

SUBDIVISION GUIDELINES - ADDENDUM

This City of Karratha Subdivision Guideline Addendum is the additional subdivisional requirements which are to be considered and incorporated within developments by intending Developers wishing to undertake subdivisional works within the City of Karratha.

This is an addendum to the “Institute of Public Works Engineering Australia (IPWEA) Local Government Guidelines for Subdivisional Development (Edition 2-2009)”.

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1. **Module 1 Legal Framework and Contract Administration Hours of Work.**

Hours to be:

- 7.00am - 6.00pm Weekdays.
- Weekends at the City of Karratha's discretion.

2. **Module 1 Legal Framework and Contract Administration Bonding outstanding Works.**

Bonding to be that the City of Karratha requires that all bonding works are indexed and increased at 10% annually, to compensate for price increases within the Pilbara District.

- Bank guarantee for ongoing developments.
- Cash for minor works.
- Bond fee to be put in place.

3. **Module 1 Legal Framework and Contract Administration Defects Liability.**

The defects liability period for Roads and Drainage is to be 36 months from practicable completion.

The defects Liability for Parks and Reserves (POS) to be 36 months from practical completion, both active and passive.

4. **Module 3 Road Guidelines.**

Additional information for base course design and requirements within the City of Karratha.

Pavement Materials Specifications and thickness design.

Background

For the roads around the main urban centres of Karratha and Dampier manufactured rock base is the preferred pavement material. This is because the Karratha/Dampier peninsular is an extension of the Chichester Range that extends eastward on the north side of the Fortescue River almost to the town of Newman. This range is predominately the remains of a very old basalt/dolerite flow that occurred over a billion years ago. The weathered soil from this range tends to contain a high percentage of active clays minimising the availability of suitable naturally occurring gravel sources in this region. Accordingly, since the start of the development of the mining infrastructure in 1968, most road construction material has been manufactured rock base using crushed basalt as the aggregate. Compared to naturally occurring gravels, rock base is a relatively expensive pavement material.

To minimise costs, the City of Karratha mix crushed aggregate with a maximum size of 26mm with the local gravels to produce a pavement material. The road pavement is then typically constructed using this material to a depth of 100mm.

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The City of Karratha has requested some guidance from WML Consultants (WML) on the validity of these processes and whether they will provide roads with the longevity of roads constructed in the past. Also WML were asked to comment on seal design.

Pavement Material Specifications

In November 2002 Main Roads WA & Australian Geo Mechanics Society produced a publication called "A Guide to the Selection and Use of Naturally Occurring Materials as Base and Sub-base in Roads in Western Australia". A copy of this document can be obtained from the MRWA website. This document provides a guide to the selection and use of naturally occurring materials that have been successfully used as pavement materials over many years. The guide provides suitable pavement specifications, based on experience for the use of pavement materials in the more remote regions of the State with regard to:-

- Arid climate – low traffic volumes
- Non-standard materials

From this Guide it is possible for the City of Karratha to develop suitable specifications for the gravel/crushed rock mixes currently used for today's construction works, which will give some confidence of pavement longevity.

For the high traffic roads the following base-course specification is suggested;

Lt 10 Base Course Specification

Specification for Warm Arid Climate with Traffic Loading greater than 5×10^5 ESAs. Say greater than an AADT of 1000VPD with 10% heavy vehicles.

Base-course material shall be gravel free from stone greater than 37.5mm and free from clods, stumps, roots, sticks, vegetable matter or other deleterious materials. The material shall also conform to the following requirements:

Particle Size Distribution WA 115.1

The grading of the portion passing a 37.5mm AS Sieve shall conform to the following.

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AS SIEVE SIZE	% PASSING BY MASS
37.5	100
19.0 9.5	100 – 71
4.75	100 – 50
2.36	81 – 36
1.18	66 – 25
0.425	53 – 18
0.075	39 – 11
0.0135	23 – 4
	11 – 2

Soil Constants

The portion of the sample passing the 0.425mm sieve shall conform to the following:

Liquid Limit WA 120.2	-	Not greater than 30.0%
Plastic Index WA 122.1		Not greater than 10.0%
Linear Shrinkage WA 123.1		Not greater than 5.0%

Maximum Dry Compressive Strength (MDCS) WA 140.1

Where the Plastic Index is unobtainable or where the Linear Shrinkage is 1.0% or less, then a MDCS value of not less than 1700 Kpa is required.

Lt 16 Base Course Specification

Specification for Warm Arid Climate with Traffic Loading less than 5×10^5 ESAs.
Say less than an AADT of 1000VPD with 10% heavy vehicles.

Base-course material shall be gravel free from stone greater than 37.5mm and free from clods, stumps, roots, sticks, vegetable matter or other deleterious materials. The material shall also conform to the following requirements: other deleterious materials. The material shall also conform to the following requirements:

Particle Size Distribution WA 115.1

The grading of the portion passing a 37.5mm AS Sieve shall conform to the following.

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19.0 9.5	100 – 71
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2.36	81 – 36
1.18	66 – 25
0.425	53 – 18
0.075	39 – 11
0.0135	23 – 4
	11 – 2

Soil Constants

The portion of the sample passing the 0.425mm sieve shall conform to the following:

Liquid Limit WA 120.2	-	Not greater than 35.0%
Plastic Index WA 122.1	-	Not greater than 16.0%
Linear Shrinkage WA 123.1	-	Not greater than 8.0%

Maximum Dry Compressive Strength (MDCS) WA 140.1

Where the Plastic Index is unobtainable or where the Linear Shrinkage is 1.0% or less, then a MDCS value of not less than 2300 Kpa is required.

Pavement Thickness Design

The thickness of a road pavement is a function of three main design inputs, these are;

- Strength of the subgrade as measured by Californian Bearing Ratio (CBR)
- The traffic volume
- The design life

The MRWA procedure for Pavement Design is Engineering Road Note No 9 - May 2007.

A copy of this document can be obtained from the MRWA website. A simple, effective method of determining pavement design using the information from this document is described below.

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Californian Bearing Ratio (CBR)

The CBR is expressed as a percentage of a manufactured rock base pavement material, which has a strength of 100%.

Subgrade materials are typically much weaker than this and thus requires a pavement, which is progressively designed thicker as the subgrade CBR strength decreases.

The laboratory testing for CBR is expensive and often give results which do not relate to field experience. For over 20 years, between 1960 and 1980 Main Roads used a calculation method from PSD and Consistency Limits conducted on subgrade samples to determine the CBR value. Much of the State Road Network was constructed during this period and is still performing well beyond its design life. The method simply assumes that coarse non plastic materials give a strong CBR and fine, clayey materials give a weak CBR. For most City works this method is perfectly adequate and a copy of the calculation spreadsheet is provided.

In the Karratha area sub grade strengths are expected to be;

- CBR 15% - good subgrade materials, typically sands and gravels containing only a small percentage of clay. Normally will support construction traffic when wet.
- CBR 10% - fair subgrade materials, typically clayey sands and clayey gravels that are only likely to give problems to the construction traffic when wet.
- CBR 5% - poor subgrade material, typically fine clayey materials that will “bog easily” under construction traffic when wet.

Design Traffic

The design traffic is measured in equivalent standard axles (ESA's) and measures all vehicles of Class 3 and above for the design life of the road which is normally 20 years (Austroads). Note that light vehicles are discounted. Note also that MRWA uses a Design Life of 40 years.

For the pavement thickness calculated below a design life of 20 years has been used for three roads. These are;

- Urban light traffic roads, say 100VPD gives a Design Traffic of 0.7+0.3 ESA's.
- Urban distributor roads, say 2000 VPD gives a Design Traffic of 1.4+0.5 ESA's.
- Heavy vehicle distributor roads, say 5000VPD gives a Design Traffic of 1.1+0.6 ESA's.

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Pavement Thickness

The design pavement thickness, for the three typical roads (in millimetres) are listed in the table below.

Road	CBR 15	CBR 10	CBR 5
Urban light	100	125	175
Urban Distributor	150	200	300
Heavy Traffic Distributor	200	250	400

For the Karratha locality it is likely that most subgrade materials will be about CBR 10 giving typical pavement thicknesses of 125mm to 250mm. Where “soft subgrade” clayey materials are encountered it is generally cost effective to excavate and replace with a stronger subgrade material before laying the more expensive pavement material.

For example on a heavy traffic distributor road constructed across a clayey flat, 200mm of granular material may be placed before placing a 200mm pavement. The total 400mm of cover over the weak clayey subgrade now satisfies the requirements of the table above.

The City of Karratha requires soil testing be undertaken by an independent company with results on sub grades and base-course materials sent to the City of Karratha prior to any base course construction.

The methodology to any insitu subgrade or base course material improvement required to meet the appropriate standard, is required by the City of Karratha.

5. **Module 3 Road Guidelines. Wearing Course.**

The wearing course for all roads within the City of Karratha is to be asphalt only.(Design pending traffic parameters).

6. **Module 4 Drainage Management Guidelines.**

1 in 1 year drainage storm event.

Drainage is required to accommodate a 1 in 1 year, 1 hour storm event and 1 in 10 year storm event.

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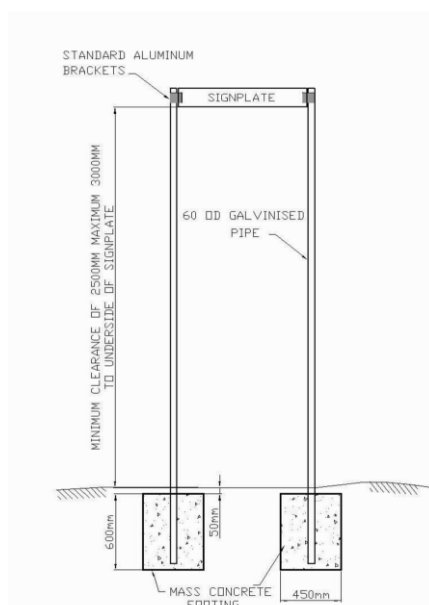
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7. Module 5 Streetscape Guidelines.

Street name plates and Community signs.

The City of Karratha requires that street signs be made to the following specifications:

- All signs are to meet the current Australian Standards AS1742.5.
- Street Name Signs Type G5 and MR-GS-5 – to be Class 1W reflective sheeting.
- Where speed limit is less than 70km/h – Sign-plates to be 150mm hollow extrusion, 1000mm in length, unless otherwise approved. Sign plates are to be double sided with 100mm black lettering, Series DN or CN on white retro-reflective, Class 1 Prismatic or similar Grade background with a 12 year or better warranty.
- Where speed limit exceeds 70 km/h – Sign-plates to be 200mm hollow extrusion, 1000mm in length, unless otherwise approved. Sign-plates to be double sided with 130mm black lettering, Series DN or CN on white retro-reflective, Class 1 Prismatic or similar Grade background with a 12 year or better warranty.
- Wording to be centrally located on sign plate with abbreviation to be 50mm lettering at top right hand side of street name.
- Anti graffiti film is to be applied.
- Signs are to be mounted either on two (2) 60 OD posts or onto Western Power poles where they are opposite an intersection.
 - All brackets to be supplied with sign plate.
 - Footings to be 450mm diameter x 600mm deep.
 - Mounting height shall be no less than 2.5 metres and not more than 3.0 metres, measured from the ground level to the underside of the sign-plate.
 - Lateral placement on urban roads to be on the 2.7 metre alignment unless otherwise approved.
 - Lateral placement on rural roads to be at least 600 mm clear of the outer edge of the road shoulder.



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ABBREVIATION, WHERE USED SHALL BE SELECTED FROM THE FOLLOWING					
ALLY	ALLEY	ARC	ARCADE	AVE	AVENUE
BLVD	BOULEVARD	CIR	CIRCLE	CRCS	CIRCUS
CL	CLOSE	CNR	CORNER	CT	COURT
CTYD	COURTYARD	CR	CRESCENT	CRSS	CROSS
DR	DRIVE	ESP	ESPLANADE	GDNS	GARDENS
GR	GROVE	HWY	HIGHWAY	L	LANE
LP	LOOP	MEWS	MEWS	PDE	PARADE
PWY	PARKWAY	PL	PLACE	PROM	PROMENADE
RMBL	RAMBLE	RISE	RISE	RD	ROAD
ROW	ROW	SQ	SQUARE	ST	STREET
TCE	TERRRACE	TRL	TRAIL	VALE	VALE
WK	WALK	WY	WAY		

“The City of Karratha has a preferred road name listing that should be considered prior to road naming.

Road names are to be agreed to by a council resolution prior to allocation”.

8. Module 6- Public Open Space Guidelines.

Public Open Space design will include cyclone rated shade structures over all play space / playgrounds and out door living areas, i.e.- (Table Seating combinations). All structures are to be approved by the City of Karratha.

9. Road Design.

That road design undertaken within the City of Karratha is in compliance with the latest Austroads Road Design Series.