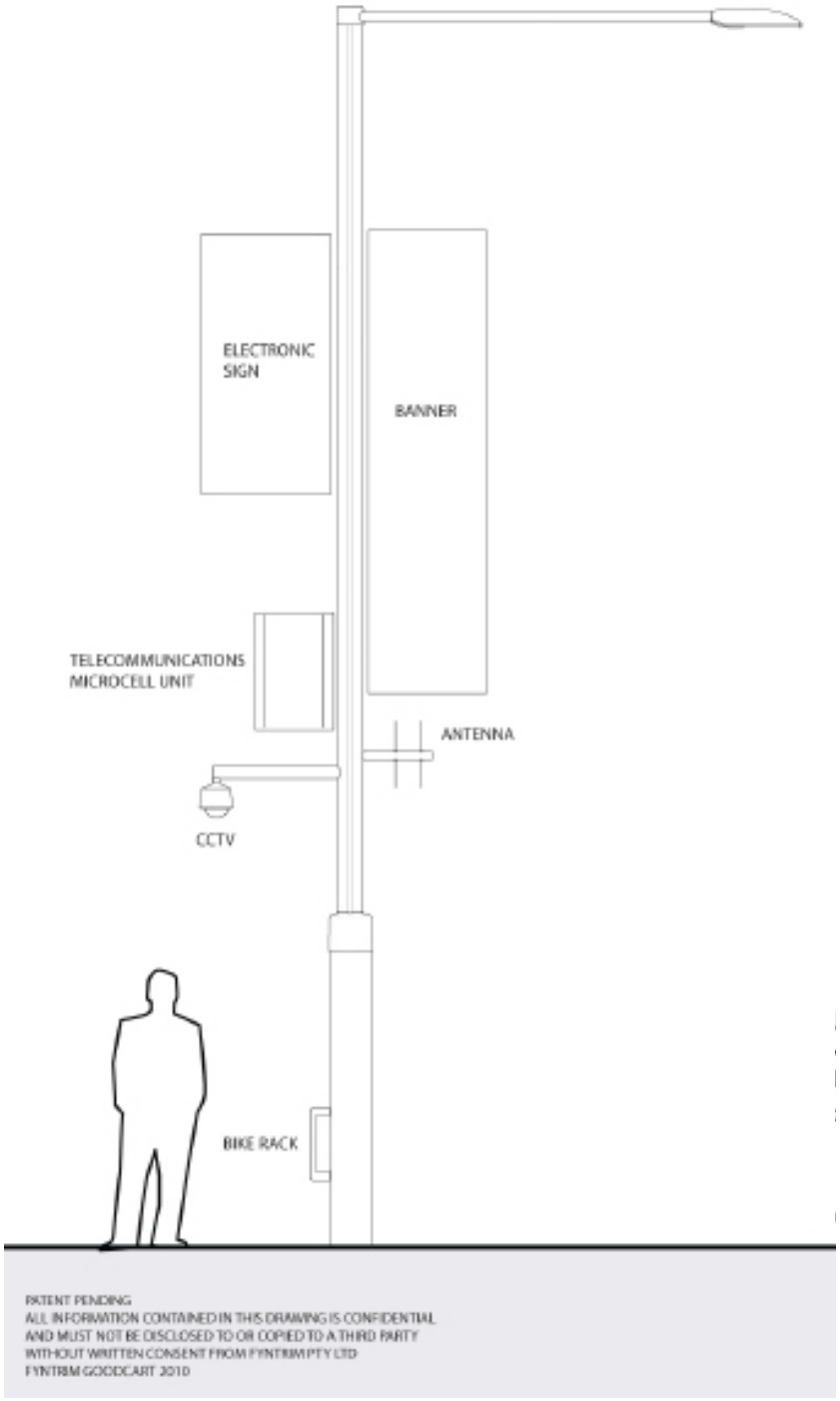
Materials:
Finish to be of high quality, clear anodised aluminium. City logo, identification number and other details to be etched into lower section of pole per Council’s instructions;

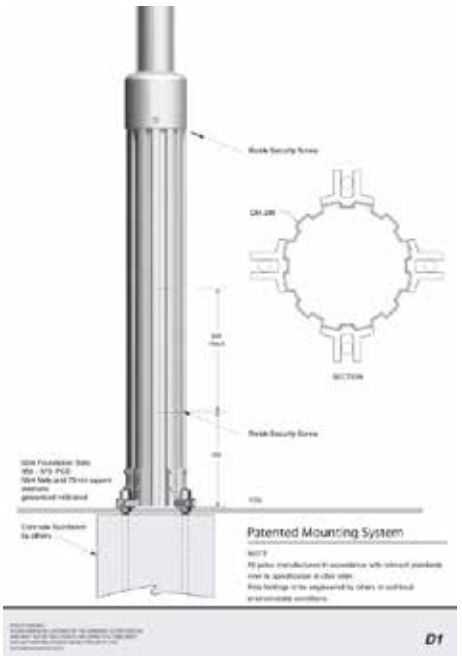
Luminance category:
Vehicular luminance category - V3
Pedestrian luminance - P2

Luminaire:
Luminaires shall conform to relevant Australian Standards and comply with the requirements of Penrith City Council, Integral Energy and other regulatory bodies.

Luminaires may be selected from the following fittings:
Luminaire type Metal Halide 140 watt
Luminaire Light Emitting Diode type.

5.2.1 MULTI-FUNCTION POLE USES





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6.0 STREET FURNITURE PRINCIPLES

The selection of furniture for streets and public open spaces should be based on the following criteria:

- Fitness for purpose – comfort, safety and robustness.
- Cost effectiveness – including recurrent maintenance costs.
- Sustainability of the material utilised.
- Equity of access – provision of accessible furniture
- Visual and environmental appropriateness within the particular context.

The technical manual sets out a range of furniture for streets and public open spaces.

Streets
Generally, a limited range of elements is suggested for the street system, to reduce clutter and maintenance, while providing an acceptable level of amenity. The range of furniture should promote unity within the streets system, while providing for some diversity to denote differing conditions and character.

Primary and secondary streets, and streets with a direct relationship with public transport and places of community focus will have a higher level of pedestrian activity and require a denser placement of furniture, particularly seats and bins.

The layout and level of provision for furniture and lighting has been determined for three types of streets, illustrated in Section 2.

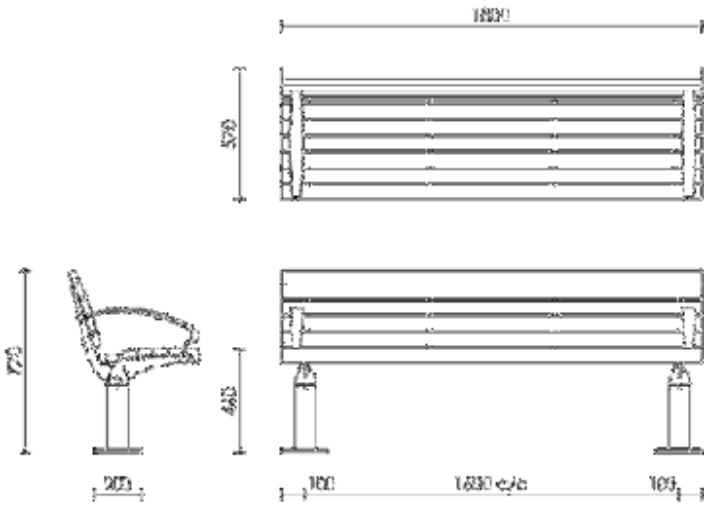
6.1 SEAT - TYPE 1

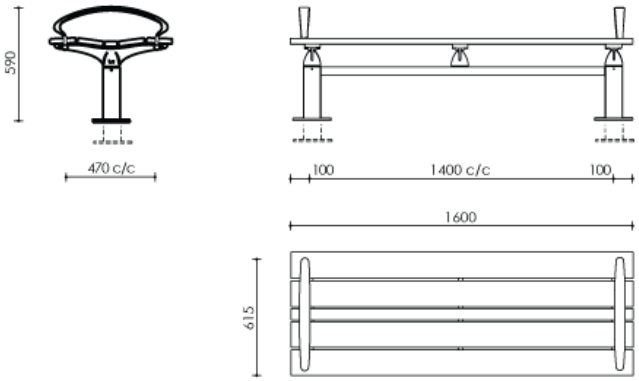
Design Criteria: Currently aluminium used for seat materials, timber provides warmer option lending colour and complexity to public spaces.

Performance Criteria: Ease of cleaning and maintenance, parts easily replaced, Subsurface fixing for cleaner ground surface and durability required.

Materials: Urban Seat 1 post mounted with arm rests: US18.MR.U.AN.PL (1800/2100MM) + armrests polished aluminium USA2,PL (pair) as supplied by Botton & Gardiner (or similar approved by Penrith City Council).

Frame: Cast aluminium.
Slats: Elliptical shaped mixed red hardwood, UV resistant oil finish timber.
Fixing: Post-mounted, sub-surface fixed.





6.2 BENCH - SEAT TYPE 2

Design Criteria: Existing benches around city centre use aluminium batons, option to change to either timber or recycled plastic batons. Timber may provide a warmer element in the city centre.

Performance Criteria: Ease of cleaning and maintenance. Batons easy to replace, Subsurface post fixings required for better paving finish and ease of cleaning.

Materials: Bench seat 9 post mounted with/without arm rests: BS9P.18.MR.U.PL (1800/2100mm), and armrests (2) polished aluminium USAR2.PL as supplied by Botton & Gardiner (or similar approved by Penrith City Council).

Frame: Cast Aluminium
Slats: Timber
Fixing: Post mounted, sub-surface fixed.

6.3 WHEELIE BIN ENCLOSURE

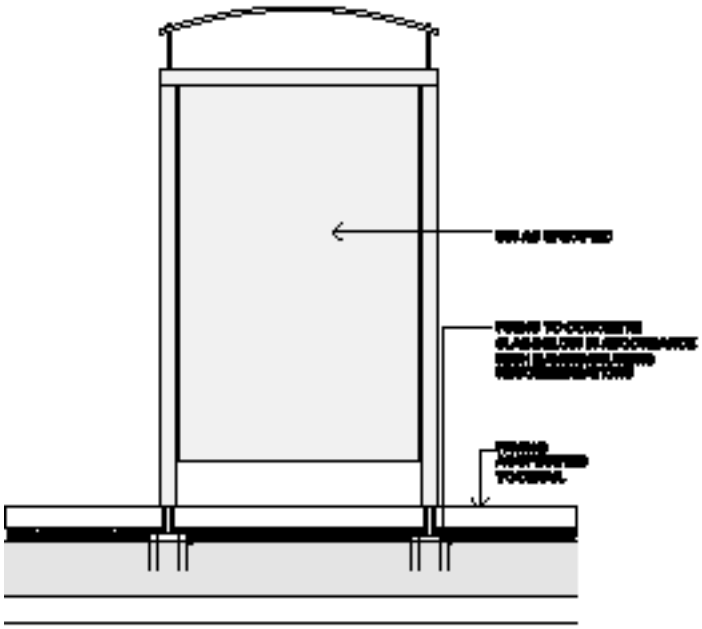
Design Criteria: Current bin form is simple round bins on single raised fixing. Option to transition to rectangular wheelie bin enclosures for ease of maintenance and cleanliness. Panels of enclosure need to deter rodents and be resistant to graffiti.

Performance Criteria: Ease of maintenance, cleaning and rubbish removal. Wheelie bins removes double handling with smaller bins, also contains unsightly bins within an enclosure. Robust metal wheelie bin to reduce risk of fire.

Materials: 120 ltr wheeled bin enclosure WBE - F - 120 as supplied by Street Furniture Australia, or similar approved by Penrith City Council.

Roof & Frame: Linished Stainless 304
Fixing: Sub-surface fixed per Manufacturers specifications.

Roof - Curved
Panel perforations: Slots / Customised

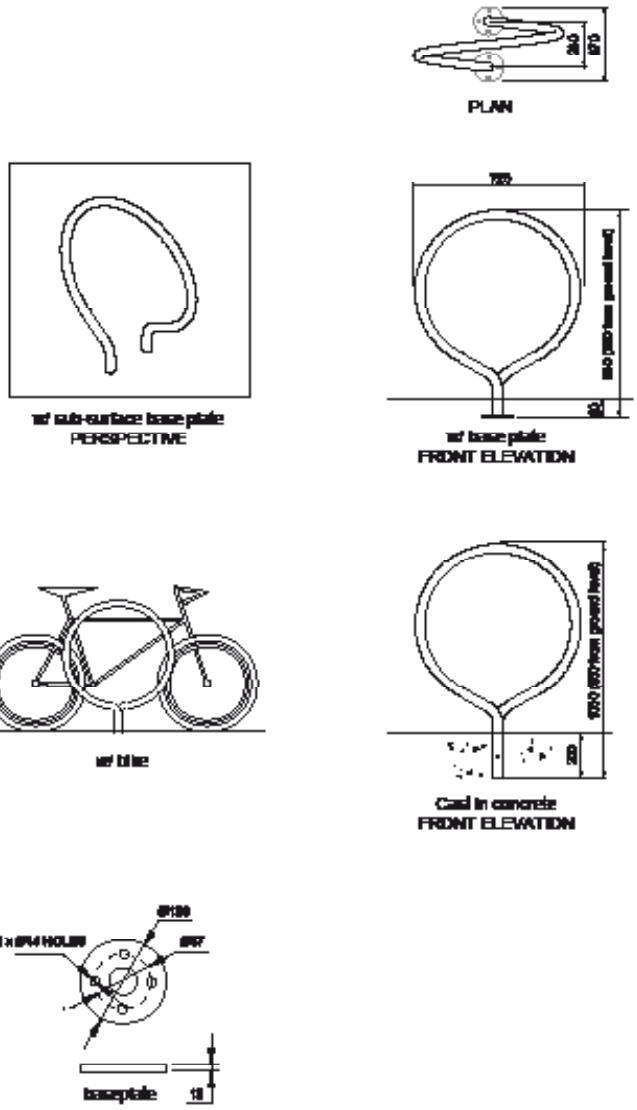


6.4 BIKE STAND

Design Criteria: Versatile element which fits with the material qualities of the public domain. Ensure a clean finish at paving surface.

Performance Criteria: Durable, easily replaced, Simple element. Subsurface mounting to ensure simple paving to the base and for ease of pavement cleaning.

Materials: Stainless steel “Spiral Hoop” as supplied by Street Furniture Australia (or equal approved by Council), sub-surface fixing per Manufacturer’s detail.

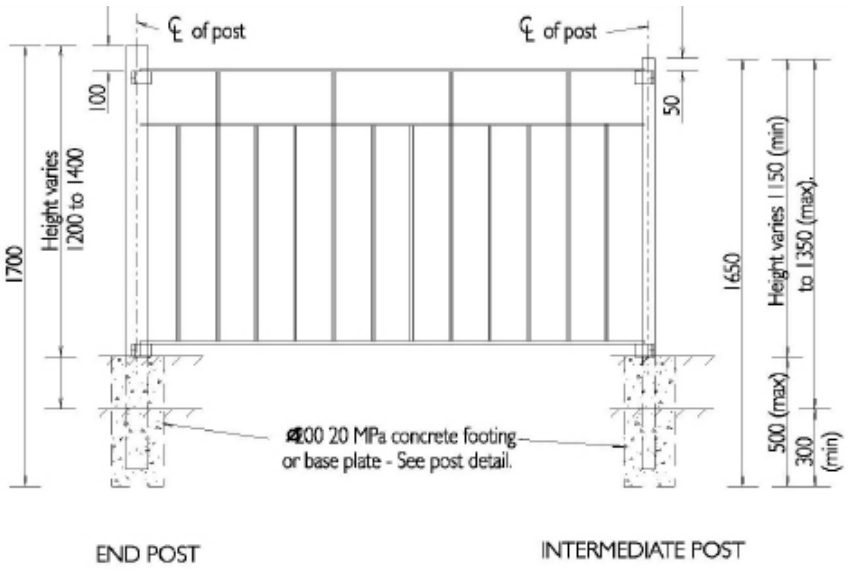


6.5 FENCING

Design Criteria: One consistent form of fencing.

Performance Criteria: Conform with Australian Standards for pedestrian fencing and RTA / Penrith City Council guidelines.

Materials: RTA type 5 fencing (or similar approved by Penrith City Council);
Finish: black powdercoat
Fixing: in-ground per details



END POST INTERMEDIATE POST

6.6 SIGNAGE GUIDELINES

Overview
This manual provides guidelines on the incorporation of signage into the Public Domain.

Signage will assist in way-finding, identification of Public Places & facilities and regulation of functions in the public domain.

Signage may be free-standing or attached to structures and can be supported by maps. To reduce streetscape clutter the multi-function light pole should accommodate signage where possible.

A wayfinding Strategy and Plan is currently being proposed. Until the Strategy and Plan is adopted by Council, the following criteria for signage shall apply. Signs may be required to be retrospectively replaced with Council-designed signs.

Design Criteria
- Minimise the amount of signage within the public domain as to avoid visual clutter
- Provide a clear unified signage system
- Contain simple instructions that are strategically and logically located
- Ensure that the principles of Universal Design are considered
- Compliment street furniture, paving & other elements of the Public Domain in appearance

Performance Criteria
- All signage to conform to Australian Standards and relevant authorities
- Signage design, material type and attachment details should integrate with that of the multifunctional poles
- Signage to be constructed of durable, hard wearing quality finishes consistent with other street furniture
- Durability: be constructed of robust, rust free, easy to maintain materials.
- Clarity: provide easy to read, unambiguous messages and universally under stood symbols
- Consistency of appearance: including graphic font, colour, symbol, size etc

Existing signage on Woodriff Street

6.7 FIXED BOLLARD

Design Criteria: Large range of bollards currently used within the city centre. Need to consolidate range to two types of bollards, fixed and removable. Bollards should be simple in design and coordinate with the other fixtures of the public domain.

Performance Criteria: Bollards should be clearly visible, easily replaced, repaired and cleaned.

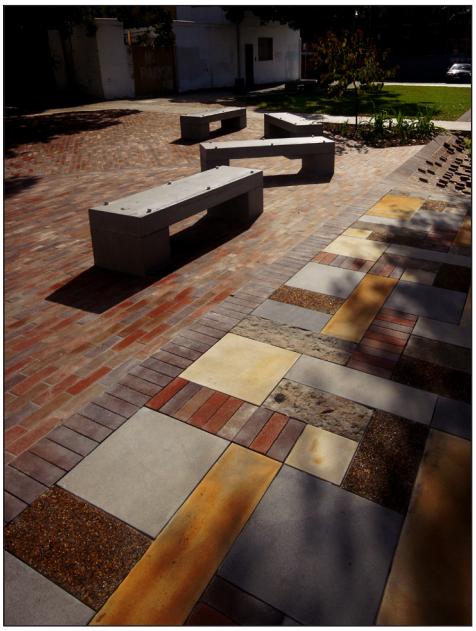
Materials: Slimline stainless steel 100 / 150NB (114.3) x 3.05 grade 304. Stainless steel pipe as supplied by Leda Security Products (or similar approved by Penrith City Council);
Finish: Linished
Fixing: In-ground per manufacturers detail.

6.8 RETRACTABLE BOLLARD

Design Criteria: Retractable bollards should be located where service vehicle access is required through a park or plaza.

Performance Criteria: Bollards should be clearly visible, easily replaced, repaired and cleaned.

Materials: Slimline stainless steel 150NB (114.3) x 3.05 grade 304. Stainless steel manual retractable bollard as supplied by Leda Security Products (or similar approved by Penrith City Council);
Finish: Linished
Fixing: In-ground per manufacturers detail.



Balfour Street Park, Chippendale - Street Closure

Customs House, Circular Quay - Standard Paving with Inserts

Memory Park, Penrith (artist impression)

7.0 SPECIAL PLACES

Parks, squares and small open spaces form the special places in the public domain and within our streets, where design can respond to the particularities of place or function. These spaces offer opportunities for unique design response integrating place making and public art, making a positive contribution to cultural vitality and a distinctive city character. The design of special places should be meaningful to the community and appropriate to the particular setting, responding to function, user requirements and physical environment.

Within the city centre there are small civic spaces that are created by fluctuations in the street layout in relation to the built edge. These spaces are a valuable supplement to streets and the formalised public spaces. They offer opportunities for gathering and events, as well as casual socialisation, and add clarity to the urban form by forming void spaces in this very dense area. Small civic spaces should be treated as special places in the public domain, as they offer opportunities to highlight focal points, and express the particular character of Penrith.

All special places should be recognisably part of the public domain, and should maintain a sense of the overall quality and design language established for the city centre. The design of special places should build on the standard range of elements to create a special image for each place.

Each special place should be underpinned by a design master plan - landscape, architectural or urban design, that identifies and outlines opportunities for public art. This is to ensure that the whole equals more than the sum of its parts, and that each space is part of a common vision for the public domain.

Public art and monuments must be installed in a manner that does not provide hazards for people with vision impairment in terms of projecting elements that could be a head height hazard or trip hazard.

PAVING, FURNITURE AND LIGHTING

Each place can have either individual paving that contrasts with the standard street paving, utilise the standard paving in a particular way, or integrate standard street paving with a different material. Paving can also incorporate art work, special tree pit surrounds, or individual lighting projects.

Special places paving can be complemented by special furniture and lighting. The character of these spaces may be formed through the design and layout of seating, particularly in areas designed primarily as rest, or social spaces. Seating may be off the shelf, or custom designed to suit the space, function and budget.

Selection of paving should employ the criteria outlined in Section 3, in relation to fitness for purpose, cost effectiveness, equity of access, and visual and environmental appropriateness.

In conjunction with the theme of special places street furniture and planting can play an important role in facilitating an inclusive environment, for example through the use of:

- Raised tactile and braille print on memorials.
- Installing sensory gardens that provide varying fragrances and sensory touch for foliage.
- Installing playgrounds that provide sensory experience for children with disabilities.
- Providing street furniture that is accessible to people who use a wheel chair.

Glebe Point Road, Glebe - Custom bus shelter integrated with fence

Promenade of Light, Islington, London - custom seats and lighting

Lawson Town Centre - custom railing