

# POLICY: ENG-ES-001

## REQUIREMENTS FOR SUBDIVISION

### PURPOSE

Developers of new subdivisions within the City of Kalgoorlie-Boulder are required to adhere to the “City of Kalgoorlie-Boulder Requirements for Subdivision Development” document.

This is to ensure that Subdivision development within the City of Kalgoorlie-Boulder is to the required standard to service the needs of residents both functionally and structurally.

### DEFINITIONS

The terms ‘Council’s Engineer’ or ‘Engineer’ shall mean the Chief Operating Officer (or their representative) or an Engineer or firm of Consulting Engineers (or their representatives) appointed by Council from time to time to act on his behalf.

The term ‘Subdivider’ or ‘Developer’ shall mean the owner of the land proposed to be subdivided and developed.

The term ‘Consulting Engineer’ or ‘Consultant’ shall mean the Engineer appointed by the Subdivider to design, document and superintend construction of the works.

The term ‘Superintendent’ means the person employed to oversee the progress and standard of site works. Generally this position is filled by the consultant employed by the developer.

The term ‘Contractor’ shall mean the person or company employed by the Subdivider to execute the construction works.

The term ‘street’ shall mean a thoroughfare which the public are allowed to use and includes every part of the thoroughfare and other things including bridges and culverts, appurtenant to it.

‘Road’ has the same meaning as ‘street’.

The meaning of all the other terms not specifically defined in this document shall be the same as the definitions contained in the *Local Government Act 1995*.

## STATEMENT

### 1. Scope

These subdivisional development guidelines have been developed by City's Infrastructure and Open Space Department as a reference guide for developers, planners, engineers, and contractors involved in subdivisional design and construction. They shall be interpreted as setting out the requirements which will be accepted by Council in granting clearance of the engineering conditions imposed on a subdivision.

### 2. General Requirements

- 2.1. Where proposals for the subdivision of land in a district include the provision of streets for the use by the public, and the proposals have been approved, the owner of the land shall not dispose of it, or part of it or an estate or interest in it, until he has caused those streets to be constructed and drained to the satisfaction of the Council.
- 2.2. Any streets and/or drains required to be constructed under the preceding section of the Local Government Act, shall be constructed to Council's requirements.
- 2.3. Where proposals for the subdivision of land in a district include the provision of a sewerage reticulation, the sewerage reticulation system shall be gravity type designed and constructed in accordance with the latest revision of Water Corporation's Design Standard DS 50 – Design and Construction Requirements for Gravity Sewers DN 150 to DN 600. Where it is not possible to service the subject land using gravity sewers, rising mains shall be designed and constructed with Council approval to Council's requirements.
- 2.4. Technical provisions included in these requirements are intended to provide a guide to the standard of work, materials and design required before streets, drains and sewerage systems will be certified to the Western Australian Planning Commission as having been made to the satisfaction of the Council. They are not necessarily complete and are not intended to be used as a specification or contract for construction. They may be subject to alteration with the approval of the Council's Engineer.
- 2.5. The Section 158 of the Planning and Development Act 2005 reads as follows:  
*"158. Expenses of construction etc. of roads etc.*

- (1) *Where a person who is subdividing land is required under this Part to construct and drain roads or construct artificial waterways shown on the plan of subdivision that person may —*
  - (a) *carry out or cause to be carried out the construction and drainage at his or her own expense; or*
  - (b) *arrange for the local government to carry out the work on behalf, and at the cost and expense, of that person.*
- (2) *Where the person does not make the arrangement with the local government, that person is to pay to the local government, on demand, an amount (calculated under subsection (3)) to cover the reasonable costs of the local government in supervising the construction and drainage.*
- (3) *For the purposes of subsection (2) the amount is to be calculated as follows —*
  - (a) *where the person has not engaged a consulting engineer and clerk of works to design and supervise the construction and drainage, the amount is to be 3% of the cost of the construction and drainage as estimated by the local government;*
  - (b) *where the person has engaged a consulting engineer and clerk of works to design and supervise the construction and drainage, the amount is to be 1½% of the cost of the construction and drainage as estimated by the local government.*
- (4) *The local government may require the person to employ a consulting engineer and clerk of works to design and supervise the construction and drainage and that person, when required to do so by the local government, is to carry out the requirement.”*

2.6. The design, preparation of drawings and specifications, and supervision of construction of subdivision works covered by these requirements shall be undertaken by a Consulting Engineer who is eligible for corporate membership of the Institution of Engineers Australia or registered in the National Professional Engineers Register(NPER).

2.7. The supervision fee referred to in Section 158 of the Planning and Development Act 2005 shall be paid to Council before construction commences - refer to Clause 6.2 for details.

- 2.8. A sewerage headworks contribution shall be paid by the subdivider to the Council before construction commences. The amount of the payment shall be based on the City of Kalgoorlie-Boulder's current Schedule of Fees and Charges (ref Cl 6.3).
- 2.9. Drawings and specifications for the construction of streets and drains shall be prepared in accordance with Section 4 of these requirements and must be approved by Council's Engineer before any work will be allowed to commence.
- 2.10. The detail contained in the drawings and specifications for the gravity sewerage system shall be in accordance with the requirements of latest revision of Water Corporation's Design Standard DS 50 – Design and Construction Requirements for Gravity Sewers DN 150 to DN 600. The required detail may be incorporated in the drawings called for in Clause 2.9.
- 2.11. All construction work shall be carried out in accordance with the approved drawings and specifications and shall be subject to inspection at various stages of the works by Council's Engineer. Final approval of the works shall only be given when the whole of the works have been constructed to the true meaning and intent of the approved drawings and specifications and to the satisfaction of Council's Engineer.
- 2.12. Council's Engineer will direct all notices, requests, instructions and approvals to the Consulting Engineer, except in urgent circumstances when they may be given directly to other parties involved in the subdivision.
- 2.13. After clearance of deposited plans by the Western Australian Planning Commission and Landgate, any land delineated and shown as a new street on such diagrams shall then be under the control of Council subject to the maintenance requirements referred to in Section 6.
- 2.14. Council is conscious of the need to preserve natural vegetation wherever possible in subdivisions. To this end Council may impose special conditions on particular subdivisions to minimise the environmental impact of street, drainage and sewerage construction, particularly in relation to preservation of established trees within road reserves. Subdividers should be conscious of these aims and should take them into consideration in the various stages of planning for a subdivision.

#### 2.15. Road upgrading conditions of subdivision

When a planned subdivision shows the joining of a subdivision road with an existing public road or roads, that existing road (or roads) shall be upgraded in accordance with these Subdivision Requirements and to the satisfaction of the Council's Engineer, if it is considered to be substandard or inadequate to accommodate the expected additional traffic generated by the subdivision.

In cases where the whole road requires upgrading as a condition of subdivision and the development is located on one side of the road only, the cost of this work shall generally be shared in accordance with a negotiated cost share agreement between the Council and the Subdivider.

When it is impractical to physically construct/upgrade the road or part thereof, the Subdivider shall lodge with the Council, a non-refundable cash contribution equal to the cost of the proposed roadworks as estimated by the Council's Engineer.

#### 2.16. Provision of adequate traffic management devices

The Subdivider shall undertake traffic studies and provide adequate intersection treatment (roundabout or traffic lights) if needed.

#### 2.17. Underground power

Underground power reticulation is required as a mandatory condition of subdivision in all new urban residential subdivisions of standard design.

### 3. DESIGN AND CONSTRUCTION CRITERIA

#### 3.1. General

Criteria provided here are minimum criteria only and are necessarily broad based to cover general subdivision situations. In particular situations amendments may be required and Council may impose special conditions not covered by the criteria.

## 3.2. Roads

### 3.2.1 General

Roads should generally be designed in accordance with relevant Australian Standards and guidelines including:

- Institution of Public Works Engineering Australia (WA Division Inc) Subdivisional Guidelines Edition No.2.1 July 2011
- Austroads guidelines and publications
- Utility Providers Code of Practice For Western Australia
- AS/NZS 1158 – Lighting for roads and public spaces

However, consideration must be given to the final aesthetic and functional aspects of the area. Aspects to be considered include minimising the environmental impact (particularly regarding existing trees and vegetation), fitting road grades as close to existing contours as practicable and provision of lot access.

Where there is a discrepancy between requirements in this Policy and the above mentioned standards and guidelines, the requirement that provides the higher level of standard and/or safety shall take precedence unless otherwise agreed with the Council's Engineer.

The designation of which road types shall apply to a particular subdivision (e.g. neighbourhood connectors, access streets, rural or industrial etc.) shall be at the discretion of the Council and the Subdivider shall comply with the requirements for those designations.

### 3.2.2 Townsite Residential Roads

Local distributors / Neighbourhood connectors: sealed and kerbed to minimum 7.4m width with embayment for bus stops or wider if so directed by Council.

Access roads: sealed and kerbed to minimum 6.0m width where no more than 100 lots are serviced or wider if so directed by Council.

Seal is to comprise minimum 25mm thick asphalt over a 7mm primerseal. Asphalt thickness at intersections with local distributor or arterial roads is to comprise 40mm thick intersection mix.

Council may, at its discretion, allow construction of un-kerbed roads, in which case shoulders and table drains shall be provided as for rural roads.

The maximum longitudinal grade of a road shall be 10% unless otherwise approved. The minimum longitudinal grade shall be 0.5%. A vertical curve shall be provided when the grade change is 1% or greater.

One-way crossfall to a maximum of 3% may be approved for access roads when excessive crossfall exists in the natural surface. Roads shall normally have two-way crossfalls of 3% except where geometric design requirements dictate that super-elevation is required.

Verges shall have sufficient width for the provision of trunk and reticulation services and property connections, and shall be a minimum of 5.0m unless noted otherwise. In areas where no more than 20 residential properties are serviced by a cul-de-sac, the minimum width may be reduced to 4.0m at the discretion of the Council's Engineer if the following conditions are satisfied:-

- Sewers are laid at the rear of the lots
- The lots are serviced by underground power reticulation
- Verge trees are not planted

Verges shall normally be graded at +2% from the top of the kerb to the property boundary. In areas of steep crossfall or where earthworks should desirably be reduced to minimise environmental impact, the verge grading may be increased as agreed with Council's Engineer.

Cul-de-sac heads shall have a minimum head radius of 9m to edge of seal with 15m radius tapers.

Kerb type shall be mountable to residential frontages and barrier or semi-barrier elsewhere.

Traffic control devices, sign posts, guide posts, street nameplates, guide signs and warning signs shall be provided in accordance with AS 1742 to the satisfaction of Council's Engineer.

Refer to Clause 3.7 for pavement design and make-up.

#### Eyebrow Treatments

Eyebrow treatments shall be provided at right angle bends on roads where lot boundaries and frontages are arranged in such a manner as to create an irregular verge area.

### 3.2.3 Industrial Roads

In industrial areas roads shall be sealed and kerbed to a minimum width of 9m unless otherwise directed by Council. All other design criteria shall be in accordance with the requirements for townsite residential roads with the following exceptions;

- Cul-de-sacs shall be avoided where possible to avoid vehicle turning problems. Otherwise the cul-de-sac's size shall be determined by the use of turning templates for the appropriate design vehicle to the satisfaction of the Council's Engineer.
- Kerb type to be semi-mountable throughout industrial roads.
- All industrial roads shall be designed for particular vehicles (eg roadtrains) to satisfy access in accordance with Council's Road Train / Heavy Haulage Policy.

### 3.2.4 Rural Roads

Rural roads and roads servicing special rural or semi-rural areas shall comply with the following criteria:

Arterial roads: minimum sealed width 7.4m (dependent on design traffic volumes in 20 years) with 1.5m compacted gravel shoulders with embayment for bus stops, in a road reserve of sufficient width to allow for future widening beyond the 40 year design period;

Collector roads: minimum sealed width 7.4m with 1.3m compacted gravel shoulders;

Access roads: minimum sealed width 6.0m with 1.3m compacted gravel shoulders where no more than 80 lots are serviced.

Geometric design shall be according to Austroads latest revision of its "Guide to Road Design" series. The minimum design speed for access roads shall be 60 km/h, collector roads 70 km/h and arterial roads 90 km/h or as required by Council's Engineer.

The maximum longitudinal grade of a road shall be 10% unless otherwise approved. The minimum longitudinal grade shall be 0.5% unless table drains are graded independently of the road to provide satisfactory drainage, where necessary. A vertical curve shall be provided when the grade change is 1% or greater.

One-way crossfall to a maximum of 3% may be approved for access roads when excessive crossfall exists in the natural surface. Roads shall normally have two-way crossfalls of 3% where geometric design requirements dictate that super-elevation is required.

Table drains shall be provided for all roads for a minimum width of 1.2m at a slope of 1 in 3 (33%).

Cut batters shall generally be no steeper than 1 in 3 (33%) except in hilly terrain, or where depth of cut is considerable, or where ground conditions

are such that it is not practical to comply with this requirement without excessive cost or environmental disturbance. Then, subject to the approval of Council's Engineer, slope of cut batters may be increased to a maximum of 1 in 1 (100%). Fill batters shall generally be no steeper than 1 in 4 (25%) except in hilly terrain or where fill heights are considerable, in which case a maximum slope of 1 in 2 (50%) may be used subject to the approval of Council's Engineer.

Verges shall have sufficient width to install public utility services (refer CI 3.2.2). In particular sufficient width must be provided to install overhead power lines with poles located at least 2.5m from the invert to the table drain.

Roads shall be designed to enable access to lots at an absolute maximum grade of 16%.

Cul-de-sac heads shall have a minimum head radius of 9m to edge of seal, with 15m radius tapers.

Intersection of collector/access and access/access roads shall be widened as follows:

- Terminating roads shall be widened to at least 7.4m seal width for a straight length of 10m from the tangent point of the turn-out radius, and then tapering to the normal seal width over an additional 10m length;
- Through roads shall be widened by at least 1m on the side of the terminating road only for a straight length of 10m each side of the turn-in radii, and then tapering to the normal seal width over an additional 10m length.

Intersections of collector/access roads shall have culverts installed under roads as required by the Council's Engineer.

Intersections of collector/arterial roads shall be subject to approval of Council's Engineer. All such intersections shall be surfaced with minimum 40mm thick intersection mix over a 7mm bituminous primerseal.

All intersections shall be kerbed extending for a minimum length of 10m each side of intersection radii.

Underground drainage systems including culverts and side entry pits, if required, shall be installed at the intersections of Collector/Arterial roads as required by the Council's Engineer.

Traffic control devices, sign posts, guide posts, street nameplates, guide signs and warning signs shall be provided in accordance with AS 1742 to the satisfaction of Council's Engineer.

Refer to Section 3.7 for pavement design and make-up.

#### 3.2.5 Public Utility Conduits

The Consultant shall ascertain the need for conduits under roads for all public utility services for both present and future services. If the Public utility authority concerned will not install conduits at the time of construction of the roads, then the conduits shall be installed by the Subdivider (prior to surfacing the roads) whether or not the conduits are immediately required. Backfill trenches for conduits with compacted cement stabilised sand as detailed for stormwater pipeline systems in Clause 3.9.5.

#### 3.3 Survey Set Out

Subdivider shall arrange at their cost, for a licensed surveyor to carry out the survey set out works in accordance with the approved drawings.

The Subdivider shall be responsible for the accuracy of the setting out works.

#### 3.4 Clearing and Stripping

Clearing and stripping for roads shall only be to the minimum extents necessary

to accommodate the works and services. Any clearing beyond necessary limits shall be rehabilitated at the Subdivider's expense.

Topsoil shall be stockpiled for later re-spreading on batters and other disturbed surfaces where appropriate.

Material from clearing shall be disposed of away from the site of the works in a place and manner approved by Council. No material from clearing shall be deposited within the road reserve or on property beyond the boundaries of the subdivision without the owner's permission.

Adequate precautions must be taken to ensure no damage occurs to trees, vegetation, fences, and services and protect other installations outside the designated areas of the works. Survey pegs or marks which are disturbed shall be reinstated by a licensed surveyor at the Subdivider's expense.

### 3.5 Earthworks

Earthworks shall be performed in a safe manner. No material shall be obtained from borrow pits within road reserves and no excess material shall be disposed of in road reserves.

All fill shall be clean, granular material obtained from general and roadworks excavations and shall not be contaminated with roots or other impurities. The fill shall be placed in even layers not greater than 300mm thick and each layer shall be compacted to at least 93% of the modified maximum dry density (MMDD) of the material.

### 3.6 Subgrade and foundation preparation

If, after excavation to subgrade level it is apparent that subgrades differ from those on which the pavement design is based, then the pavement shall be redesigned or unstable subgrade material shall be removed and replaced with approved imported fill material.

After clearing and topsoil stripping and excavation to subgrade level, compact subgrades and foundations of embankments to at least 93% of modified

maximum dry density of the material for a depth of not less than 300mm. Alternatively method compaction of the surface may be acceptable depending on the materials.

### 3.7 Pavements

#### 3.7.1 Pavement Design

Pavements shall generally be designed for a 40 year design life in accordance with the latest revision of Austroad's "Guide to Pavement Technology" series.

In all cases pavement design shall be based on the in situ subgrade CBR, which shall be determined for each different subgrade type expected to be encountered in the works.

The Consultant shall adopt whatever test procedures are necessary to provide an accurate assessment of subgrade CBR for design purposes. Council's Engineer may request further field or laboratory testing at his discretion.

In any case the absolute minimum pavement profile shall be as follows:-

	<b>Alternative 1</b>	<b>Alternative 2</b>
Access Roads and Collector Roads	125 'B' grade sub-basecourse 100 'A' grade basecourse 25mm asphalt on townsite roads over a 7mm primerseal. Two coats sprayed seal on rural roads	200 'A' grade basecourse 25mm asphalt on townsite roads over a 7mm primerseal. Two coat sprayed seal on rural roads
Other Roads: (except industrial)	150 'B' grade sub-basecourse 100 'A' grade basecourse 25mm asphalt on townsite	225 'A' grade basecourse 25mm asphalt on townsite roads over a 7mm primerseal.

	roads over a 7mm primerseal. Two coat sprayed seal on rural roads	Two coat sprayed seal on rural roads
Industrial Roads	175 'B' grade sub-basecourse 100 'A' grade basecourse 25mm asphalt over a 7mm primerseal.	250 'A' grade basecourse  25mm asphalt over a 7mm primerseal
Intersections	40mm thick intersection mix asphalt at intersections involving industrial and or arterial or distribution roads.	

Alternative pavement profiles giving equivalent load bearing capacities will be considered. Council may, at its discretion, allow sprayed seal surfacing in lieu of asphalt surfacing on townsite roads.

### 3.7.2 Basecourse Widths

On kerbed roads the width of basecourses shall equal the width of seal plus 1m (0.5m either side). On un-kerbed roads the width of basecourses shall equal the width of seal plus shoulder width.

### 3.7.3 Compaction

All sub-basecourses, basecourses and shoulders shall be compacted to at least 98% of the modified maximum dry density of the material.

### 3.7.4 Materials

#### i) 'A' grade basecourse

'A' grade basecourse shall consist of graded crushed rock or laterite gravel. When tested in accordance with AS1289 the material shall have the following properties;

AS Sieve Aperture	Percentage Passing
26.5mm	100
19.0mm	95-100
9.5mm	78-88
4.75mm	48-71
2.36mm	34-57
1.18mm	24-46
0.425mm	14-33
0.075mm.	6-20

Liquid Limit:	not to exceed 25%
Plastic Limit	not to exceed 20%
Plasticity Index:	not to exceed 6%
Linear Shrinkage:	not to exceed 2%
Los Angeles Abrasion Value:	not to exceed 40%
Maximum Dry Comp. Strength:	no less than 1700 kPa

The material shall be free from organic matter and other deleterious substances.

ii) *'B' grade sub-basecourse*

'B' grade sub-basecourse shall consist of laterite gravel.

**Gravel** shall be selected natural laterite gravel which exhibits an even grading curve throughout the full range. When tested to AS 1289 the material shall have the following properties:-

- Percentage passing 40mm sieve; 100%
- Percentage passing 1.18mm sieve; 10% to 50%

- Percentage passing 0.075mm sieve; less than 20%
- Plasticity Index; 3% to 10%
- Linear Shrinkage; less than 8%
- Minimum CBR at the placed in situ
- moisture density condition; 35

The material shall be free from organic matter and other deleterious substances.

*iii) Asphalt*

Asphalt for roads shall be a nominal 10mm size asphaltic concrete mix in accordance with an AC10 mix designation to AS 2734.

Asphalt for intersections (40mm intersection mix) shall be nominal 14mm size, heavy duty dense graded asphaltic mix in accordance with an AC 14 designation to AS 2734.

*iv) Sprayed Seals*

Sprayed seals shall consist of at least a two coat seal. The two coat seal shall consist of a tack coat followed by two hot bitumen seals or alternatively the first may be a hot bitumen primerseal and the second a hot bitumen seal. Sizes of cover aggregates shall depend on the nature of the road and the surface texture required and will be subject to approval by the Council's Engineer.

*v) Heavy Duty Trafficable Bricks/Blocks*

Heavy duty trafficable bricks/blocks with a minimum thickness of 76 mm shall be laid strictly in accordance with manufacturer's recommendations.

### 3.8 Kerbing

All concrete kerbing shall be machine extruded to profiles approved by Council's Engineer.

Concrete for kerbing shall be N32 grade central batch mixed concrete with maximum slump of 90mm.

Provide a base key 150mm wide x 75mm deep under all kerbing laid to a radius of 15m or less.

Provide contraction joints at 2.5m intervals and full depth expansion joints at 5m intervals along the new kerblines at sides of drainage gullies, at tangent points of all small radii, horizontal curves and at junctions with existing kerbing. The expansion joints shall be 10mm wide.

Kerbing shall be laid accurately to line and level with continuous reference to string lines set for both line and grade.

The backfilling to the kerbing shall be placed after acceptance of the kerbing. The backfill material shall be free draining sand or a similar material to the locally occurring topsoil, free from debris and compacted to not less than that of the surrounding natural surface.

### 3.9 Stormwater Drainage

#### 3.9.1 General

Stormwater drainage systems are required to provide for effective disposal of stormwater and shall be designed using methods in accordance with latest revision of Australian Rainfall and Run-off. The peak flows determine for each Average Exceedance Probability (AEP) event shall use the latest Intensity Frequency Duration (IFD) data for Kalgoorlie-Boulder obtained from the Bureau of Meteorology.

### 3.9.2 Common Catchments

Subdividers with land in a common catchment area have a joint responsibility to ensure that the whole catchment area (including arterial and distributor roads) will be served by an effective drainage system. When only a portion of a catchment is being developed at a particular time the drainage strategy for the whole area should be determined. Subdividers are responsible for arranging their own cost sharing arrangements. The Subdivider shall provide, at their cost, the necessary conduits and system capacity to carry stormwater from arterial and distributor road reserves. Access Chambers (AC) or other drainage facilities shall be provided at the edge of the arterial drainage system.

### 3.9.3 Average Exceedance Probability Events and Run-off Coefficients

Subdivisions shall be provided with underground pipe systems (table drains for rural roads) at the subdividers costs and be design to convey peak flows from 10% (1 in 10 year) Average Exceedance Probability Events.

Subdivisions' stormwater drainage systems shall make provision for 1% (1 in 100 year) Average Exceedance Probability Events via overland flow paths and/or storage to ensure flooding does not enter the subdivision's residential and/or commercial lots.

The total area contributing should be analysed and run-off coefficients assigned to each contributing sub-area. A run-off coefficient of 0.85 shall be used for all commercial and industrial areas unless otherwise approved by Council's Engineer.

### 3.9.4 Drainage Conduit Types

The drainage conduits shall be reinforced concrete pipes and boxes in classes appropriate to loadings and cover heights.

Other types of conduits shall be approved by Council's Engineer.

Reinforced concrete pipes shall be Rubber Ring Joint Type unless otherwise approved.

### 3.9.5 Underground Pipe Systems

The minimum pipe size for underground pipe systems shall be 300 mm diameter.

Pipelines shall be designed to ensure that hydraulic grade lines do not reach a level of less than 150mm from finished surface levels for the Average Exceedance Probability Event.

The velocity in pipes shall be limited to the range 1.0m/sec. – 3.6m/sec. The possibility of scour at outfalls shall be considered and steps shall be taken to eliminate it where it may occur.

Access Chambers (junction pits) shall be provided at each change in direction and at maximum 90m spacings and their location shall not unduly restrict the future access to lots.

Inlet pits shall be placed at low points and at the upstream side of intersections if warranted by flow considerations. Inlet pits shall also be placed at intervals to limit the width of gutter flow to 1.5m (or 2.0m in the case of one-way crossfall), in kerbed roads, and at intervals to prevent the top water level in the table drain from rising to within 200mm of the edge of the shoulder in the case of un-kerbed roads, or to limit the inflow to the entry pit to its inlet capacity, whichever is the less, for the Average Exceedance Probability Event flows.

Inlet pits shall be installed on the upstream side of pedestrian ramps and pedestrian crossing points to limit the width of flow to 500mm. Road low points and accompanying pits shall be located at the centre of single lots and opposite side boundaries of multi-unit lots.

All precast access chamber liners shall be precast concrete circular as

manufactured by suppliers approved by the Council's Engineer.

Grated pits shall be designed to be safely traversed by cyclists in accordance with Bikewest and Austroads Guidelines.

On kerbed roads side entry pits shall be used, although combined side entry/grated pits may also be used.

On un-kerbed roads, concrete catchpits situated in table drains shall have grated tops at least 150mm above entry lips to prevent access to the pit by the public.

All outlets to pipe drainage systems (and inlets in the case of open ended culverts) shall have concrete headwalls with concrete aprons, and shall have anti-scour rock beaching for a minimum distance of 2m beyond the edge of aprons.

All trenches for pipes laid under road pavements shall be backfilled to the pavement subgrade surface with compacted cement stabilised sand. Sand and cement shall be thoroughly mixed in the proportions of 100kg of cement to one cubic metre of sand. Sufficient water shall be added and mixed such that the moisture content is just sufficient to enable mixing and placement of the material. The material shall be placed in even layers not exceeding 225mm in thickness and each layer shall be compacted with a minimum of four (4) passes of a vibratory plate compactor having a minimum static mass of 50kg. Care shall be taken to ensure that the material fills all voids under the haunches and that no damage occurs to the pipe whilst compacting material next to and immediately over the pipe. The cement stabilised sand shall preferably be supplied from a central batch mixing plant.

Sealed joints shall be used for all drainage pipes and box culverts located under road pavements.

### 3.9.6 Open Drains

Where drainage is by means of open drains, allowances must be made for access culverts to properties although they may not need to be provided at the development stage. Where pipe sizes required for crossover culverts exceed 375mm diameter, they shall be provided by the Subdivider.

The maximum velocity of flow in open drains shall not exceed 2m/sec in unlined drains.

Mortared stone pitching shall be provided in open drains at all junctions and bends greater than 22.5°.

Appropriate safety devices, such as guideposts, shall be provided at the road shoulder to protect and/or advise road users of the presence of the drain.

All culverts shall have adequate concrete headwalls and drains scour protection - refer Clause 3.9.5.

Table drains to un-kerbed roads shall be sized so that the top water level in a drain does not rise to within 200mm of the edge of the shoulder for the design recurrence interval flow. Catchpits and culverts may be utilised to contain flows in table drains within permissible limits where practicable - refer Clause 3.9.5.

Where there is a risk of scouring in open drains (including table drains), the drains shall be fully lined with a lining of rock, concrete or other method approved by Council's Engineer.

### 3.9.7 Sub-Soil Drains

Where sub-soil water is present, or is likely to become present at any time, and is likely to interfere with the stability of the road pavement (or footpath or access way, etc) a system of sub-soil drainage shall be designed and installed to the approval of Council's Engineer.

Sub-soil drains shall be installed to cut off flows at least 600mm clear of any surface of the pavement and shall discharge to pipe drainage systems or open drains downstream of the affected area, as appropriate for each situation.

### 3.9.8 Drainage Easements

Where drains cross private property they shall be laid in registered easements which shall show on all plans. The easement shall be centrally located over the drainage line and it shall have a width of at least twice the depth of the drain with an absolute minimum width of 3.0m.

In cases where stormwater is proposed to be discharged onto private land downstream of a subdivision or development, the subdivider, at their own expense, shall make necessary arrangement with the owner of the downstream land to provide an easement in favour of the City over the route of the drain and to construct and/or improve the drainage outlet.

## 3.10 Sewerage

### 3.10.1 General

Gravity sewers, access chambers and boundary connections shall be designed in accordance with latest revision of Water Corporation's Design Standard DS 50 – Design and Construction Requirements for Gravity Sewers DN 150 to DN 600.

### 3.10.2 Materials

The materials used in the construction of sewer mains shall be in accordance with the latest revision of Water Corporation's Design Standard DS 50 – Design and Construction Requirements for Gravity Sewers DN 150 to DN 600.

### 3.10.3 Boundary Connections

A boundary connection shall be constructed in the gravity sewer to serve every property.

### 3.10.4 Access Chambers (A/C)

All precast A/C liners shall be precast concrete circular A/C as manufactured by suppliers approved by the Water Corporation of Western Australia. All A/C shall be fitted with 600mm diameter Gatic cast iron covers (or similar approved) cast into reinforced concrete slabs.

### 3.10.5 Clearing

The area of the work limited to the line of new sewers and to the minimum width reasonably required for construction shall be cleared of trees, stumps, roots, brush and rubbish. Materials cleared shall be removed from the site and disposed of at the public rubbish tip. No trees shall be removed without the approval of Council's Engineer and all existing trees shall be maintained and protected against any damage. Any trees removed without permission or damaged shall be replaced by the Subdivider at no cost to Council.

### 3.10.6 Blasting - Use of Explosives

No blasting shall be carried out without the Council Engineer's approval. All blasting and handling of explosives shall be at the Contractor's sole risk in every respect and shall comply fully with the requirements of the following;

- (a) *Mines Regulation Act 1946*
- (b) *Explosives and Dangerous Goods Act 1961*
- (c) AS 2187 – Explosives – Storage, Transport and Use
- (d) AS 2188 Explosives – Relocatable Magazines for Storage

### 3.10.7 Backfilling Materials

- (a) Sand to be used to backfilling of trenches shall be natural sand free from rock or other hard sharp objects that would be retained on a 13.2mm test sieve, and free from organic matter and other matter injurious to pipes. The percentage of material passing the 75 micron sieve shall not exceed 30% when tested in accordance with section 33 of AS 1141.
- (b) Basecourse to be used for backfilling shall be A Grade basecourse as specified in CI 3.7.4.

### 3.10.8 General Trench Backfill - Non Traffic

In all non-traffic areas, backfill the trench as follows:

Backfill to within 225mm of the surface of the trench with selected excavated material placed in even layers and compacted at optimum moisture content to 95% of the standard Maximum Dry Density of the material in accordance with AS1289. Backfill material shall be free of any vegetation or other deleterious material and shall contain no stones larger than 150mm nominal size.

Backfill the top 225mm of the trench with similar material to that removed from the same zone and compact at optimum moisture content to 97% of the Standard Maximum Dry Density of the material in accordance with AS1289.

### 3.10.9 General Trench Backfill – Trafficable

Across formed roadways for the full width of the road formation (including shoulders) and for the width between kerbs plus one metre beyond each kerb, and in other areas subject to vehicular traffic (including right-of-ways where shown on the drawings), backfill the trench as follows:

Backfill to within 225mm of the surface of the trench with cement stabilised sand placed in even layers not exceeding 225mm in thickness. The

moisture content of the mixture shall be just sufficient to enable adequate mixing static mass of 50kg to 95% of the Standard Maximum Dry Density of the material in accordance with AS1289.

Backfill the top 225mm of the trench with basecourse placed in two even layers and compacted at optimum moisture content to 98% of the Modified Maximum Dry Density of the material. The top backfilling of crossings controlled by the Main Roads Western Australia (MRWA) shall be to the requirements and specifications of the Main Roads Western Australia.

#### 3.10.10 Surplus Spoil Disposal

Excavated material which is not suitable for trench backfilling and material which is surplus to backfill requirements shall be disposed of at a location and in a manner to be approved by Council.

### 3.11 Miscellaneous Facilities

#### 3.11.1 Footpaths

Footpaths in road reserves shall be provided in townsite residential subdivisions at the Subdivider's cost.

Footpaths provided by the Subdivider shall be 1.8m wide when located behind the kerb and 1.5m wide when located elsewhere. The Council's preference is for footpath to be located behind the kerb in residential subdivisions.

Footpaths shall be 75mm thick N25 concrete with a 2.5% maximum slope towards kerbs (or edge of roadways) in all areas other than driveway crossings and trafficable locations.

At driveway crossings and at all trafficable locations the footpaths shall be 100mm thick N25 concrete reinforced with one layer of F72 mesh.

Tooled contraction joints shall be provided at 2m intervals and 12mm wide full depth expansion joints shall be provided at 9m intervals. Footpath

surface shall have a non-slip broomed finish. Footpaths shall be constructed for the full length between kerb lines of cross streets with pedestrian ramps at all kerblines unless noted otherwise. The edges of the footpath shall be polished smooth and rounded using an edger of radius 10mm. The edges shall be free from irregularities of alignment and/or level.

Alternatively Council may accept asphalt surfaced footpaths in lieu of concrete footpaths in special situations. Asphalt footpaths shall consist of 25mm thick AC7 asphalt on 150mm thick 'A' grade compacted basecourse.

Other types of footpath may be accepted at Council's discretion.

Footpaths shall be provided by the subdivider:-

- Along one side of local distributor roads with frontage access.
- Along both sides of portions of local distributor roads where there is heavy demand (such as opposite schools where there is a demonstrated need).
- Along one side of access ways where reduced carriageways are proposed and where there is potential for traffic/Pedestrian conflict.

Footpaths shall be laid parallel and adjacent to the kerb line (or edge of roadway) or to the Engineer's approval in the case of cul-de-sac heads. The longitudinal profile shall follow the longitudinal profile of the kerb line (or edge of roadway).

Concrete pedestrian ramps shall be constructed at all road crossings and as required by the Council's Engineer in accordance with Council's Drawing Number 10-P-147.

### 3.11.2 Pedestrian Access ways/Cycle ways (PAW/CW)

Pedestrian access ways/cycle ways shall be constructed by the Subdivider at the time of subdivision. In townsite residential subdivisions they shall be

2.5m wide concrete paths constructed to similar standards as concrete footpaths. The verges between paths and boundaries of PAWs in townsite residential areas shall be surfaced with 75mm of 'B' grade basecourse laid on two layers of 0.2mm thick polythene sheeting. In semi-rural or rural residential subdivisions they shall be 2.5m wide asphalt surfaced paths constructed to similar standards as asphalt surfaced footpaths. Other types of path construction may be accepted by Council.

Provide approved type cycle safety barriers at ends of paths. Where footpaths are not provided in road reserves extend paths to connect with road pavements. Where roads are un-kerbed provide pipe culvert crossings to open drains to facilitate connections to roads.

Concrete pedestrian ramps shall be constructed at all kerblines/PAW/CW crossings in accordance with Council's Drawing Number 10-S-002.

#### 3.11.3 Shared Use Paths

When the Subdivider is required to provide Shared Use Paths (SUP) the paths shall be a minimum 2.5m wide, 100mm thick N25 concrete reinforced with one layer of F72 mesh.

Apart from the above requirements Shared Use Paths shall be installed and finished as specified for footpaths under CI 3.11.1.

Concrete pedestrian ramps shall be constructed at all road crossings and as required by the Council's Engineer in accordance with Council's Drawing Number 10-S-002.

#### 3.11.4 Street Nameplates

Street nameplates shall be erected at all newly created intersections and shall indicate the names of both streets.

Nameplates shall generally be in accordance with the latest revision of AS1742.5 and shall incorporate any special feature which may be required by Council (e.g. City Logo, colours of legend and background). Colours

shall be retro-reflective, blue text on yellow background.

Depth of nameplate shall be 150mm with 100mm lettering except on major roads where a depth of 200mm with 150mm lettering shall be used.

Nameplates shall be mounted at a height of three (3) metres above finished ground level. If two or more nameplates are to be erected on the same pole they shall be erected at differing levels.

Nameplates shall be mounted on a 50mm nominal bore galvanised steel pole concreted a minimum of 600mm into the ground. The pole shall be erected on the 2.7m alignment.

#### 3.11.4 Regulatory and Traffic Control Signs and Devices

Main Roads Western Australia is the responsible authority for all regulatory traffic control signs/devices and pavement marking.

The Consultant shall request approval from Main Roads Western Australia (MRWA) for regulatory signs/devices and pavement markings once approval is obtained from the Council's Engineer.

The drawings shall comply with the following:-

- MRWA design standards.
- Austroads Guide to Traffic Control Devices.
- Australian Standards AS 1742 – Manual of Uniform Traffic Control Devices.

The supply and erection of the regulatory traffic control signs/devices and pavement marking is the responsibility of the subdivider.

#### 3.11.5 Provision of Screen Fencing

Where Lots are being created with rear or side boundaries which abut

public reserves to which the lots have no access, the subdivider shall provide uniform fencing, or otherwise specified by the Council, along the common boundary to protect the amenity and safety of the reserves.

### 3.12 Battle Access Legs

#### 3.12.1 General

Where urban, industrial or rural subdivisions contain more than one lot to which access is provided by a distinct access leg, then that access leg shall be constructed in accordance with these guidelines.

#### 3.12.2 Urban Areas

The minimum access leg width for battleaxe lots shall be 4m with a 3m wide pavement placed centrally in the access leg.

Battleaxe pavements shall be constructed from concrete or standard asphalt surfaced road pavement. Sufficient verge width for all services shall be allowed in all cases.

The access leg shall be drained to ensure that no stormwater from the access-way flows into the lot or into any abutting lots.

Stormwater shall be collected and pipe/drained into the subdivisional drainage system/street frontage or collected into an approved soakage system located within the access leg.

#### 3.12.3 Rural Areas

In general, minimum width of access legs in rural areas shall be 10m with a pavement width of 3.5m to 5m depending on the number of lots serviced by the access leg.

In rural subdivisions where the access leg services a single lot and there is no requirement for dust suppression, the minimum construction standard is compacted gravel, limestone or equivalent pavement.

In those cases where the access leg services two or more lots in a rural subdivision, the access leg shall be sealed with an aggregate seal. The minimum width of seal shall be 4m with 500mm wide shoulders on both sides.

Appropriate drainage to battleaxe access ways in rural areas shall be provided.

### 3.13 Lot Filling

Areas of lot filling shall be clearly indicated in the drawings. Consultant shall show proposed contours of filling and finished lot levels, which shall provide suitable grades to accommodate sewerage and stormwater disposal. The Consultant shall also grade lots to acceptable levels to ensure vehicle access to the lot from the street is not restricted by steep grades.

Where it is necessary to erect retaining walls on lot/subdivision boundaries, such retaining walls shall be designed and certified by a practicing structural engineer. A separate Building permit may be required for retaining walls.

Construction of these retaining walls and any modifications to existing boundary fences/walls of abutting lands/road reserves shall be the responsibility of the Subdivider. The Subdivider shall be responsible for liaising with adjoining land owners and service authorities with regard to these constructions. Lot filling may be carried out by others. No filled lots will be permitted to drain onto abutting lands.

Areas of lot filling shall be cleared and stripped of all organic material and rubbish, and the filling placed and compacted to the approved design levels.

The tolerances on lot filling shall be  $\pm 50$ mm. All fill material shall be compacted to the full depth to a minimum of 95% modified maximum dry density when tested in accordance with AS 1289: Methods of Testing Soils for Engineering Purposes.

For urban subdivisions on a clay sub-grade, the clay surface shall be sloped

towards a subsoil drainage line and covered with a minimum fill of 300mm of clean sand or equivalent. Clay fill shall be compacted to a minimum of 90% of the modified maximum dry density when tested in accordance with AS 1289: Methods of Testing Soils for Engineering Purposes.

#### 3.14 Dust Control

The Subdivider shall be responsible for the satisfactory control of dust and sand drift from the development site and associated works near the subdivision. The measures to prevent the generation of dust shall generally be carried out in accordance with “A Guideline for the Prevention of Dust and Smoke Pollution” from Land development Sites in Western Australia (*Department of Environmental Protection, November 1996*).”

#### 3.15 Street Lighting

The Subdivider shall provide street lighting, including the suitable illumination of traffic management treatments to the newly created subdivision in accordance with Western Power Corporation Specifications and AS/NZS 1158 – Lighting for roads and public spaces.

### 4. Submission Requirements

#### 4.1 General

Two copies of design drawings, specifications and drainage and pavement calculations shall be submitted to the Council’s Engineer for review.

Review comments will be provided to the Consultant within 6 weeks of the documents being received by Council.

Two copies of amended drawings, specifications and drainage and pavement calculations shall then be re-submitted by the Consultant for the Council’s Engineer’s review.

Once the drawings, specifications, drainage and pavement calculations have been amended to the satisfaction of the Council’s Engineer, one copy of

approved documents shall be signed by Council's Engineer and marked 'Approved for Construction' and shall be returned to the Consultant together with any conditions imposed on the approval.

#### 4.2 Drawings

The following drawings are required to be submitted for Council's Engineer's consideration. If considered necessary by Council's Engineer, information, details and/or drawings additional to those listed shall be provided.

<b>Drawing</b>	<b>Scales</b>	<b>Information to be Shown</b>
Locality Plan	min. 1:5000	Site of the works, existing roads including major arterial and distribution roads, new roads, locality areas and other significant features.
Pre calculated Plan	min. 1:2000	All cadastral information relating to lots, roads, easements, and access ways.
Layout Plan	min. 1:1000	New roads and existing roads to which they are connected. Details of new road alignments and curves. Existing services and structures (power poles, water mains, Telecommunication cables, fences, drains). New drains, culverts and drainage structures. New footpaths, cycle ways, access ways. Advance warning signs and other traffic signs. Sewerage reticulation construction details. Lots with lot numbers. Any necessary easements. Survey and bench marks.
Services Plan	Min 1:1000	
Longitudinal Sections of each road. Length of grade lines with grades	min. 1:1000 horiz. and 1:100 vert. (or larger scales in the	Design centreline levels at max. 20m intervals (10m on vertical curves). Natural surface levels at max. 20m

Drawing	Scales	Information to be Shown
expressed as in %	same proportions)	intervals, location of horizontal curves and super-elevation details, location of drainage culverts. Running distance along centre line.
Cross Section of each road	Min. 1:200 horiz. and 1:100 vert. (or larger scales in the same proportions)	At max. 20m intervals: Natural surface extending from property line to property line. Road reserve boundary. Design and natural surface levels on the centreline of the road.
Road Intersection and cul-de-sac treatments	1:200	Lot boundaries, footpaths, channelisation, islands and medians, kerbing, drainage details, design spot levels along pavement edges and centreline referenced by set-out dimensions where necessary.
Standard Details	1:10 1:20	Typical cross-sections for each different cross-section type (min. 1:100 horiz., 1:50 vert.) showing all details of design surfaces (widths and slopes of pavements, shoulders, table drains, batters.) and profiles of basecourses and surfacing. Details or kerbing and other concrete structures. Drainage details including headwalls, pipe trench details, pits, open drains. Standard details for gravity sewer design and construction. Retaining wall details. Any other standard or typical details as necessary.
Drainage Catchment Plan		Natural surface contours, new and existing roads, location of new and existing pits, culverts, catchments of

Drawing	Scales	Information to be Shown
		individual pits, culverts (with areas marked).
Earthworks Grading Plan	1:1000	New and existing surface contours with max 1 m intervals. All existing and proposed road and property boundaries. Details of retaining walls. Detailed areas of cut and fill.
Drainage Plans	1:500 Horizontal 1:100 Vertical	Existing and proposed drainage lines detailing pipe sizes, grades, lengths, junction pits, gullies, other drainage structures, and whether the pipes are slotted or solid. Upstream and downstream levels on all existing drainage and outfalls to which connections are being made. Existing and proposed sewer lines and any other services which may affect the drainage works. Existing and proposed drainage easements. Invert levels of existing and proposed drainage structures.
Traffic Design Drawings	1:250 (1:500 for larger road sections)	Proposed pavement marking, kerbing, channelisation, regulatory and warning signs.

All levels shall be to Australian Height Datum (AHD) and temporary bench marks shall be clearly indicated on the drawings. All drawings shall be on A1 size sheets and shall be signed by a practising professional civil engineer who shall accept responsibility for the design.

#### 4.3 Drainage Calculations

Submit drainage calculations for approval for every underground drain and all

open drains including but not necessarily limited to bridges, pipe drains, box culvert drains. Calculations shall show catchment areas, run-off coefficients, recurrence intervals, rainfall intensities, times of concentration and method of sizing of pipes and drains. Calculations shall be set out in a standard tabular format or approved format to facilitate checking.

Drainage calculations and/or drawings shall be provided demonstrating that the Subdivision's stormwater drainage systems have been designed to ensure that flooding from 1% (1 in 100 year) Average Exceedance Probability Events does not enter the subdivision's residential and/or commercial Lots as required by CI 3.9.3. Calculations shall be provided in a format approved by the Council's Engineer to facilitate checking.

#### *4.4 Pavement Calculations*

Submit pavement calculations for approval. Calculations shall show the method adopted for calculation of subgrade CBR including test results, design pavement life, design traffic loadings, determination of basecourse thicknesses and need for subgrade stabilisation/improvement where necessary. Provide copies of all subgrade tests.

#### *4.5 Construction Drawing*

The Subdivider shall provide the Council's Engineer with a full set of drawings issued 'For Construction' or their latest revision in both electronic and hard copy format prior to construction of the subdivision.

#### *4.6 As-Constructed Drawings*

The Subdivider shall provide the Council's Engineer with a full set of 'As Constructed' engineering drawings in both electronic (dxf or dwg), a digital format suitable for loading into geographic information and asset management systems and hard copy format prior to the release of the subdivision.

These drawings shall be in a reproducible form, clearly marked "As constructed" and certified by a licensed surveyor as follows:

- Road drawings to show details of any alterations made during construction;
- Drainage and sewer drawings and grades against the design lines, levels and grades.
- As Constructed sewer drawings in accordance with the requirements of latest revision of Water Corporation's Design Standard DS 50 – Design and Construction Requirements for Gravity Sewers DN 150 to DN 600.
- Street lighting drawings shall show light locations and luminaire details.
- Pre-calculated plan to the satisfaction of the Council's Engineer.

## 5. Control and Supervision of Construction

### 5.1 *General*

All subdivision works shall be designed and constructed in accordance with sound engineering principles and in compliance with the approved drawings and specifications.

Final approval for the works shall only be given when the whole of the works shown on the drawings of subdivision have been executed to the true intent and meaning of the approved drawings and specifications and to the satisfaction of Council's Engineer.

Traffic Management Plans, for the area affected by subdivisional works, shall be submitted to the Council's Engineer for approval prior to the commencement of the works.

### 5.2 *Responsibility for Quality of Construction*

Irrespective of any approvals given by Council's Engineer, the Subdivider and his responsible agents (including where applicable the Consulting Engineer and/or the Contractor) shall remain fully responsible for the quality of the works. The inspections, checks and tests to be carried out by Council's Engineer are not intended to be comprehensive or detailed and do not take the place of

comprehensive superintendence of the works by the Subdivider's Consulting Engineer.

All subdivision works shall be subject to the provisions of AS2990 'Quality Systems for Engineering and Construction Projects' and AS3900 to 3904 'Quality Systems'. The quality assurance category to be adopted should be Category C generally with only critical aspects to be subject to Category B requirements. The Consultant shall ensure that all contract work complies with these provisions.

### 5.3 *Schedule of Inspections*

Inspections by Council's Engineer or his representative shall be required at the following stages of construction of roads and drainage facilities. A minimum of 48 hours notice shall be given by the Subdivider's Consultant that inspections are required:

- (a) On completion of foundation and subgrade preparation and prior to placing any fill and basecourses;
- (b) After laying of drainage pipe (and culverts) and prior to backfilling trenches;
- (c) On completion of each of the basecourses and in particular immediately prior to surfacing of basecourses;
- (d) During application of bituminous surfacing;
- (e) During laying of concrete kerbing;
- (f) On practical completion of all of the subdivision works including survey lot pegging and stabilisation.

No second or follow up stage of construction shall proceed until approval has been given for the preceding stage.

Representatives of the Consultant and the Contractor shall be present at stage inspections if requested by Council's Engineer.

## 5.4 *Testing and As Constructed Surveys*

### 5.4.1 General

All test results and as constructed surveys taken during the works, whether required under this part or not, shall be made available to Council's Engineer. All materials and compaction tests shall be carried out by a NATA approved testing laboratory. All as constructed surveys shall be carried out by an independent licensed surveyor. Works which fail to meet specified criteria shall be corrected and re-tested or re-surveyed, as the case may be, at Contractor's/Subdivider's cost.

### 5.4.2 Roadworks and Drainage

The following minimum tests shall be required:

- (a) Grading and testing of properties of representative samples of sub-base and basecourse materials prior to commencement of supply of those materials;
- (b) In situ density testing -

Embankment filling: 4 tests per 1000 cub.m

Sub-base and basecourse: 4 tests per 500 cub.m

Additional density tests of foundation and subgrade to road pavements shall be taken at the Subdivider's costs when requested by Council's Engineer.

The following tolerances shall apply to the constructed levels of the road subgrade and basecourse layers unless otherwise approved by the Council's Engineer:

- Subgrade                   -30mm, +5mm within of design levels
- Basecourse               -5mm, +10mm within of design levels

The following minimum as constructed surveys shall be required by Council:

- (a) After completion of subgrade preparation and prior to cartage of basecourses, take levels at no greater than 20m intervals on the centreline and on both edges of pavement boxing. The as constructed information shall be presented in plan or tabular form showing the chainage, the design subgrade levels for each point, the as constructed levels and the difference between the two.
- (b) After completion of basecourse construction and prior to surfacing (sealing), take levels at no greater than 20m intervals on the centreline (at chainages to match subgrade levels) and on both edges of basecourse. The as constructed information shall be presented in plan or tabular form showing the chainage, the design basecourse levels for each point, the as constructed levels and the difference between the two.
- (c) Pipe Drain systems and open drains (not including table drains). Details shall include location and size of pipes and drains, length between ends (or centreline distances to pits etc), lid or cover levels where appropriate, and invert levels at ends. For open drains bottoms widths, invert levels at no greater than 20m intervals and side slopes shall additionally be required.

## 5.5 Sewers

Sewers shall be constructed and tested in accordance with the requirements of the latest revision of Water Corporation's Design Standard DS 50 – Design and Construction Requirements for Gravity Sewers DN 150 to DN 600 apart from testing for watertightness. The sewer shall be tested for watertightness in accordance with the below requirements.

Sewers and connection point shall be tested for watertightness with two separate tests. The first shall be made after laying prior to backfilling the trenches. The second test shall be made after backfilling of trenches is completed.

The method of test shall be an air test as follows:-

UPVC pipe sewers and connecting points shall be plugged and subjected to an air pressure of 50 kPa for three minutes. The air supply shall then be shut off and the air pressure shall not fall below 35 kPa in less than one minute.

The following minimum compaction tests shall be required:

- Sewer trench backfill 1 test per 150 cub.m; minimum 1 test per sewer line between access chambers or maintenance shafts.

The following minimum as constructed information and surveys, prepared and certified by a licensed surveyor, shall be required by Council plotted on base maps to match Council's sewer plan index system at a minimum scale of 1:500.

- (a) the location of the centreline of every manhole referenced to lot boundaries;
- (b) distance from centreline to centreline between every manhole and the distance from the centreline of a manhole to the plugged end of every inspection opening;
- (c) all pipe invert levels at the internal face of manholes;
- (d) reduced level of tops or covers of manholes;
- (e) surface level and invert level at all inspection openings;
- (f) identification number of manholes;
- (g) type of access chamber, e.g. drop;
- (h) pipe diameter of all sewer lines between manholes, and manholes and inspection openings;
- (i) distance along the centreline of the sewer from the centre of the downstream manhole to the plugged end of every branch to boundary connections. All branches brought up and/or into lot boundaries shall be detailed;
- (j) distance from centreline of downstream manhole to centreline of slop junctions;
- (k) distance from centreline of downstream manhole of start and stop of

concrete encasement, including details of pipe sleeves and cement grouting for railway crossings;

- (l) type of:
  - (i) pipe jointing (e.g. solvent weld),
  - (ii) bedding to sewer (e.g. crushed metal),
  - (iii) backfill.

## 5.6 *Practical Completion*

Any items of work found to require rectification at the time of the practical completion inspection, shall be rectified before certification of practical completion is issued.

The Consultant shall notify Council's Engineer in writing of the practical completion date following satisfactory completion of all subdivisional works.

If at anytime after the granting of practical completion the subdivisional work is found to be contrary to Council's requirements, or is found to have been constructed in error to the approved drawings, specifications and any instructions which may have been issued by the Consultant or Council's Engineer during the course of construction, then the works shall be rectified at no cost to the Council. Minor rectification items may be undertaken at the completion of the defects liability period.

## 6. Maintenance and Release

### 6.1 *Survey Release*

The Subdivider or his nominated representative shall satisfy Council that the Subdivider has complied with all relevant conditions imposed by the Western Australian Planning Commission pertaining to survey release of all or part of a constructed subdivision.

The conditions which must be complied with by the Subdivider prior to the Council's approval of survey release of a subdivision shall include, but shall not necessarily be limited to, the following:

- (a) Creation and location of all stormwater drainage easements;
- (b) Creation of any other easements (temporary or permanent) which are relevant to the subdivision;
- (c) Creation of all reserves (including drainage and recreation reserves) pertaining to the subdivisional works;
- (d) Payment of all monies required to be paid to the Council in consideration of any works associated with the subdivision and which are to be carried out by the Council;
- (e) Payment of any maintenance retention money (of lodgement of bank guarantees) and payment of supervision fees required by Council;
- (f) Stabilisation of topsoil sand or other material or matter subject to movement over or near the subdivision shall be completed to the satisfaction of Council's Engineer;
- (g) Completion of all roadworks and other works associated with the subdivisional construction to the stage of practical completion;
- (h) Lodgement of all as constructed drawings and data as required by Council.

## 6.2 *Supervision Fees*

Supervision fees calculated in accordance with section Section 158 of the Planning and Development Act 2005 (Ref CI 2.5) shall be paid by the Subdivider to the Council before construction commences. The amount of the payment shall be based on the estimated cost of all of the works at the time. Upon certification of practical completion of the works, the consultant shall provide the actual construction cost of the works and the amount of the fee shall be adjusted accordingly, if necessary.

## 6.3 *Sewerage Headworks Contribution*

A sewerage headworks contribution shall be paid by the Subdivider to the

Council before construction commences.

Sewerage headworks charges shall be applied to all subdivisional developments, (Residential/Commercial, Industrial/Other), except as determined by Council and notified in writing,

#### 6.4 *Maintenance*

A twelve months defects liability period shall apply from the date of practical completion of the subdivisional works. During this period the Subdivider and/or its responsible agents shall be responsible for rectification of any defects, whether they are construction or design defects, which may become apparent. The Subdivider or its responsible agents shall carry out rectification work within the time requested by Council when notified of such defects. If defects are not rectified within the time required by Council then Council may have the defects rectified at the Subdivider's expense. In this case the cost of the work shall become a debt due to the Council and Council may draw on any retention money or bank guarantee being held, without reference to or approval from the Subdivider and without limiting its right to recover any balance of money due should the security be insufficient to cover the costs of the work.

Before practical completion is granted the Subdivider shall lodge with the Council an amount of 5% of the total costs of the works as security for ensuring the rectification of defects, which shall be retained by Council for the duration of the defects liability period. Alternatively a bank guarantee of approved form may be lodged in lieu of retention money.

The bank guarantee shall contain clauses wherein the bank shall guarantee to pay to Council unconditionally on demand any amount up to the total amount of the guarantee at any time so required, and that the guarantee shall not be withdrawn until notified by Council (i.e. it shall not have a termination date). Any bank guarantee lodged with the Subdivider by a Contractor in lieu of retention money shall be acceptable as part or full security (as the case may be) provided it is in a form which is acceptable to Council.

Any defect rectified during the defects liability period shall be subject to a further

twelve months defects liability period. During this further period Council may, at its discretion, withhold the release of all or part of any security.

Retention money or bank guarantees shall only be released at the expiration of the defects liability period (or any further period) after satisfactory rectification of all defects.

#### 6.5 *Landscape Maintenance Bond*

All landscaping and grassing shall be supported by a maintenance and watering period of at least two summer periods to ensure full establishment. This condition shall be guaranteed by way of a maintenance bond in the form of cash or a guarantee from a financial institution acceptable to Council. The bond will be returned when the maintenance period has been satisfactorily completed.

### **RELEVANT DOCUMENTS**

Policy: ENG-ES-002 – Road Train / Heavy Haulage

City of Kalgoorlie-Boulder Drawing Number 10-P-147

City of Kalgoorlie-Boulder Drawing Number 10-S-002