DESIGN AND DEVELOPMENT MANUAL

PART A

ROADWORKS AND STORMWATER DRAINAGE

Effective from 10 March 2008

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ROADWORKS AND STORMWATER DRAINAGE

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APPENDICES

LIST OF DEFINITIONS AND ABBREVIATIONS

DEFINITIONS	
Consultant	A company or individual suitably registered by the Board of Professional Engineers, Queensland and experienced in the design and construction of subdivisional works.
Council	Caboolture Shire Council.
Developer's surveyor	A surveyor who acts on behalf of the developer. The surveyor should be endorsed in the Register of Surveyors as a Consulting Surveyor.
Experienced soils technician	A soils technician employed by a NATA registered testing authority who has the necessary qualifications and experience to perform the required tests and procedures.
NATA registered testing authority	A laboratory that has been registered by NATA to perform the required testing. The laboratory shall only perform tests or procedures that are covered by the terms of their registration by NATA.
Surveyor	A surveyor who is endorsed in the Register of Surveyors as a Consulting Surveyor.
Geotechnical testing authority	A laboratory that has been registered by NATA to perform geotechnical testing. The laboratory shall perform tests or procedures that are covered by the terms of their registration by NATA.

ABBREVIATIONS	
ARRB	Australian Road Research Board
AS	Australian Standard
Austroads	National Association of Road Transport and Traffic Authorities in Australia
BCC	Brisbane City Council
CBR	California Bearing Ratio
GTA	Geotechnical Testing Authority
LATM	Local Area Traffic Management
NAASRA	National Association of Australian State Road Authorities
NATA	National Association of Testing Authorities
QDOT	Queensland Department of Transport
QUDM	Queensland Urban Drainage Manual
RPEQ	Registered Professional Engineer, Queensland
SAA	Standards Association of Australia

SECTION 1 – INTRODUCTION

The aim of this Manual is to provide Consultants with criteria for the submission of Operational Works drawings to Caboolture Shire Council for approval and to provide details of associated construction requirements.

The standards adopted in this guideline are considered general and it is appreciated that circumstances may arise where departure from them may be justified. Submissions by Consultants of alternative design standards are at the discretion of the Manager Engineering Planning, Caboolture Shire Council, and are to be based on professional experience and sound engineering practice.

Compliance with this guideline should expedite approval of Operational Works plans.

All works associated with subdivisional developments shall be designed and the construction supervised by a Registered Professional Engineer, Queensland (RPEQ), who is experienced in the design and construction of works and services related to development (referred to in these guidelines as the 'Consultant'), or by a suitably qualified person under the direct supervision of an RPEQ. The registration number of the RPEQ shall be shown on all certificates.

Where in these Standards reference is made to the Surveyor or Developer's Surveyor, that Surveyor shall be endorsed in the Register of Surveyors as a Consulting Surveyor.

All testing associated with developments shall be undertaken by a National Association of Testing Authorities Registered Testing Authority endorsed for the appropriate tests using procedures described in the current Australian Standards. All testing and fieldwork to be carried out by suitably qualified, experienced and endorsed personnel.

Where reference is made to other design manuals etc., this document takes precedence over the design requirements specified in such manuals.

Where reference is made to AUSTROADS publications as the relevant standard, “desirable” design criteria shall be taken to be mandatory. Any exceptions to this are to be approved by the Manager, Engineering Planning (or Council).

Consultants are expected to have systems in place to assure the quality of the design drawings and the reports that they produce. Checking of engineering designs by Council Officers is not meant to take the place of the Consultants own "in house" checking procedures. The check performed by Council Officers is to ensure that the design broadly conforms with Council Standards, and it is not necessarily a detailed compliance check of calculations and all drawing details.

It is the Consultant's responsibility to ensure that the design complies with and has satisfied all relevant Conditions of Council Development approval.

It is the Consultant's responsibility to ensure that all omissions and errors in the design drawings are corrected. Amended plans, if any are required, are to be forwarded to Council for checking and approval prior to the commencement of construction of that work.

SECTION 2 - CONSTRUCTION DOCUMENTS

2.1 GENERAL REQUIREMENTS

Prior to commencement of construction of any subdivisional works or external works associated with other development applications the following documents are to be submitted to Council for approval:

(a) Engineering Plans for Operational Works.

(b) Suitable stormwater catchment plans and full stormwater drainage calculations including an electronic copy.

(c) Approval of relevant State and Federal Government Departments where applicable, e.g. Queensland Department of Main Roads.

(d) Downstream drainage easements where applicable.

(e) Confirmation that the Operational Works shall be constructed in accordance with Council's adopted Standard Construction Specifications as detailed in Section 2.12.

Section 2.12 Council Standard Specifications

One A1 and one A3 complete sets of engineering design plans prepared by a Consultant and certified by an RPEQ shall be submitted to Council for checking and approval for all works. Additional sets will be required on approval of the plans.

Engineering Design Plans cannot be submitted prior to approval of the appropriate development application by Council.

Once approved by Council two (2) complete sets of engineering design plans will be made available to the Consultant (stamped approved by Council). One (1) complete set of approved plans is to be kept on-site at all times.

2.2 ENGINEERING PLANS

The Engineering plans generally shall contain sufficient information to allow adequate checking of the plans and for the construction of works. The complete set of engineering design plans should generally include but is not limited to the following information:

- locality plan;
- layout and stage plan;
- plan of each new road (at appropriate scale);
- longitudinal section of each road;
- cross sections of each road (including typical sections);
- detail plan of each intersection and cul-de-sac head;
- signage and linemarking plan;
- detail plan of each traffic management device;
- drainage catchment and stormwater layout plan, and relevant calculations;
- interallotment drainage plan;
- longitudinal section of each drainline to show service crossings (depth and

Section 2.9

Details to be included on Construction Plans

location);

- water quality/erosion control plan;
- plan of open drains/channels;
- landscape plan for development projects (where required);
- composite plan of proposed sewer reticulation showing overall layout;
- detailed plan of proposed water and sewer reticulation (in accordance with Cabwater requirements);
- other details as necessary (e.g. detention basin/culvert details etc.).

Note: 1. Refer to Section 2.9 for details to be included on each of the above plans.

2. Where applicable, the required details may be amalgamated on the relevant drawings.

2.3 STANDARD OF DRAWINGS

The standard of engineering plans is to be commensurate with standards normally accepted in good civil engineering practice and should meet the requirements of current Australian Standards (AS1100 Technical Drawing). Sub-standard drawings and poorly presented calculation tables will be rejected.

The first sheet of the set of drawings is to contain an index of Drawings, Site Layout, Locality Plan and any general notes.

2.4 SHEET SIZES

All engineering plans shall be drawn on standard size sheets the following sheet sizes only being acceptable:

Size	Overall Dimensions
A1	841 mm x 594 mm
A3	420 mm x 297 mm

AS 1100 Technical Drawing

Working plans may be reduced (to scale) to A3 format for ease of handling, in accordance with Clause 2.5, but must be legible when reduced from the original A1 format.

2.5 SCALES

Scales used for all plans shall be those recommended by the current Australian Standards (AS1100 Technical Drawing) namely:

1:1, 1:2 and 1:5 and multiples of 10 of these scales.

Although not preferred, 1:25 (and multiples of 10) may also be accepted.

Plan - 1:1000 or 1:500

Longitudinal section scales to match plan scales i.e. generally:

- Horizontal 1:1000
  and Vertical 1:100;

or

- Horizontal 1:500

and Vertical 1:50.

Intersection Details - 1:200, 1:100 or 1:250

Cross Sections - 1:100

Other Details - As appropriate

Bar scales are to be provided on all drawings.

2.6 DIMENSIONING ON PLANS

Linear dimensions on all plans shall be in metres, with the exception of some detail plans of small structures (e.g. access chambers) and some standard plans (e.g. kerb and channel), which may be in millimetres.

2.7 CHAINAGE

Chainage on plans shall be expressed to two decimal places of a metre (e.g. 0.01m).

2.8 LEVELLING

All levels shall be to Australian Height Datum, and indicated on the plans.

In general, all levels on plans shall be expressed to three decimal places of a metre (e.g. 0.001m).

2.9 DETAILS TO BE INCLUDED ON CONSTRUCTION PLANS

All engineering drawings submitted for approval are to include a title block showing all of the following:

- Estate name (if any);
- Real Property description (on locality/layout plan only);
- Locality (on locality/layout plan only);
- Developer's name;
- Consultant's name and address;
- Scales (Bar Scales);
- Drawing title;
- Plan number and sheet number;
- Schedule and date of amendments;
- Signed design certification (checked and approved) by a RPEQ;
- Survey datum and identification of survey mark used in the design (on locality/layout plan only);
- North Point when appropriate;
- Road name or road number where appropriate; and
- Stage number (if any).

Without limitation, the following information should be included in the engineering drawings depending on the size and layout of the subdivision:

2.9.1 Locality Plan

Location of the subdivision in relation to adjacent towns, main roads, major street, etc. Plan must include a north point.

2.9.2 Layout and Stage Plan

For large subdivision, the layout plan should show the relationship of all new roads to each other, and to existing roads adjoining the subdivision. Where development is to be carried out by stages, the boundaries of proposed stages should be shown on this plan, and the stages identified by numbering.

All site cut/fill earthworks including existing and finished surface contours shall be shown on the layout plan in sufficient detail to define the extent of the earthworks. Sufficient contrast of line thickness is to be provided. Depending on extent of detail, the earthworks may need to be shown on a separate plan.

Location and levels of retaining walls (if required).

Calculated Q100 and Q50 flood contour (where appropriate), located by field survey. In addition Q20 flood contours are to be provided through parks.

For small subdivisions, where all new roads can be shown on one detailed plan, the layout plan may be omitted.

2.9.3 Plan of each Road

The plan of each road shall include:

- road reserve boundaries;
- access restriction strips;
- allotment and easement boundaries, both existing and proposed and relevant property descriptions;
- concrete footpaths, pathways, and bikeways;
- centre-line or other construction line;
- chainages on centreline or construction line or set out co-ordinates;
- bearings of the centreline or construction line;
- offsets, if the construction line is not the centreline;
- tangent point chainages or co-ordinates of each curve;
- deflection angle, radius, arc length, tangent length and secant distance of each horizontal curve;
- road reserve boundaries, centreline, and bearing of each intersecting road;[1.]
- chainage of the Intersection Point of road centrelines;
- kerb lines, kerb radii, and chainage of all tangent points of the kerb line;[1.]
- edge of pavement, where no kerb is to be constructed;
- dimensioned road reserve, footpath, and pavement widths, where these differ from the typical cross-section;

- existing and finished surface contours, highlighting cut and fill areas;[2.]
- location and detail of signs and roadmarkings to be provided;[3.]
- drainline locations, pipe diameters and stormwater pit locations;[4.]
- access chamber locations, chainage and offset, and inlet and outlet invert levels;[4.]
- location and levels of existing utilities or other existing works within the site;
- location and levels of Bench Marks and reference pegs;
- North Point; and
- location of allotment accesses where obvious or mandatory, e.g. cul-de-sac allotments, near existing driveways and traffic calming devices.

[1] ***May be detailed on separate intersection plan***

[2] ***May de detailed on separate layout or earthworks plan***

[3] ***May de detailed on separate traffic control plan***

[4] ***May be detailed on separate stormwater drainage layout plan***

The relevant drawings should be cross-referenced to reflect the above.

2.9.4 Longitudinal Section of Roads

The longitudinal section of roads shall include:

- existing surface levels;
- design road centreline and kerb lip levels;
- chainages;
- tangent point chainages and levels of each horizontal and vertical curve;
- chainages and levels of crest and sag points;
- chainage of the intersection point of centreline of intersecting roads including road name and number;
- design grades;
- cut or fill depths;
- chainage and levels of grade intersection points;
- lengths and/or radius of vertical curves;
- sections on control lines on superelevated curves (i.e. pavement edges, kerb, or lane edges);
- sight distance diagram, for each direction of travel (where required);
- longitudinal linemarking; and
- details of horizontal alignment.

Note: The existing surface levels and design road centreline level are to extend 50m beyond the limit of construction where the road may be extended in the future.

2.9.5 Detailed Plan of Intersections (including heads of culs-de-sac)

Intersection detail plans shall include all the relevant information required for plans as listed above, together with additional details such as:

- kerb levels on kerb returns (i.e. TP's plus 3 additional points on curve at equal intervals with maximum interval 3 metres);
- chainages of intersecting roads;
- pavement contours (maximum 0.2 metre vertical intervals);
- channelisation works;
- drainage details (including overland flowpaths);
- locations of concrete footways and kerb ramps; and
- linemarking and signs.

Note: Where "T-Head" culs-de-sac have been specifically approved for use (refer Conditions of Development Approval) then additional information will be required. (e.g. minimum 5 metre footpath width (from property boundary to invert of kerb and channel to be maintained).

2.9.6 Typical Cross Sections

A typical dimensioned cross section shall be shown for each road, and shall include:

- road reserve width;
- pavement widths;
- shoulder widths;
- footpath widths;
- crossfalls of pavement and footpaths;
- pavement and shoulder depth (subject to test results);
- type of kerb and channel;
- location of subsoil drainage ;
- type of pavement surfacing;
- services locations are to be included, i.e. both existing and proposed; and
- 300mm cutback of existing pavement where pavement is to be extended or widened.

2.9.7 Cross Sections of Roads

A cross section shall be shown at maximum spacing of 20 metres, except in flat country where all cross sections conform to the typical cross section. Where roads are in steep terrain cross sections may be required at closer intervals. Cross sections are to extend into allotments for the limit of batters.

Cross sections shall include:

- road reserve boundaries;
- pavement centreline (or other construction line);
- natural surface;
- design cross section;
- crossfall of pavement and footpath, pavement and footpath widths, and pavement depths wherever these differ from the standard cross section, e.g.

Superelevation and Curve Widening;

- where design is for a road in an existing road reserve the design cross-section must show the existing profile and ultimate profile for the full reserve width;
- medians showing infill details;
- location of existing and proposed services;
- chainage of cross section; and
- datum reduced level.

2.9.8 Pavement Markings & Traffic Signs Plan

All necessary signage (including temporary signage for roadworks etc.) shall be provided in accordance with the current edition of "Manual of Uniform Traffic Control Devices - Main Roads Department, Queensland" (MUTCD).

The following shall be provided but not limited to:

- Street name signs at each intersection. The colours shall be retroreflective Class 1, white background with black lettering.
- "No Through Road" signs are to be provided at the entrance to all dead end roads temporary or otherwise.
- Warning signs, at the approach to all hazards.
- "Keep Left" signs at the approach end of the first island at all channelised intersections, and at all median openings.
- Edge lines and separation lines on arterial roads and residential, industrial and rural collector roads.
- At a temporary termination of road construction, such as a subdivision or stage boundary, an obstruction marker (and adequate reflectorised guide posts) shall be erected in accordance with current MUTCD requirements.
- Warning signs on collector roads at locations where shared paths/bicycle ways enter the road reserve.
- Other traffic control devices necessary for effective traffic control (e.g. retroreflective raised pavement markers etc.)

Section 4.7 Line Marking/Signage

Manual of Uniform Traffic Control Devices – Main Roads Department, Queensland

2.9.9 Stormwater Drainage Catchment Plan

The catchment plan shall include:

- The full external catchment
- A plan of the development showing the layout of roads and allotment boundaries.
- Existing and finished surface contours (in different line types). Contour intervals are to be sufficient to enable sub-catchments to be defined.
- Contours shall be extended external to the site to enable the limits of all external catchments to be fully defined.
- Subcatchment boundaries, labels and areas.
- Location of drainlines, access chambers, inlet/gully pits, outlets, open drains etc.
- Labelling of stormwater structures.

Caboolture ShirePlan

- North point.

Note: Where stormwater runoff from an external catchment will be drained via stormwater drainage through the subdivision/development, the boundaries and the area of the catchment shall be shown on the catchment/layout plans. Stormwater Drains within the subdivision shall be sized to accept the design discharge from a fully developed external catchment (based on the ShirePlan).

The stormwater drains shall be constructed to the external boundaries of the estate at lines and levels to suit the connection of future drainage systems. The stormwater drains shall be terminated in structures suitable for collection of stormwater from the external catchments.

Easements, drainage reserves, and pathways (where required) shall be provided to cater for drainage from future upstream developments.

Where practical the number of access chambers is to be minimised by providing gully pit to gully pit connections.

2.9.10 Interallotment Drainage Plan

(These details may be shown on layout plan if there is sufficient room)

- location and size of interallotment drainage lines;
- location and size of pits;
- location and size of each connection point;
- invert and surface levels of pits and connection points;
- pipe material, lengths and grades;
- details of connections to kerb and channel; and
- location, size and cross sections of swales.

2.9.11 Longitudinal Sections of Stormwater Drainage

A longitudinal section of all stormwater drainlines including interallotment drainage lines:

- road chainage and offset at each structure;
- drainage chainages along pipes;
- existing surface levels and surface profile (where required);
- proposed surface levels, design surface levels and surface profile;
- design invert levels;
- access chamber chainages, and type of structure;
- distances between access chambers;
- grade of each pipe in percent;
- diameter of each pipe reach;
- hydraulic grade line for the minor storm event;
- hydraulic grade line for the major storm event at critical locations;
- velocity in pipes and at outlets for the design storm;

- class and type of joint of each pipe reach;
- location of all other services, existing and proposed - e.g. Telecommunication, sewer, water and gas (where applicable) showing sizes and levels; and
- Full length of outlet drains.

2.9.12 Open Cut Channels

Open channels including overland flowpaths for the major storm event are to be shown on a plan with:

- A typical cross-section of the open channel, showing construction details including batter slopes (**Note:** the maximum desirable batter slope is 1 in 6. Batter slopes between 1 in 6 and 1 in 4 are to be turfed and batter slopes greater than 1 in 4 are to be stone pitched or satisfactorily retained).
- Cross-sections will be required at minimum 40 metre intervals and critical locations showing depth and width of flow.
- Top and toe of batters with depth and width of flow.
- Any low-flow pipes or concrete lined sections, including cut-off walls.
- Details of concrete lined sections including reinforcement, cut-off walls and seepage points.
- Spot levels (at 20 metre intervals) or contours along the channel.
- Scour protection to bed and banks, drop structures etc.
- Longitudinal sections of the channel showing the design flows, velocity and depth.
- Plans to demonstrate that satisfactory discharge can be achieved.
- All open drains are to be designed and constructed in accordance with Chapter 8 – Stormwater Drainage.

2.9.13 Landscape Plans

When landscaping works are planned within the road reserve (e.g. planting within traffic islands and/or on footpaths) or within proposed parkland/drainage reserve then a detailed Landscaping Plan in accordance with Caboolture ShirePlan Division 13 (Landscaping Code) and Policy 13 (Landscaping) and Council's Landscaping Guidelines is to be submitted to Council for written approval.

Planning Scheme Policies

2.9.14 Water Quality/Erosion Control Plans

The sediment and erosion control plan shall include, but is not limited to, the following:

- The existing topography of the site.
- How the site is proposed to be altered, i.e. details of the proposed development.
- The proposed sediment and erosion control measures (both permanent, and short term including during construction).
- Catchment boundaries (both existing and proposed).
- The construction vehicle entrance to the site, including shake down or

Soil Erosion And Sediment Control – The Institute of Engineers Aust, Qld Division.

submerged grid location.

The design of erosion and sediment control structures shall generally be in accordance with SOIL EROSION AND SEDIMENT CONTROL – The Institute of Engineers Aust, Qld Division.

2.10 APPROVAL OF CONSTRUCTION DOCUMENTS

Initial submissions of Construction Documents to Council for approval shall be as listed in Clause 2.2 and detailed in Clause 2.9.

Once Construction Documents are considered satisfactory by Council, the plans will be stamped "approved". One complete set of Construction Documents will be retained by Council for future reference and use by Council's Inspectors, and the other copies will be made available to the Consultant by Council.

In approving documents for construction, Council does not accept any responsibility for the correctness and/or accuracy etc. of the documents and it shall be the total responsibility of the Consultant to ensure that the designs detailed in the documents are workable and satisfy conditions of Council Development Approval and Council's Planning Scheme and Design & Development Manual.

Note: Council's adopted standard construction specifications are not required to be submitted to Council in conjunction with construction documentation.

2.11 CONSTRUCTION OF THE SUBDIVISIONAL WORKS

Construction shall not commence prior to receipt of Council's approval. The Consultant shall give Council's Inspector five (5) working days notice of intention to commence construction and the name of the successful tenderer shall be submitted to Council for approval. Works are to be undertaken by contractors who are competent and experienced in the relevant work being performed.

Prior to commencing construction, a prestart meeting is to be held with Council's Inspector and the Consultant shall also submit to Council copies of the following documents together with evidence of payment where applicable.

- Notification & Payment form for The Building and Construction Industry (Portable Long Service Leave) Authority and Workplace Health & Safety.
- Notice of Appointment of Principal Contractor.
- Relevant Statutory Permits.
- Public liability insurance policy.

2.12 COUNCIL STANDARD CONSTRUCTION SPECIFICATION

All works shall be in accordance with Council's adopted Standards as detailed below.

Table 5.5A Pavement Materials

- In accordance with Main Roads specifications for roadworks with the exception of:
- Asphalt Surfacing for Access, Minor Collector and Collector Roads – Brisbane City Council S310 Supply of Dense Graded Asphalt – Brisbane City Council

S320 Laying of Asphalt.

Note: Where a discrepancy occurs between the Design and Development Manual and the Standard Construction Specifications, the provisions of the Design and Development Manual shall apply.

2.13 COUNCIL'S STANDARD DRAWINGS

Consultants shall use Council's Standard Drawings for the construction of subdivisional works where applicable. Refer to Appendix K Standard Drawings. Consultants shall prepare and submit for approval necessary detail drawings.

2.14 SERVICES ROAD CROSSINGS

2.14.1 Services trench backfilling under road pavements

All services crossing or traversing existing or proposed road pavements, including stormwater pipes, sewer pipes, electrical, telecommunications & water conduits etc. shall be backfilled from the pipe bedding up to the subgrade level of the road pavement, with class 2.5 gravel (Min. CBR 15) compacted to the minimum acceptable of 100% Standard Maximum Dry Density, tested in accordance with AS1289.E1.1 and AS1289.E3.1.

Appendix K Standard Drawings

SECTION 3 - GENERAL ROADWORKS DESIGN STANDARDS

3.1 ROAD HIERARCHY

The road pavement widths provided shall be as detailed in the Conditions of Development Approval. The actual widths are determined having due regard to the traffic function they will perform. The general road hierarchy is as follows:

3.1.1 Access Street

A Road which has the primary function of providing access to abutting properties and through which traffic, not having an origin or destination there, will not be attracted.

3.1.2 Minor Collector Street

Road which has the primary function of providing access to abutting properties, but which may provide for traffic using the streets as a means of circulation from one street to another in a minor way.

3.1.3 Collector Road

A road which provides for the collection and distribution of local traffic in an area and which may provide access to abutting development. New Collector roads are not to provide direct frontage access for residential lots, however they may provide

access for multi unit residential development, schools, shopping centres, commercial and industrial development.

3.1.4 Sub Arterial and Arterial Roads

Roads where the primary function is for the movement of traffic from one local area to another. The arterial road provides routes through the Shire, and typically connects with the Highway network. Only larger commercial or industrial developments will be granted direct access to these roads, and the access would typically be via controlled intersections, e.g. traffic signals.

There are many existing instances on the road network where sub arterial and arterial roads have direct residential frontage. In these instances the road function conflicts between the efficient through movement of vehicles and the need to provide safe access to abutting properties. As traffic volumes grow and in response to road safety issues relating to property access, these roads could ultimately be modified with the implementation of a central concrete or double linemarked median to restrict property access to left in/left out only.

When new development occurs adjacent to sub arterial or arterial roads Council will require that the applicant be required to dedicate a strip of land along the road frontage to road reserve to enable the road to be constructed in accordance with the Council standard drawings and Council's long term road planning intent for the road.

Note: While short term (10-15 years) traffic forecasting models may indicate that a road operate as a two lane road, Council may require the applicant dedicate sufficient road reserve for an ultimate four lane road, such that there is always the opportunity to further upgrade the road to four lanes if required in the longer term.

3.2 TRAFFIC IMPACT ASSESSMENT

An applicant will be required to submit a development Traffic Impact Assessment report (TIA) when any of the following occurs;

- Forecast traffic to/from the development exceeds 5% of the two way flow on the adjoining road or intersection, and congestion currently exists or is anticipated within 10 years of the development completion, or is near a sensitive location.
- Development access onto a sub arterial, or arterial road or within 100m of a signalised intersection,
- Residential development greater than 50 lots and/or units,
- Commercial offices greater than 4,000m^2 Gross Floor Area (GFA),
- Retail greater than 1,000m^2 GFA,
- Warehouses greater than 6000m^2 GFA,
- On site carpark greater than 100 spaces.

The TIA is to review the development's impact upon the external road network for the period of 10 years from completion of the development. The TIA is to provide sufficient information for determining the impact and the type and extent of any ameliorative works required to cater for the additional traffic.

The TIA must include a future structural road layout of adjoining properties that will form part of this catchment and road connecting to these properties. The TIA is to assess the ultimate developed catchment's impacts and necessary ameliorative

works, and the works or contribution required by the applicant as identified in the study.

The assessment of impacts upon the road network shall be based upon "environmental capacity/residential amenity" for lower order roads (refer thresholds in development manual for access and collector streets), and in terms of "Level of Service" (LoS) and "Degree of Saturation" (DoS) for the higher order roads. Refer to Austroads Guide to Engineering Practice publications for definitions of DoS and LoS.

The minimum LoS for roads in urban areas shall be 'C' with an intersection DoS of 0.8. The minimum LoS for roads in rural areas shall be 'B' with an intersection DoS of 0.7. A road or intersection is considered to be rural where any of the following apply:

- Rural road cross section with no kerb and channelling
- Speed limit greater than 60km/hr
- A road that is within predominately rural land that will and/or is gradually becoming developed / urbanised.

The TIA must cover issues such as how the development will be serviced by public transport, make allowance for the orderly development of adjacent allotments and cater for internal bicycle and pedestrian movements and access to the external bicycle and pedestrian network.

Note: All lots must be within 500 metres of a collector/possible bus route. The TIA is to determine the optimum location for the bus shelter.

The TIA is to indicate the internal road hierarchy and is to determine maximum traffic volumes on arterial roads within the assessment area.

3.3 CLASSIFICATION OF ROADS

Zone	Road Type	Carriageway (metres)	Catchment (dwellings)	Maximum Traffic Volume (AADT – veh/day)
Residential	Access	6	1-20	
	Access	8	21-75	
	Minor Collector	8	76-150	
	Minor Collector	10	151-300	
	Collector without direct lot Access	10 or 2 x 5.5	301-800	
	Collector with direct lot Access	12 or 2 x 6.0	301-800	
Rural Residential	Access	6	1-75	
	Minor Collector	8	76-300	
	Collector	10	301-800	
Industrial	Access	12	-	2000
	Collector	14	-	8000
Rural	Access	7m seal	1-15	
	Collector	9m seal	16-800	
All Zones	Arterial	As determined by approved	-	>8000
		Traffic Impact Assessment	-	

Note: Where significant medium and/or high density residential and commercial development occurs, road status has to be upgraded accordingly to cater for the increased traffic volumes that will be generated.

Council will require the full road reserve width for the class of road required for the ultimate traffic to be provided.

3.4 ROAD RESERVES AND CARRIAGEWAYS

For roads with kerb and channel a minimum width of carriageway plus 8 metres (i.e. 2 x 4m footpaths) applies to a road reserve width for residential access roads and 10 metres (i.e. 2 x 5m footpaths) for all other roads.

The minimum carriageway width is to be in accordance with the minimum width specified in the Conditions of Development Approval.

In rural areas, the minimum road reserve width is 20 metres and greater widths are required to provide a minimum clear width of 4 metres beyond cut or fill batter lines.

3.5 ROAD GEOMETRIC CROSS SECTION

For footpath-road-footpath geometry for Residential and Rural roads, refer to Council's Standard Drawings for details.

3.6 ROAD RESERVE REALIGNMENTS

Where it is proposed to realign an existing road reserve, preliminary longitudinal road gradings and cross sections for the proposed new route shall be submitted as a proposed plan to enable Council to assess the feasibility of the proposed route.

3.7 ROADWORKS DESIGN

Council has not adopted "Queensland Streets" for subdivision road design. However, the philosophy of promoting subdivisional designs which will provide the optimum combination of safety, amenity, convenience and economy for both residents and road users is a common aim.

It is essential to limit the speed of vehicles in Residential streets to encourage through traffic to utilise the collector/arterial road network. This is to be achieved by providing speed restrictive designs which utilise the street geometry to actively discourage vehicles from driving at more than the design speed.

Queensland Streets Section 2.3 Traffic Speed Tables 2.3.B, S.3.C and S.3.D

Limiting vehicle speed by utilising street geometry is essentially achieved by limiting the length of uncontrolled straight. i.e.:

- Limiting total street length (e.g. short culs-de-sac).
- Limiting length of straight (e.g. introducing bends in the layout).
- Curved alignment (achieved by providing single curves or a series of curves).
- Traffic control devices (in an essentially otherwise straight alignment).

A curvilinear design supplemented with traffic control devices, narrowing etc. is generally the preferred design option and fixed control devices such as traffic islands should be considered as a "last resort".

The "Queensland Streets" publication provides tables which may be used as a

general guide only to the relationship between desirable maximum vehicle speed and curve radii etc. Each situation has various influencing factors which should be addressed by the designer.

3.8 DESIGN SPEED

The design speed on which the geometric design of each road type is to be based shall be:

Residential/Rural Residential:		
	Access	40 kilometres per hour (maximum)
	Minor Collector	50 kilometres per hour (maximum)
	Collector	60 kilometres per hour(desirable)
	Arterial	In accordance with approved Traffic Impact Assessment
Industrial:		
	Access	40 kilometres per hour (maximum)
	Collector	60 kilometres per hour (desirable)
Rural:		
	Access	60 kilometres per hour (maximum)
	Collector	110 kilometres per hour (desirable)
	Arterial	In accordance with approved Traffic Impact Assessment

3.9 GRADES

The absolute maximum permissible longitudinal road grade is not to exceed 20%. The grades listed below are to be considered the maximum for extreme cases, and Consultants shall limit grades and the length of steep grades used in their designs having regard to terrain and road safety.

Grades steeper than "Desirable Maximum" values will only be approved when all other possible alternatives have been fully investigated and proved to be unreasonable. Grades steeper than "Absolute Maximum" values will not be approved.

		Desirable Maximum	Absolute Maximum
Residential and Rural Residential Access		10%	20%
Minor Collector/Collector		8%	10%
Industrial	- Access	8%	10%
	- Collector	5%	6%
Rural	- Access	15%	20%
	- Collector	10%	16.7%
Arterial		6%	8%

QUDM Section 5.10.3 Gully Inlets in Road

Grades in excess of 16.7% shall not be permitted for lengths greater than 100 metres and access to adjoining land from such sections of road will not be permitted.

The desirable minimum grade for all roads based on kerb and channel drainage requirements shall be 0.5% with an absolute minimum allowable grade of 0.4%

(except where earth table drains are proposed a minimum grade in the tabledrain of 1% applies).

Ensure at least minimum grades are achieved around kerb return and throughout the entire length of vertical curves. The tangent point of a vertical curve in the side road shall be located at, or outside of the kerb line or edgeline of the through road.

The sag point on the side road is to be located clear of the kerb return. Where it has been demonstrated that this is not possible drainage should be provided in accordance with QUDM Section 5.10.3 Gully Inlets in Roads [Refer to Clause 5.10.3(d)(ii)].

Vertical Curves

A vertical curve of parabolic form shall be provided at every change of grade where the algebraic change of grade exceeds:

- 1% Access/Minor Collector/Collector
- 0.6% Arterial

Every effort should be made to maximise the length of vertical curves except where minimum grades occur or lengths that would produce unacceptable flat grades.

3.10 VERTICAL ALIGNMENT

AUSTROADS Rural Road Design - Guide to the Geometric Design of Rural Roads

AUSTROADS Urban Road Design – Guide to the Geometric Design of Major Urban Roads

Vertical alignment shall be designed in accordance with the current edition of AUSTROADS Rural Road Design - Guide to the Geometric Design of Rural Road and AUSTROADS Urban Road Design – Guide to the Geometric Design of Major Urban Roads.

3.11 HORIZONTAL ALIGNMENT

AUSTROADS Rural Road Design - Guide to the Geometric Design of Rural Roads.

AUSTROADS Urban Road Design – Guide to the Geometric Design of Major Urban Roads.

Queensland Streets Section 2.3 Traffic Speed Tables 2.3B, 2.3C and 2.3.D

AUSTROADS Rural Road Design - Guide to the Geometric Design of Rural Roads.

Horizontal curve radii shall generally be designed in accordance with the formulae and methods detailed in the AUSTROADS Rural Road Design and AUSTROADS Urban Road Design – Guide to the Geometric Design of Major Urban Roads.

Where it is intended to limit vehicle speed by street geometry and/or a curvilinear alignment within the road reserve refer to the Queensland Streets publication as a general guide to the relationship between desirable maximum vehicle speed and curve radii etc.

Where necessary, central medians are to be provided to prevent vehicles crossing to the incorrect side of the road.

Note: All movement access is provided to the adjoining lot.

Significant changes in speed environment are to be avoided with the designer providing a design with gradual changes in the speed regime.

3.11.1 Superelevation

Superelevation shall be provided on all curves on Rural Roads and Arterial Roads. Superelevation is not desirable in Residential subdivisions. Where curve widening is required, it shall be applied in accordance with AUSTROADS Rural Road Design.

3.11.2 Maximum Superelevation

Maximum superelevation on a curve shall generally be 5%.

3.11.3 Minimum Superelevation

Minimum superelevation shall be 3% except within superelevation transition lengths.

3.12 MINIMUM CURVE RADIUS

AUSTROADS Rural Road Design - Guide to the Geometric Design of Rural Roads

AUSTROADS Urban Road Design – Guide to the Geometric Design of Major Urban Roads.

The minimum curve radius for the selected superelevation and the appropriate design speed determined in accordance with Section 3.7 shall be in accordance with AUSTROADS Rural Road Design and AUSTROADS Urban Road Design – Guide to the Geometric Design of Major Urban Roads.

3.12.1 Residential Access Street

It is impractical to apply ideal standards of curvature to access streets, as the limitations of allotment layout often necessitate 90^{o} bends of very small radius which can be negotiated only at speeds well below the normal design speed.

However, as drivers expect such sharp changes in alignment on access roads, traffic safety need not be prejudiced provided that such curves are readily visible. Deflections of 60^{o} or less however, which are less easily recognisable as a potential hazard to an approaching driver, should have curves of appropriate radii, in accordance with the above.

For a deflection greater than 60^{o} the minimum centreline curve radius shall be 16 metres (which is consistent with a speed of approximately 20 kilometres per hour without superelevation). Curve widening is required in accordance with Queensland Streets.

3.13 INTERSECTIONS

3.13.1 Types of Intersections

All intersections shall be of the three-way or "T" type unless a roundabout (or signalised intersection) is being included in the design.

Intersections and property accesses, with the exception of “Figure 6.41 Warrants for Rural Turn Lanes”, shall be designed in accordance with the current AUSTROADS publication Guide to Traffic Engineering Practice Part 5 - Intersections at Grade. For determining warrants for intersection turn treatments, refer to “Department of Main Roads Report Number ID105 New Warrants for Unsignalised Intersection Turn Treatments, June 2005”.

AUSTROADS Guide to Traffic Engineering Practice Part 5 - Intersections at Grade

Visibility requirements for intersections and property entrances shall be designed in accordance with the current AUSTROADS publication Guide to Traffic Engineering Practice Part 5 – Intersections at Grade. All intersections are to be 90º, + or - 10º.

Concrete splitter island treatments at intersections are to be provided in accordance with Clause 4.6 Splitter Islands and Traffic Islands.

3.13.2 Roundabout Design

The design of roundabouts shall be carried out in accordance with the current AUSTROADS publication (Guide to Traffic Engineering Practice Part 6 - Roundabouts).

AUSTROADS Guide to Traffic Engineering Practice Part 6 - Roundabouts

Consultants are to obtain preliminary approval of the design criteria applicable to each roundabout (e.g. design speed, sight distance, type of vehicle catered for, number of lanes, radius of central island etc), prior to submitting completed design drawings for approval.

Note: Sight distance criteria 1, 2 and 3 is to be achieved for roundabouts at intersections with collector and arterial roads.

Raised splitter islands shall be provided at approaches to all roundabouts.

Where the central island (or part thereof) is landscaped a metered reticulated watering point and sub-soil drainage shall be provided (with appropriate flushing points).

3.13.3 Intersection Surfacing

An asphalt wearing course of minimum thickness of 25mm is to be provided to the turning areas of all intersections.

3.13.4 Location of Intersections

Intersections onto a curve on the through road should be avoided. If unavoidable, the angle between the centreline of the side road, and a tangent to the centreline of the through road at the point of intersection shall be 90^{o}.

An intersection must not be located on the inside of a curve on the through road, unless satisfactory sight distance can be achieved for the relevant speed environment.

The spacing between two intersections measured along the centreline of the through road between the centrelines of the side roads, shall be not less than the following:

(1) Side roads on opposite sides of the through road:
Where the through road is a:

- Access Roads	40 metres
- Minor Collector	75 metres
- Collector Roads up to 8000 VPD	100 metres
- Collector Roads > 8000 VPD	300 metres
- Arterial Roads	300 metres (unless median is unbroken)

(2) Side roads on the same side of the through road:
Where the through road is a:

- Access Roads	75 metres
- Minor Collector	75 metres
- Collector Roads up to 8000 VPD	100 metres
- Collector Roads > 8000 VPD	300 metres
- Arterial Roads	300 metres

The above distances are minimum distances. The applicant may be required to

demonstrate via concept design that appropriate separation of intersections e.g. based upon vehicle speed and present/forecast turning and through traffic volumes, minimum intersection spacing will be dictated by deceleration and queue storage distances.

The minimum length of straight alignment measured along the centreline of the side road from the adjacent kerb line of the through road to the tangent point of a curve on the side road should be:

- Access Roads 10 metres
- Minor Collector 30 metres
- Collector Roads 60 metres
- Arterial Roads 100 metres

3.13.5 Property Accesses

1 Proposed access points to rural allotments from existing or proposed roads are to be indicated on the drawings and where access is proposed from a State Controlled Road, the access point is to be approved by the Queensland Department of main Roads. Proposed access ways are to be located a minimum distance of 6m from the turnout at intersections.

AUSTROADS Intersections at Grade – Guide to Traffic Engineering Practice – Part 5

2 For all access points it is required to demonstrate that:

Visibility equal to the safe intersection sight distance as defined in Section 6 of AUSTROADS Intersections at Grade is available.

3 To minimise conflicts between car park traffic and through traffic, access driveways shall not be located in the prohibited areas indicated on Standard Drawings 01-43 and 44. This does not apply to residential accesses and to access driveways where access to the property would not be possible in any other location.

CSC Standard Drawing No. 01-43 or 44

3.13.6 Kerb Radii

The minimum radius of the invert of the kerb at an intersection shall be:

- Rural Zone – In accordance with CSC Standard Drawing No. 01-18
- Centre and Industry Zones – 15 metres

All other zones:

- Collector to Collector 12 metres
- Collector or Arterial to Arterial 15 metres
- All other intersections 10 metres

CSC Standard Drawing No. 01-18

SECTION 4 - GENERAL

4.1 PAVEMENT CROSSFALLS

Roads shall be designed with a centre crown and the normal crossfall of pavement

and shoulders on straight alignment shall be 3%.

Where steeper or flatter crossfalls than the normal are required, for example on superelevated curves at intersections or turning circles of cul-de-sac, the maximum and minimum permissible pavement crossfalls shall be 5% and 2% respectively.

4.2 PAVEMENT TAPERS

Pavement tapers are to be provided from all new work to existing construction. Tapers shall generally be a minimum of 1 in 10 or such greater length as required by the current edition of AUSTROADS – Intersections At Grade and shall be constructed to the same standard as proposed full road pavements.

4.3 KERB AND CHANNEL

Concrete kerb and channel shall be provided on both sides of road pavements on all urban roads and all rural residential roads. Kerb and channel (or concrete lined table drains) shall be provided on all Rural roads when grades are in excess of 10%. For soils which are easily eroded, kerb and channel (or concrete lining) will be required when the grades of rural roads are greater than 7%.

Consideration may be given to using Kerb and Channel through deep cuttings as detailed on CSC Standard Drawing No. 01-63.

Unless otherwise specified the type of kerb and channel used shall be as specified below and shall comply with IPWEAQ Standard Drawing No. R-0080.

CSC Standard Drawing No. 01-63

Industrial and Commercial areas and Park frontages	Barrier kerb (B1 300)
Traffic islands	Barrier (B5) Modified to key in 125mm below pavement surface
All other locations	Mountable kerb (M3)

IPWEAQ Standard Drawing No. R-0080

Consultants wishing to use alternative kerb profiles in special circumstances are to obtain prior approval from the Manager, Engineering Planning Unit.

The desirable minimum grade for kerb and channel shall be 0.5%, and the absolute minimum 0.4%.

Note: Pavement of minimum depth of 100mm is to extend a minimum of 150mm behind kerb and channel.

4.4 SUBSOIL DRAINS

Subsoil drains shall be provided beneath all kerb and channel. On roads with no kerb and channel, subsoil drainage will be required where poor subgrade drainage exists, and at locations directed by the Council Inspector.

Subsoil drains are to be provided in accordance with CSC Standard Drawing No. 01-65.

CSC Standard Drawing No. 01-65

Sub-soil drainage shall be provided in all medians/traffic islands etc. where surface treatment other than concrete has been provided. The drainage shall be connected to an underground drainage system with adequate maintenance provision/flush out points. Marker posts are to be located at all flush out points.

4.5 CUL-DE-SAC

No more than 20 lots may be accessed via a cul-de-sac.

A turning circle shall be provided at the end of all cul-de-sac unless T-head (or 3 point turn type) cul-de-sac have specifically been approved. The minimum radius measured to the invert of the kerb and channel shall be:

(i) A Residential or Rural Residential Subdivision - 9 metre radius

(ii) Where prior approval has been obtained alternative 3 point turn type cul-de-sac may be adopted. Design of this type of cul-de-sac shall generally be in accordance with Section 2.12 Turning Areas of Queensland Streets with due allowance to be made for the CSC pavement widths. Allowance shall also be made to accommodate the turning of a 12.5m long garbage truck. A garbage bin collection area and two parking bays shall also be provided at these locations

Queensland Streets Section 2.12 Turning Areas

Section 2.9.5 Detailed Plan of Intersections

(iii) Industrial - 12.5 metre radius

The footpath width shall be not less than 5 metres or 4 metres for residential access roads at any point in the turning circle, or in the approach to the turning circle.

Note: Refer also to Section 2.9.5 for details required for plan of intersection / cul-de-sac.

An Asphalt wearing course of minimum thickness 25mm is to be provided at all cul-de-sacs and intersections.

4.6 SPLITTER AND TRAFFIC ISLANDS

A minimum eight (8.0) metre long by 1.2m wide concrete splitter island is to be constructed at the terminating leg of intersections in the following circumstances:

- Access Roads with carriageway widths of 8m or greater intersecting with any road,
- Collector road intersecting with a collector road,
- Minor collector road intersecting with a Collector road,
- Minor collector road or collector road intersecting with a sub arterial or arterial road.

Council may in certain instances require for the concrete splitter island to be widened to 2.0 or 2.5m such that the island can also act as a pedestrian refuge.

Standard Drawing 01-69

The above requirements of a concrete splitter island may be superseded in instances where a Traffic Impact Assessment Report concludes that the intersection be upgraded to traffic signals, roundabout, or other intersection treatment.

Section 4.16 Proposed Tree Planting/ Landscaping

The applicant will be required to demonstrate that a 19.0m long semi trailer is able to undertake all turning movements at the intersection.

Raised kerb islands less than $12m^2$ in area or 2 metres wide between kerb faces shall be constructed with in accordance with Standard Drawing 01-69. Council will accept low profile fully mountable traffic islands.

Note: If coloured/patterned concrete is proposed as an infill material on trafficable areas, then colouring is to extend for the full depth of the concrete.

If landscaping/plantings are proposed within medians/central islands then an appropriate landscaping plan is to be submitted for written approval. The Consultant

is to ensure that sight distance is not compromised by proposed landscaping/plantings etc. Refer also to 4.16 Proposed Tree Planting/Landscaping

Sub-soil drainage shall be provided in all medians where surface treatment other than concrete has been provided. The drainage shall be connected to an underground drainage system with adequate maintenance provision. Reticulated watering points are to be provided to all landscaped medians. The number of connections to the water main at each intersection is to be minimised and a water meter is to be provided at each connection point.

4.7 LINEMARKING / SIGNAGE

Unless otherwise specified all signage and linemarking (including short term) is to be provided in accordance with the current edition of "Manual of Uniform Traffic Control Devices. - Main Roads Department, Queensland".

Manual of Uniform Traffic Control Devices – Main Roads Department, Queensland

Linemarking of the road centreline and parking lanes/edgelines is to be provided in accordance with CSC Standard Drawing 01-41. Parking lanes/road edge lines are to be provided at the following offsets from the centre line of the road:

CSC Standard Drawing No. 01-41

- 3.0 metres offset for a 10.0 metre road or a 5.5 metre divided road
- 3.5 metres offset for a 12.0 metre road or a 6.0 metre divided road
- 3.7 metres offset for a 13.0 metre or greater road

Section 2.9.8 Traffic Control Plan (Pavement Markings & Traffic Signs

Centre lines are required on all collector roads. On sealed rural roads edge lines are to be provided at a 3m or 3.5m offset from the centreline.

The approach to each traffic management device (including kerb blisters, and each nose of traffic islands) shall be painted (reflectorised) white with suitable paint and with glass beads incorporated on the surface.

Manual of Uniform Traffic Control Devices – Main Roads Department, Queensland

Raised pavement markers shall be used to augment line marking on the road surface in accordance with the Manual of Uniform Traffic Control Devices.

4.8 DIVIDED ROADS

Consultants proposing divided roads are to obtain the approval from Council's Engineering Planning Unit prior to submitting Operational Works Plans. The proposal is to include proposed pavement widths.

4.9 PATHWAY – BICYCLE & PEDESTRIAN

Provision shall be made for bicycle and/or pedestrian pathways where required by Council's Planning Scheme, Conditions of Development Approval or Council's Bicycle and Pedestrian Strategy.

CSC Standard Drawing No. 01-64, 01-74, 01-15

Construction of pathway is to be in accordance with CSC Standard Drawings 01-64, 01-74 and 01-15.

Due consideration, where appropriate, should also be given to the design and construction standards detailed in AUSTROADS – Parts 13-14. Refer to IPWEQ Standard Drawings P-0010 and P-0013.

Queensland Street AUSTROADS – Part 13 & 14 IPWEAQ Standard Drawings P-0010, P-0013

For Residential Developments unless otherwise specified in the conditions of Development Approval, pathways shall be constructed in reinforced concrete or other approved material as follows:

- Where the development has frontage to one or both sides of a minor collector road, then along one frontage only. (Width 1.5m) (Not required for the Rural Residential Zone unless specified within the ShirePlan Schedule 1 Bicycle and Pedestrian Network Strategy).
- Where the subdivision has frontage to one or both sides of a collector road, then along each frontage. (Width 2.5m) (Not required for the Rural Residential Zone unless specified within the ShirePlan Schedule 1 Bicycle and Pedestrian Network Strategy).
- Where the subdivision has frontage to one or both sides of an arterial road, then along each frontage. (Width 2.5m)
- Within all pedestrian laneways (Width 1.5m). The footway is to commence at the rear of the kerb and is to be accessed via a kerb ramp. Bollards are to be provided near the ends of all pathways to restrict vehicle access.

For Commercial Developments

- A full width pathway along frontage

For Industrial Developments

- A 1.5m wide pathway along one frontage of industrial access roads
- A 2.5m wide pathway along both frontages of industrial collector and arterial roads.

For all developments, the applicant may be required to demonstrate how pedestrians and cyclists from the development will access the external bicycle/pedestrian network.

4.9.1 Kerb Ramps

Kerb ramps in accordance with CSC Standard Drawing No. 01-15 are to be provided in all developments, other than in the rural zone, at all intersections and at the end of all pathways i.e. between lots, park access etc. At intersections, the ramps are to be located in accordance with AS1428 Design for Access and Mobility to align with existing or future pathways. Tactile indicators are to installed in accordance with AS1428.4.

CSC Standard Drawing No. 01-15

AS1428 Design for Access and Mobility

4.9.2 Grassing

Minimum fifty (50) millimetres compacted thickness of approved topsoil shall be placed over the balance areas of all footpaths and pathways. These areas are then to be grassed and are to be properly established and maintained during the maintenance period.

4.9.3 Location of Services on Footpaths

The standard allocation in the footpath cross section for the various services and utilities is shown on CSC Standard Drawings No. 01-64 and 01-74. Deviation from these alignments will not be permitted.

CSC Standard Drawings No. 01-64 & 01-74

4.9.4 Design Requirements for Persons with Disabilities

The design of pathways shall comply with the requirements of the current Australian Standard AS1428 Design for Access and Mobility where practical.

AS1428 Design for Access and Mobility

4.10 EARTHWORKS

(Refer also Section 5 - Pavement Design and Construction)

Unless otherwise specified, earthworks on allotments shall be carried out in accordance with Australian Standards AS3798 - Guidelines on Earthworks for Commercial and Residential Developments).

Supervision, inspection and testing is to be carried out in accordance with Section 8 and Appendix B of AS 3798. For all structural fill the scope of services to be provided by the geotechnical testing authority is to be in accordance with Level 1 or Level 2 as detailed in Appendix B. Level 3 supervision is not permitted for structural fill, but is acceptable for non-structural fill.

For all structural fill, a certificate is to be provided to Council prior to the works being accepted "on maintenance" to confirm that the works comply with the requirements of the specification and drawings. This certificate is to be provided by the GTA in the case of Level 1, and by the Consultant in the case of Level 2.

All structural fill is to be compacted to the minimum dry density specified in Table 5.1 of AS 3798, or greater density if deemed appropriate by the Consultant. Non-structural fill may be compacted to a density commensurate with its use. The proposed density is to be submitted to Council with the engineering design for approval.

The minimum frequency of field density tests shall be as specified in Section 8 of AS3798 or, in the case of residential lots, as specified below, whichever requires the most tests:

Section 5 Pavement Design and Construction

Where lots have been filled to a depth greater than 300mm but less than 500mm at least one (1) density test is to be provided for each proposed allotment.

AS3798 – Guidelines on Earthworks for Commercial and Residential Developments

Where lots have been filled to a depth greater than 500mm one (1) density test for every 500mm depth of fill or part thereof.

Note: If springs or seeps are encountered, underdrains and/or side drains shall be constructed. The Consultant shall design appropriate drainage and submit these to Council prior to the works being accepted "on maintenance".

Filling of land/earthworks below the calculated Q100 Flood Contour will not be permitted unless specifically approved by Council

Note: All lots are to be graded to ensure they are self-draining at a minimum grade of 1 in 150 in the Rural Residential zones, and 1:100 in all residential zones. This criterion is to be certified by a Surveyor.

- Subsoil drains are to be provided along the toe of all retaining walls.
- It is the Consultant's responsibility to ensure that works do not adversely affect the drainage of any adjoining properties, and that all existing properties adjacent to the subdivision remain self-draining both during construction of and on completion of the development works. A detailed survey of drainage patterns on adjoining lots may be required, and in any case is recommended to aid in the settlement of potential disputes with adjoining landowners.
- Consultants are to ensure that filling adjacent to existing allotments is minimised and does not result in the loss of amenity of the residents of the existing allotments. Wherever possible the level of the frontage road to the new allotment(s) is to be lowered to minimise this depth of fill. When a new allotment adjoins an existing allotment the maximum depth of fill anywhere on the new allotment is not to exceed 0.3m. Consultants are to note that retaining walls are

to comply with Section 4.12 and that an inter allotment drainage scheme is to be provided in accordance with Section 8.15 whenever the allotment does not totally slope toward the frontage road. Any proposed retaining wall greater than 0.3m in height adjacent to an existing property will require a letter of support from the adjoining property owner.

- "As Constructed" details showing the extent and finished levels of the filling works are to be submitted for Council's records.
- Any uncompacted fill, vegetation or other unsuitable material on the site shall be removed prior to additional fill being placed. This includes topsoil, tree roots, peat, decomposing material, saturated material, etc. In this regard, the GTA is to inspect and approve existing ground conditions prior to additional fill being placed.
- Following completion of the filling works, compaction tests across the entire site are to be submitted to Council prior to acceptance on maintenance. An appropriate notation shall be placed on Council's rates records to advise prospective purchasers that the site has been filled and that special foundation requirements may apply.
- Compaction of earthworks within road reserves are to be in accordance with Table 5.5A.

4.11 PARKLAND

Clearing/earthworks within areas of proposed parkland is not to be undertaken without written approval of Council. Approval to clear is dependant upon the intended use/purpose of the parkland and is subject to an inspection of the proposed parkland.

The applicant is required to construct bollards or a barrier fence in treated timber or equivalent material along the road frontage of all parkland to restrict public vehicle access. A gate type structure is to be provided to allow access for a tractor mounted slasher. Refer to IPWEAQ standard drawing G-0043.

IPWEAQ Standard Drawing No. G-0043

Selective clearing should generally be undertaken for a minimum distance of 4 metres from all property boundaries within parkland to allow access for a tractor mounted slasher.

AS4678 – Earth Retaining Structures

Materials/construction equipment is not to be stored on dedicated/proposed parkland whether short or long term.

Drainage through all parkland is to comply with Council's Planning Scheme.

4.12 RETAINING WALLS

Retaining walls will only be approved following submission of a full detailed design and the design certified by a RPEQ that the design complies with AS4678 – Earth Retaining Structures.

The following items should be noted when submitting plans containing retaining walls:

- compliance with the current edition of AS4678.
- retaining walls are to be fully contained within property boundaries - agricultural drains are to be provided behind all retaining walls at the base and connected to an approved point of discharge. .

- free draining gravel/filter material is to be provided behind all retaining walls.
- a concrete mowing edge strip (minimum width 200mm) is to be provided along the toe of all retaining walls.
- where it is proposed to construct retaining walls, adequate provision is to be made for all services e.g. interallotment/roof-water drainage, water conduits, telecommunication, power and gas conduits, etc.
- construction of retaining walls in concrete or masonry is preferred. Where other materials are used the consulting engineer is to certify that a 50 year minimum life will be achieved.
- timber retaining walls are not acceptable and will not be approved.

Note: Retaining Walls over 1m in height also require building approval or certification.

4.13 CONSTRUCTION EQUIPMENT/HOURS OF OPERATION

Construction work involving the use of motorised construction equipment must not be conducted:

Environmental Protection Regulation 1998
Workplace Health & Safety Act

- Before 0630 or after 1830 from Monday to Saturday; and
- On Sundays or Public Holidays.

4.14 APPROVAL FROM OTHER PARTIES

1 Construction work within declared roads requires approval by the Queensland Department of Main Roads (DMR).

2 All Contractors are to comply with all relevant Government regulations, especially those contained in the current edition of the Workplace Health and Safety Act.

Section 8.4

3 Where appropriate, approval shall be obtained from other relevant Government Departments.

4 Evidence that a legal point of discharge for stormwater has been obtained. Refer Section 8.4 – Legal point of Discharge

4.15 REMOVAL OF EXISTING VEGETATION

Where the existing vegetation is removed from allotments, the ground is to be cleared, grubbed, levelled and re-grassed to the satisfaction of Council.

Cleared vegetation is to be chipped and used for mulch, harvested for other commercial products or disposed of at an approved green waste facility.

Where existing vegetation is removed from the site appropriate methods are to be employed to minimise dust nuisance to the satisfaction of Council. In extreme conditions all vehicular traffic, including construction equipment, may have to be prohibited from all or part of the area until Council can be assured that the dust nuisance is controlled. Vegetation clearing should be staged where possible to assist in dust control.

On existing road reserves, no clearing of trees is to be undertaken without prior written approval from the Queensland Department of Natural Resources and Mines.

The land is to be checked and consideration given to any wildlife occupying that area with this wildlife being removed in an appropriate manner in accordance with the requirements of the Queensland Parks and Wildlife Service before any clearing or development takes place.

Where applicable, the preservation of remnant vegetation and wildlife corridors through the development is highly desirable to protect the sites natural environmental values.

Note: The consultant is to check the conditions of Development Approval prior to commencing clearing vegetation for any restriction regarding protected vegetation. The Department of Natural Resources and Mines should also be contacted to determine if any approvals are required.

4.16 PROPOSED TREE PLANTING / LANDSCAPING

When landscaping works are planned within the road reserve (e.g. planting within traffic islands and/or on footpaths) a detailed Landscaping Plan is to be submitted to Council for written approval. Reference is to be made to Council's ShirePlan when preparing Landscaping plans.

Where tree planting is proposed within road reserves the applicant is to submit to Council a schedule of the trees and location at which they are proposed to be planted for approval. All plantings are to be in accordance with the Standard Footpath

Section 2.9.13 Plans of Existing Vegetation and Landscape Plans

Allocation Guidelines for Trees as indicated on CSC Standard Drawing 01-64 and 01-74.

CSC Standard Drawing No. 01-64 & 01-74

Note: In conjunction with "on maintenance" and "off maintenance" inspections the Consultant is to provide a copy of written approval for plantings. Failure to demonstrate that approval has been given for the plantings will automatically preclude the works being accepted on or off maintenance.

4.17 WATER QUALITY / EROSION CONTROL

It is the Consultant's responsibility to ensure that adequate measures are taken to prevent erosion and sedimentation, and the degradation of surface and groundwater which may result from development, both during and after construction.

The Consultant is required to:

- Incorporate both permanent and temporary water quality controls into the design. A sediment and erosion control plan is to be submitted with the engineering drawings.

Section 2.9.14 Water Quality/Erosion Control Plans

- Program works to minimise the potential for erosion. Areas exposed to erosion at any one time shall be minimised and disturbed areas shall be stabilised before moving to fresh areas.

Soil Erosion & Sediment Control – The Institute of Engineers, Aust QLD Division

- Ensure all water quality/erosion control devices are properly maintained and functional at all times.

The design of erosion and sediment control structures shall generally be in accordance with the Institution of Engineers, Australia Publication – Soil Erosion and Sediment Control.

4.18 SERVICES TO REAR LOTS

CSC Standard Drawing No. 01-43

The services to "battle axe" allotments (e.g. water reticulation, electricity, telecommunications and roofwater drainage) are to be extended from the road along the access handle to the building area within the allotment prior to construction of the concrete driveway.

Within all access handles a driveway of minimum width 3.0 metres is to be constructed in concrete or an equivalent material approved by the Council. Refer to CSC Standard Drawing No. 01-43. Driveway construction is to extend to the back of kerb and is to be completed prior to the "on maintenance" inspection.

4.19 GUIDE POSTS

Road edge guide posts shall be provided at all locations where kerb and channel is not constructed (e.g. half road construction, tapers, ends of roads etc). Refer to QDMR Drawings No. 1356 and 1357.

QDMR Drawings No. 1356 and 1357

4.20 TRUNCATIONS

A truncation of the real property boundary shall be provided at each deflection, curve, intersection, etc such that verge widths can be maintained at not less than 5 metres (or 4 metres for residential access roads) at any point.

Section 3.12.18 Kerb Rad II

Truncations of the real property boundary at all intersections shall be a minimum of 3 chords to suit the kerb radius detailed in Section 3.12.8.

4.21 CONDUITS BENEATH ROAD PAVEMENTS

Water service conduits are to be constructed in accordance with IPWEAQ Standard Drawing No. R-0160. Conduits for other services are to be constructed in accordance with the requirements of the relevant authorities.

When conduits are placed under roadways for services, then at all locations where the conduits cross the kerb and channel, a metal plaque is to be placed in the kerb indicating the utility contained within the conduit, e.g. Water - "W", Electricity - "E", Telecommunication - "T", Gas - "G".

IPWEAQ Standard Drawing No. R-0160

All conduit crossings of existing road pavements are to be bored beneath the road pavement. Trenching will not be permitted.

4.22 PARKING DESIGN

The design of off and on street parking facilities should be carried out in accordance with Australian Standard AS 2890 Series.

AS2890 Series

SECTION 5 - PAVEMENT DESIGN AND CONSTRUCTION

5.1 PAVEMENT DESIGN

Following approval of Operational Works drawings by Caboolture Shire Council, the

APRG Report No 21 – Guide to the Design of New Pavements for Light Traffic

Consultant is to arrange for soil testing by N.A.T.A registered laboratory and submit a proposed pavement design including the soil test results to Council for approval.

Soil testing shall be undertaken in accordance with the current Standard Test Methods as detailed in the Main Roads Materials Testing Manual.

All pavements shall be designed as flexible pavements unless prior approval is obtained from Council's Engineering Planning Unit.

Appropriate pavement loadings in terms of Equivalent Standard Axles (ESA's) are provided in Appendix A for the various road categories used for Caboolture Shire.

Total pavement thickness shall be based on the appropriate design. These charts are based on APRG Report No 21 – Guide to the Design of New Pavements for Light Traffic for ESA's up to 1 x 10^5 and the Austroads Pavement Design guide for ESA's above 5 x 10^5.

The charts based on a 95% confidence level are to be used for pavements adjacent to kerbing or kerb and channel, except where isolated sections of kerb and channel are provided along Rural Roads to minimise earthworks in cuttings. The chart based on 90% confidence level is to be used for other pavements.

The charts incorporate a 25mm allowance for construction tolerance.

Where subgrade CBR's less than 3 are achieved then additional pavement thickness is to be provided in accordance with section 5.1.4 of this manual.

Pavement Design is to be based on the 4 day laboratory soaked CBR of the subgrade material. Samples are to be compacted to 100% Standard Compaction prior to testing.

Approval of pavement designs is based on the tests being representative of the subgrade over the various lengths of road at the box depth. This is subject to confirmation by a visual inspection and load testing in accordance with the following sections.

AUSTROADS Pavement Design Guide

Section 5.1.4. Pavements with Subgrade CBR<3.0

5.1.1 Subgrade Testing

For the determination of pavement depth, CBR testing shall be carried out at maximum intervals of 100m, or at closer intervals where there are significant variations in the subgrade materials. For short roads, a minimum of two tests will be required.

The subgrade is to be tested at the presumed design level of the future road subgrade, and testing is to be sufficient to ensure that soft layers up to a depth of 600mm below proposed subgrade level are detected and adequately covered using the pavement design procedures.

Soil type boundaries are to be defined by a Geotechnical Testing Authority (GTA) and a copy of their report is to be submitted with the proposed pavement design.

Design CBR's are to be reported as follows:

CBR Range	**Value Reported to Nearest**
< 5	0.5
5 - 20	1
> 20	5

5.1.2 Submission of Pavement Design

The proposed pavement design, together with CBR test results, location of soil type boundaries etc, shall be submitted to Council's Engineering Planning Unit for approval prior to placement of pavement material.

Soil type boundaries are to be defined by a Geotechnical Testing Authority (GTA) and a copy of their report is to be submitted with the proposed pavement design.

The Consultant will be advised in writing of the acceptance or otherwise of pavement designs and material tests.

Council Officers will not undertake any pavement inspections until the pavement design has been approved in writing.

5.1.3 Design Life and Minimum Pavement Thickness

A minimum design life of 20 years shall be used unless otherwise specifically approved by the Manager Engineering Planning.

The minimum total pavement thickness for all roads shall be 200 mm except as detailed below

Industrial Collector	250mm (minimum)
Arterial	250mm (minimum)

The total thickness of the pavement may include the pavement surfacing in situations where the surfacing is considered to contribute to the overall strength of the pavement (e.g. asphalt concrete seal ≥ 25 mm). However, the thickness of a thin bituminous seal (e.g. two coat seal or AC < 25mm thick) will not be included in the total pavement depth.

The minimum design thickness of any gravel pavement layer shall be 100mm, and asphaltic concrete layer shall be 25mm.

5.1.4 Pavements with Subgrade CBR < 3

No charts have been provided for subgrade CBR's less than 3. If the design CBR determined for the subgrade is less than 3 then the pavement thickness adopted is the required pavement thickness for CBR 3 plus an additional minimum thickness as follows:

Design CBR	**Additional Thickness**
< 1	250mm
1.5	200mm
2	150mm
2.5	100mm

After applying this selected subgrade (or subgrade replacement) layer, the design is to be based on a design subgrade CBR of 3.

Alternatives to the above method of subgrade replacement may be considered. These alternatives could include but not be limited to subgrade stabilisation and the use of geofabrics. If alternatives are proposed, the Consultant shall submit full details of the design and relevant documentation to Council for checking and approval. The approval of alternatives will be at the discretion of the Manager Engineering Planning.

5.2 INSPECTIONS

Council Officers will carry out the set inspections detailed below unless otherwise specified. These inspections must also be attended by the Consultant and the Contractor.

Prior to Council Officers attending on site the Consultant is to have inspected the works and must be satisfied that the works are at a stage ready for inspection. In this regard a check list and certification must be completed by the consultant prior to all relevant inspections (refer Appendix C for subgrade inspection and Appendix D for preseal inspection).

If the relevant paperwork is not supplied or the Consultant is not present then the inspection will not proceed.

Council Officers will not deal directly with Contractors.

The Consultant is expected to undertake all other inspections on drainage, roadworks, earthworks, sewerage, water supply, and associated works necessary to ensure that the finished product conforms to Council standards and is "fit for its intended purpose". Appendix C Appendix D

A reinspection fee may be charged when the inspected works are not considered to be at the appropriate standard and a further inspection is required by Council officers.

The minimum notice required for any inspection by Council Officers is as follows:

- Subgrade Inspection 48 hours
- Preseal Inspection 48 hours
- On-Maintenance Inspection 5 working days
- Off-Maintenance Inspection 5 working days

These lead times will be reduced by Council staff wherever possible.

The Contractor is to provide all tapes, stringlines, personnel, plant/machinery, and any other items of equipment necessary for the relevant inspections.

5.2.1 Group Titles

Council Officers will not normally carry out inspections of construction works for the internal roads and accessways. The Consultant or his representative is required to undertake the inspections as necessary to ensure that the finished product conforms to standards and is "fit for its intended use". The Consultant will be required to certify the construction of all works.

5.3 SUBGRADE INSPECTIONS

The Consultant should verify on site that the subgrade tests are representative of that on which the pavement approval is based prior to requesting a subgrade inspection by Council Officers.

Appendix C

The subgrade inspection by the Council Officer will include a visual and load test.

Checklist and certification are to be completed by the consultant prior to the inspection by Council.

5.3.1 Visual Test

Note: Consultant to bring details of soil tests and pavement design to inspection.

1. To confirm that the pavement excavation depth and width is in accordance with the approved depth and geometric design.
2. To ensure that the base of the box is even with specified crown and crossfall.
3. To check that the sub-grade material is consistent in type and colour with the tested material on which the design was based.
4. To ensure that the subgrade is free from wet spots or any other visually defective areas e.g. tree stumps and other organic/inorganic matter.

5.3.2 Load Test

Proof loading will be required to check for any area of the subgrade which might show signs of deflection.

If deflections are detected in the subgrade indicating a weakness in the sub strata the Consultant must direct the appropriate remedial works.

For the Load Test a full water cart, pipe-laden truck or other acceptable rolling road press (graders and rollers are not acceptable) is to be driven along the subgrade at a speed equivalent to a slow walk i.e. about 2 kilometres per hour. The minimum weight on the rear axle shall be 8 tonne.

The subgrade materials are to be as near as practicable to the optimum moisture content.

5.3.3 Subgrade Compaction Testing

Field density is to be carried out at the frequency nominated in Section 5.6.1. All test results are to be available at the inspection. Advice of remedial treatment must be included with any failed test results.

Section 5.6.1 Testing Frequency

The minimum acceptable density is 100% Standard Relative Dry Density.

5.3.4 Remedial Treatments

Subgrades that are deemed to have failed any of the above tests will require another inspection by Council after the satisfactory completion of any remedial treatment.

A reinspection fee will be charged where an inspection has failed and another inspection is required by Council officers.

The Consultant shall provide details of the remedial treatment, and confirmation of its success, with all other pavement test results prior to the reinspection.

Remedial treatments may include but are not limited to the following:-

1. Additional excavation to reach a sound subgrade stratum.
2. Placement of free draining crushed rock below design subgrade level to provide a working platform (e.g. spalls, 100mm clean rock; with geofabric).

5.3.5 Deep Box (Design Subgrade CBR < 3)

Where the design subgrade CBR < 3 the following procedure is to be adopted with

respect to pavement inspections.

1. Council Officer to undertake an inspection of the deep box to ensure that the minimum depth has been achieved. A load test is not required to be undertaken at this stage.
2. Council officers to attend a load test following the placement and compaction of the subgrade replacement material at a level equivalent to design subgrade CBR = 3.

   Where an alternative to subgrade replacement has been approved in accordance with 5.1.4, a load test is to be carried out at a level equivalent to design subgrade CBR = 3.
3. Subgrade compaction tests for pavements with a deep box may be taken on the subgrade replacement material.
4. Next inspection required to be attended by the Council Officer is the pre-seal inspection.

5.4 PRESEAL INSPECTIONS

The preseal inspection is required to ensure that the pavement material has been placed and compacted in accordance with the pavement design, that sufficient depth has been allowed for the placement of the required seal thickness, and to check the profile is such to enable the correct crossfall to be achieved.

Appendix D

Checklist, Design of Pavement Surfacing and certification are to be completed by the consultant prior to the inspection by Council officers.

5.4.1 Pavement Compliance Testing

It is a requirement that the Consulting Engineer arrange for the appropriate compliance testing of the compacted pavement material.

Compaction and pavement material property test results shall be provided prior to the inspection. Advice of the remedial treatment directed by the Consultant must be included with any failed test results for any pavement layers or pavement materials.

5.4.2 Visual Test

Visual Test to ensure that:

(a) The pavement surface is even and complies with the design crossfall.

(b) The base course has been trimmed to the correct level to allow for the placement of the specified thickness of surfacing.

(c) The surface is to be clean, coarse, and tight with a stone matrix. The surface should be drag broomed beforehand so that the true surface is visible. The surface should not be excessively wet.

(d) Any kerb and channel which has been damaged during construction (including kerb which contains excessive visual defects, scraping etc) is to be replaced/repaired prior to the pre-seal inspection.

(e) Where new work joins to an existing sealed pavement, a saw cut edge 150 - 300mm into the existing pavement is to be provided to enable a smooth join to be made. Where the sequence of construction dictates otherwise and the edge is liable to be damaged prior to the placement of the AC, this may be done

immediately prior to the AC being placed

5.4.3 Load Test

Proof loading will be required to check for any areas of the pavement which might show signs of deflection and uses the same procedure as for subgrade inspections.

Deflections detected in this test may indicate a weakness in the underlying pavement materials or a weak sub base and the Consultant must direct the appropriate remedial works.

5.4.4 Remedial Works

Pavement that are deemed to have failed any of the above tests

will require remedial treatments. These may include but are not limited to the following:

- excavate wet or unsuitable pavement (and subgrade) and replace with suitable material.
- tyne up and recompact materials.
- adjust moisture content.

Main Roads Standard Specification Roads Third Edition 1999

Pavements that are deemed to have failed any of the above tests will require another inspection by Council after the satisfactory completion of any remedial treatment.

A reinspection fee will be charged where an inspection has failed and another inspection is required by Council.

The Consultant shall provide details of remedial treatment, and confirmation of its success, with all other pavement test results prior to the On Maintenance inspection.

5.5 PAVEMENT MATERIALS

Pavement materials shall conform to Main Roads Standards Specification MRS 11.05 - Unbound Pavements for Type 2 Materials. All materials testing shall be undertaken in accordance with the standard test methods as detailed in the Main Roads Materials Testing Manual.

AS1289 Methods of Testing Soils for Engineering Purposes

Section 5.1.1 Subgrade Testing

5.5.1 Testing Frequency

Compaction - Compaction tests are required on subgrade, subgrade replacement, sub-base and base layers at a frequency of one (1) test per 100 metres. For short roads a minimum of one (1) test is required. Caboolture Shire compaction standards are detailed on Standard Drawing 01-83.

Degree of Saturation - DoS testing of the base layer shall be undertaken at a frequency of one (1) test per 100 metres.

The following properties are to be tested

Course Component
- Ten Percent Fines Value (wet)
- Wet / Dry Strength Variation
- Degradation Factor
- Flakiness Index

Note: Test results provided by the Quarry on the source material will be accepted provided the testing is carried out by a NATA Registered Laboratory. One series of test results is to be provided for each different material source per job or per Stage of Development.

Fines Component
- Liquid Limit
- Plasticity Index
- Weighed Plastic Index

Note: Samples for Fines Component testing shall be taken from material delivered to site for subgrade replacement, sub base and base layers at a minimum frequency of one test per 400 cubic metres.

Grading
- Particle Size Distribution
- Ratio of 0.075 material to 0.425 material

Note: Sample for Grading testing shall be taken from the compacted pavement for all subgrade replacement, sub base and base layers at a minimum frequency of one test per 400 cubic metres.

5.6 SURFACING OF ROAD PAVEMENTS

Pavement surfacing is to be provided as detailed below.

Unless otherwise approved in writing the wearing surface shall be:

Primer coat plus 2 coat sprayed bitumen seal (16mm/10mm)	All rural roads that are **not** trafficable immediately.
Primerseal (10mm) plus 2 coat sprayed bitumen seal (16mm/10mm)	All rural roads that are trafficable immediately
Primerseal (10mm) plus 25mm thick asphaltic concrete	Residential and rural residential access roads
Primerseal (10mm) plus 40mm thick asphaltic concrete	All other roads unless specified otherwise

The Consultant shall supervise the laying of all pavement surfaces and is to ensure that all surfacing is undertaken in accordance with good engineering practice and the relevant specification.

5.6.1 Primerseals and Primes

A primerseal is to be placed under all asphalt surface courses; as well as under all sprayed seal courses that will be trafficable immediately after surfacing.

Austroads Practitioners Guide to Design of Sprayed Seals.

Primerseals are to consist of a cutback bitumen of grade AMC4 (or equivalent) covered by 10mm aggregate or alternatively to consist of a bitumen emulsion covered by 10mm aggregate.

DMR Specification: Cutback Bitumen MRS11.20

A prime coat is to be placed under all sprayed seal courses that will **not** be trafficable immediately after surfacing.

DMR Specification: Bituminous Emulsion MRS11.21

Primed pavements are to consist of a cutback bitumen of grade AMC00 (or equivalent) or alternatively to consist of a bitumen emulsion.

Proposed application rates for primerseals and primes are to be submitted to Council for approval prior to the preseal inspection.

DMR Specification: Sprayed Bituminous Surfacing MRS11.11

The minimum timing between a primerseal or prime coat and the next seal coat (i.e. AC or sprayed seal surface) are as follows:

- A primerseal or prime coated pavement consisting of cutback bitumen shall cure for a minimum of 14 days before applying the next seal coat.
- A primerseal or prime coated pavement consisting of bitumen emulsion shall cure for a minimum of 4 days before applying the next seal coat.

DMR Specification: Sprayed Bituminous Emulsion Surfacing MRS11.12

5.6.2 Asphaltic concrete

Unless otherwise directed all AC work on access and collector roads shall comply with the Brisbane City Council Department of Works Specifications for Type 2 Mix.

Brisbane City Council Specifications: 5310 & 5320.

AC work on arterial roads shall be in accordance with DMR Specification for DG10 mix.

DMR Specification MRS11.30

5.6.3 Laying of Asphalt

(Refer Appendix E)

The Consultant shall be present to inspect the laying of the AC and is to ensure that the asphalt is delivered and placed in accordance with Standard Specifications detailed in 5.6.2 and good engineering practice.

In particular the consultant shall certify that:

- The surface was satisfactorily prepared and suitable for the laying of AC.
- The surface on which the asphalt was placed was dry and free of any surface water. The asphalt was not placed in the rain or when rain was imminent.
- All existing asphalt pavements were cut back 150 -300mm to provide a clean, straight, vertical surface at the joint line against which the new asphalt was placed.
- The temperature of the mix immediately prior to spreading was as detailed in the Specification.
- The temperature of the asphalt at the time of commencement of rolling was as

detailed in the Specification.

- The rolling technique employed (including the pattern and number of passes) to achieve compaction of the asphalt was in accordance with good engineering practice.
- The finished surface of the asphalt layer has a uniform appearance and does not contain any cracked, bony or fatty sections.
- Longitudinal asphalt joints (cold) are prohibited from the vehicle wheel paths.

5.6.4 Sprayed Seals

(Refer Appendix F)

Sprayed bitumen seals shall consist of a double application of bitumen and a double application of aggregate on a primerseal or prime coated pavement. The prime coat alternative shall only be used when the pavement is **not** open to traffic prior to the next seal coat.

The size of aggregate shall be nominally 16mm and 10mm.

The application rates for cover aggregate and the bituminous spray rates etc. are to be determined in accordance with the current edition of Austroads publication "Practioners Guide to Design of Sprayed Seals", and Main Roads Specifications for Sprayed Bituminous Surfacing MRS11.11 and/or Sprayed Bituminous Emulsion Surfacing MRS11.12.

Materials used and methods employed shall conform to the Main Roads Specifications for Sprayed Bituminous Surfacing. MRS11.11 and / or Sprayed Bituminous Emulsion Surfacing MRS11.12..

The Consultant shall be present to inspect the sealing operation and is to ensure that the bitumen is delivered and placed in accordance with the above specification and good engineering practice.

Austroads publication "Practioners Guide to Design of Sprayed Seals.

DMR Specification: Sprayed Bituminous Surfacing MRS11.11

DMR Specification: Sprayed Bituminous Emulsion Surfacing MRS11.12

In particular the consultant shall certify that:

- The surface was satisfactorily prepared and suitable for the application of a sprayed bituminous seal to the consultant's satisfaction and in accordance with the above specification.
- The surface to be sealed was dry and free of any surface water. The sealing operation did not take place in the rain or when rain was imminent.
- All existing pavements were cut back 150 - 300mm to provide a clean, straight joint against which the new seal was placed.
- The temperature on the pavement surface was monitored (and recorded) and was not less than 20^{0C} for at least one (1) hour prior to the commencement of, and during, spray.
- Temperatures of the bituminous material were monitored (and recorded) at regular intervals and spraying did not occur if the temperature of the material was found to be outside the temperature range as detailed in the specifications.
- Materials and methods used in the sealing process conformed to the Specifications for Sprayed Bituminous Surfacing MRS11.11 and/or Sprayed Bituminous Emulsion Surfacing MRS11.12.
- Spreading and rolling of cover aggregate was undertaken in accordance with the Specifications for Sprayed Bituminous Surfacing MRS11.11 and Sprayed Bituminous Emulsion Surfacing MRS11.12.

- Wet cover material was not used.
- All details of the sealing operations, including times (i.e. commencement and finishing times) and relevant temperatures have been recorded on a 'Bituminous Materials Spraying Record Sheet' and have been certified by the Consultant as being true and correct.

The consultant is to submit details of the proposed sprayed seal design prior to the preseal inspection.

5.6.5 Interlocking Concrete Pavers

The use of interlocking concrete pavers is not permitted.

5.6.6 Concrete

The use of concrete as the wearing surface may be considered for small areas of road generally associated with LATM. If it is proposed to use this alternative, the Consultant shall submit full details and relevant documentation to Council for checking and approval. Approval for the use of concrete will be at the discretion of the Manager Engineering Planning.

The overall design (including the pavement depth) and construction is to be in accordance with the Cement and Concrete Association of Australia specifications:

Subgrades and Sub-Bases for Concrete Road Pavements

Thickness Design for Concrete Road Pavements

Concrete for Road Pavements

Steel Reinforcement for Concrete Road Pavements

Joints in Concrete Road Pavements

Joints Sealants for Concrete Road Pavements

Outline Guide for the Construction of Concrete Road Pavements

Cement and Concrete Assoc. of Australia. Guide Specification for

The depth of the concrete is to be not less than 150mm.

The surface of the concrete is generally to be stamped with the grooves 3 -5mm deep. However, alternative surface treatments may be submitted for consideration. The final surface should provide an acceptable skid resistant finish.

Where the concrete is to be coloured, due consideration should be given to the selection of appropriate colours. The use of contrasting colours is preferred. All such colouring is to extend for the full depth of the concrete.

5.6.7 Stamped AC

Stamped AC construction in accordance with approved manufacturers specifications is an acceptable means of pavement treatment.

5.7 CONSTRUCTION TOLERANCES

The works are to be constructed within the tolerances detailed in the construction specifications.

Works constructed outside these tolerances may not be accepted on maintenance.

Any deviations outside these tolerances as approved by the Manager Engineering Planning, must be shown on the "As Constructed" Drawings.

SECTION 6 – ON MAINTENANCE INSPECTIONS

The purpose of the On Maintenance inspection is to ensure that the development has been completed in accordance with the approved Operational Works Drawings, the conditions of development approval, and that the appropriate standards of construction and materials have been used.

Consultants shall undertake an inspection of the works and submit a checklist confirming that all aspects of the works have been inspected and completed to a standard appropriate for acceptance by Council prior to the On Maintenance inspection by Council.

Five (5) working days notice is required for an On Maintenance inspection by Council in accordance with Section 6.2 Inspections.

Consultants shall submit the required "as constructed" information in accordance with Section 6.4 Post-Compliance Action prior to the works being accepted On Maintenance by Council.

Council will accept the works On Maintenance upon the successful completion of an On Maintenance inspection and receipt of the necessary "as constructed" information.

Section 6.2 Inspections

Section 6.4 Post-Compliance Action

Council shall accept all the works (roadworks, stormwater drainage, landscape works, sewerage and water reticulation) from the same date. Council will not consider accepting the individual sections of the works (roads, stormwater drainage, sewerage or water reticulation) On Maintenance separately, and all the necessary inspections must be completed and all the necessary "as constructed" information must be submitted for all sections of work prior to the works being accepted On Maintenance.

The minimum maintenance period for roadworks, drainage and landscaping shall be twelve (12) months unless otherwise directed. Longer periods may be required for specific items on the estate where problems have been encountered or where non-standard methods or materials have been used.

The minimum maintenance periods for embankments greater than 2m in height adjacent to bridges or other structures shall be 3 years.

6.1 PRE-INSPECTION CHECKLIST

A pre-inspection checklist must be forwarded (by facsimile if necessary) to the Council Inspector prior to the requested On Maintenance inspection. The pre-inspection checklist is to be in the form given in Appendix H advising that all works have been completed and inspected to the satisfaction of the Consultant.

Appendix H – Compliance with Specifications: Pre-Inspection Checklist

The Council's inspection will not be carried out if this checklist has not been received from the Consultant. If the certificate is found to be incorrect and the site is not ready, the inspection will be immediately cancelled, a re-inspection fee charged, and a minimum of five (5) working days notice required before another inspection is carried out.

6.2 INSPECTION

The on-site inspection is to be attended by the Consultant, the Civil Contractor(s) and the Council Inspector. Each person will be required to provide their own safety equipment for the inspection of sub-surface structures e.g. helmet, boots, vest. Any need for specialised equipment should be pre-arranged by the Consulting Engineer or the contractor in accordance with the requirements of the Workplace Health and Safety Act.

Workplace Health and Safety Act (Current Edition)

It shall be the responsibility of the Principal Contractor as nominated to ensure the requirements of the Workplace Health and Safety Act are satisfied.

The inter allotment drainage system is to be checked hydraulically using a water truck or similar.

All access chambers, catchpit and field inlet lids are to be removed by the commencement of the inspection.

6.3 NON-COMPLIANCE OF INSPECTION

If the development fails to satisfy the requirements of the inspection other than for minor defects, the Consultant shall be so advised and a re-inspection fee charged. When the defects have been remedied, the Consultant shall arrange another inspection. A minimum of five (5) working days notice is required prior to the re-inspection.

6.4 POST-COMPLIANCE ACTION

The Consultant is to forward the following to Council prior to formal acceptance of the subdivision On Maintenance.

a. Letter confirming satisfactory completion of the On Maintenance inspection and requesting that the maintenance period commence from the date of inspection.

b. A Certificate of Completion in the form given in Appendix G.

c. All outstanding test data and measurements of asphalt quality core tests and core tests locality plan.

Appendix G - Certificate for Construction of Roadworks, Drainage, Sewerage, Water Supply and Landscaping.

d. Notification of the contract amount and maintenance security amount (not less than 5% of the contract price or a minimum of $1,000), and the method of security (e.g. bank guarantee or cash).

   This would normally be carried out in association with the submission of the plan of survey to Council for sealing. It must be completed prior to the works being accepted On Maintenance.

Section 6.4.1 As-constructed drawings

Appendix J – Details of Development Works

e. Request to reduce performance bonds if applicable, and details of any financial contributions.

f. Pressure test certificates for sewer and water mains in accordance with the requirements of Cabwater and C.C.T.V. of all sewer mains.

g. One (1) set of "As Constructed" engineering drawings certified by an RPEQ, an electronic copy of the As Constructed information in DWG format and a completed Form A given in Appendix J is to be provided to Council.

h. Formal acceptance of On Maintenance will be in the form of a letter from the

Caboolture Shire Council to the Consultant confirming the On Maintenance commencement date.

6.4.1 As Constructed Roads and Stormwater Drainage Drawings

One (1) complete set of "as-constructed" drawings with alterations to design highlighted are to be submitted to Council. In general all work that falls outside of the specified construction tolerances is to be detailed. These are to be stamped with a certificate stating that these drawings are a true and accurate record of works "as constructed" and then signed by a RPEQ.

Consultants are to obtain the DCDB from Caboolture Shire Council and sign a data agreement.

Drawings must include approved street names, constructed pavement details, design CBR, and ESA's. The information is to be presented in a legible and logical format.

A record of 'as constructed' information (including amendments) in DWG format is to be submitted to Council with the signed hard copy. DWG files must be in GDA co-ordinates and include property boundary information.

Section 5.7 Construction Tolerances

The Council is a participating Council in the Asset Design & As-constructed Data Routines (ADAC) regional initiative for the standardization of as-constructed drawings in digital format. From March 2005, submission in digital format shall be made through the ADAC portal: www.ADAC.com.au.

Should Council develop the ADAC system to include the submission of data for active assets, submission of the on paper pro-forma will be superseded by the digital submissions and the Consulting engineer shall make this submission through the ADAC portal.

6.5 MAINTENANCE PERIOD

The minimum maintenance period for Roadworks, Stormwater Drainage and Landscaping is 12 months. During this period, responsibility and liability for rectification of defects and damage lies with the Developer.

All relevant complaints relating to the development will be referred to the Consultant during the maintenance period.

The consultant is to ensure that works are maintained during the maintenance period. Rectification works identified at the On Maintenance inspection are to be carried out within four (4) weeks of the On Maintenance inspection.

Appendix I – Three (3) Monthly Maintenance Inspection

The Consultant must inspect the works at three (3) monthly intervals during the maintenance period. The relevant certification (Appendix I) must be completed and forwarded to Council a minimum of eight (8) weeks prior to requesting an off maintenance inspection.

The aim of this inspection is to check critical items of the works (e.g. open drains), to ensure that works/structures are operating effectively, and to ensure minor problems are rectified before major problems/damage occurs.

SECTION 7 – OFF MAINTENANCE INSPECTIONS

The purpose of the Off Maintenance inspection is to ensure that the constructed works have performed satisfactorily during the maintenance period and that omissions and defects have been rectified.

7.1 INSPECTION

The “off maintenance” inspection, when requested by the Consultant, will be generally undertaken within the next 5 working days at a mutually agreed time.

Prior to requesting the "off maintenance" inspection the consultant is to have inspected the works to ensure all works are satisfactory.

All areas inspected at the On Maintenance stage will be re-inspected with special emphasis placed on any unsatisfactory points noted during the On Maintenance inspection and any points that have been brought to Council's attention during the defects period.

Where obvious rectification works have been recently carried out the maintenance period will be extended for a minimum period of three (3) months or greater time such that Council Officers are satisfied that all works are performing satisfactorily and will not pose a future maintenance problem for Council.

Any matters outstanding at the time of this inspection will automatically preclude the works from being accepted Off Maintenance by Council.

7.2 NON-COMPLIANCE OF INSPECTION

If the works fail to satisfy the requirements of the inspection other than for minor defects, the Consultant shall be so advised and a re-inspection fee charged. When the defects have been remedied, the Consultant shall arrange another inspection. A minimum of five (5) working days notice is required prior to the re-inspection.

All unsatisfactory work is to be rectified prior to Consultant arranging a second inspection.

Until all works are satisfactorily completed and the entire stage is accepted "Off Maintenance" the Developer/Consultant is responsible for any maintenance/rectification works which may be required (including slashing of parks/unsold lots , cleaning out of drainlines etc.).

If minor works requiring rectification are not completed and a re-inspection arranged within fourteen (14 days), a complete re-inspection of all works will be required.

7.3 POST COMPLIANCE ACTION

The Consulting Engineer shall forward a letter to the Council requesting:

1. The works be accepted Off Maintenance.
2. That the maintenance security and any other bond monies be released.

Formal acceptance Off Maintenance will be by a letter to the Consultant confirming that the works or specified parts of the works have been accepted by Council.

SECTION 8 – STORMWATER DRAINAGE

8.1 GENERAL

The design methods and procedures outlined in the Queensland Urban Drainage Manual (QUDM) shall apply except as amended or supplemented by these requirements.

This section is intended to provide supplementary information to expand on some of the elements specified in the Caboolture Shire Council Planning Scheme. Therefore the user must read this chapter in conjunction with the Caboolture Shire Council Planning Scheme to ensure that the development proposal complies in its entirety with the relevant codes, planning scheme policies and requirements of development application approvals.

Queensland Urban Drainage Manual

Caboolture Shire Council Planning Scheme

Where the application of engineering principles (e.g. hydrological, hydraulic etc) are required then a suitably experienced RPEQ must be engaged to prepare and certify the design. A RPEQ must inspect the works during construction to ensure that the design intent is achieved and certify the same prior to acceptance on maintenance. CCTV of stormwater infrastructure will be required at the discretion of the Council Officer.

8.2 LEGAL AND TOWN PLANNING

The requirements of Caboolture Shire Council Planning Scheme and QUDM – Section 3.0 shall apply. Where the requirements of these two documents are not consistent, the Caboolture Shire Council Planning Scheme shall apply.

Queensland Urban Drainage Manual

Caboolture Shire Council Planning Scheme

8.3 EASEMENTS

Stormwater Drainage Infrastructure other than interallotment drainage lines should be located within roads, pathways, park or drainage reserves. Open drains and overland flowpaths shall not be located within developed lots in the Residential zones.

All Council and interallotment pipelines, overland flow paths and open drains through private property shall be contained in easements.

Easements shall connect to a point of lawful discharge.

Queensland Urban Drainage Manual – Section 3.02

Easement widths shall be not less than the greater of the following:

a. over pipelines, three times the width of the pipe drain;

b. 3.0 metres for single pipes with diameter up to and including 300mm;

Queensland Urban Drainage Manual – Section 3.03

c. 4.0 metres for pipes with diameter greater than 300mm and for multiple pipes with diameter up to 300mm and culverts;

d. open drains are to be contained within easements, which provide a minimum width of 3m along one side of the open drain to facilitate vehicle access and future maintenance. This criteria may be waived where the side slopes of the drain are constructed at slopes of 1 in 10 or flatter; and

e. requirements (i) to (iv) of QUDM – Section 3.04 (h).

8.4 LAWFUL POINT OF DISCHARGE

The drainage shall be carried to a point at which it may be lawfully discharged. Lawful Point of Discharge shall be determined using QUDM – Section 3.02.

Approval in the form of an easement shall be obtained from downstream property owner/s of any property affected as a result of the discharge. A letter from the downstream property owner granting "discharge approval" as described in QUDM-section 3.03 shall not be accepted.

In staged developments, easement provisions shall be made within future stages and downstream properties with the first stage of the development.

8.5 DESIGN RAINFALL DATA

Design Intensity-Frequency-Duration (IFD) Rainfall for Caboolture Shire shall be as per tabulation for Caboolture. The IFD rainfall tabulation is contained within Appendix L.

8.6 DESIGN STORMS – AVERAGE RECURRENCE INTERVAL

Design Average Recurrence Interval (ARI) – For design under the "major/minor" concept, the design ARIs to be used are given below. The drainage system is to be designed to cater for a fully developed upstream catchment.

(i)	MAJOR SYSTEM DESIGN ARI (years)	100
(ii)	MINOR SYSTEM DESIGN ARI (years)	
	Zones	
	Residential Zones	10
	Centre Zones, Industrial Zones	20
	Rural Zone	5

Road Cross Drainage

Road Cross drainage structures (Bridges, Culverts, Floodways) shall be designed to satisfy trafficability criteria in the major storm event.

Road Cross drainage structures shall be designed with sufficient capacity to convey the minor storm event without the road being overtopped.

Trafficability will depend upon the combination of depth and velocity of flow over the road.

a. The road crossing shall be designed to ensure that the road remains trafficable (passable to traffic) in the major storm event. The limiting criterion of depth by velocity product less than 0.6 shall be applied to overtopping of roads during the major design storm events. The water depth above the crown of the road shall not exceed 200mm.

b. Council may waive requirement a) above subject to assessment of the importance of the road, the significance of interruptions to traffic, and the economics of providing a higher level of serviceability.

8.7 RATIONAL METHOD

The requirements of QUDM – Section 5.0 shall apply. Methods and equations identified in QUDM as 'preferred' or 'recommended' shall be adopted.

Queensland Urban Drainage Manual – Section 5.0

8.8 OTHER HYDROLOGICAL MODELS

A method that generates a hydrograph must be adopted for the design of those components of the drainage system, which are volume dependent, such as detention basins.

Hydrological models may be used as long as the requirements of Australian Rainfall and Runoff (AR&R) are met, summaries of calculations are provided and details are given of all program input and output.

Where computer analysis programs are used, copies of the final data files shall be provided on submission of the design to Council.

8.9 MINIMUM FLOOD IMMUNITY LEVELS

The minimum flood immunity levels shall be as follows:

Location	Minimum Design Allotment Levels for Urban Zones or Level of Flood Free Area in Rural and Rural Residential Zones
Adjacent to River, Creek or Waterway	Calculated 100 year ARI ultimate flood level + 300 mm freeboard
Adjacent to Engineered Channels	Calculated 100 year ARI ultimate flood level + 300 mm freeboard
In areas affected by tidal water	Adopted 100 year ARI storm tide level + 300 mm freeboard (The adopted 100 year ARI storm tide is RL 2.8 AHD. This value incorporates greenhouse effects)
Adjacent to roads and overland flow paths	Calculated 100 year ARI flow depth + 50 mm freeboard

Note: where allotments are located in areas affected by more than one of the above locations then the greater minimum design allotment level shall be adopted.

8.10 MINOR DRAINAGE SYSTEM DESIGN CRITERIA

The requirements of QUDM – Section 5.08 shall apply and the following criteria shall be satisfied:

- In residential, rural residential, industrial and centres zones, carriageways shall have kerb and channel along the frontage of all lots
- For residential, rural residential, centres and industrial zones discharge from the minor storm is to be collected in roads when the width of flow in the roadway exceeds 3.0 metres or such lesser width as detailed in QUDM.

8.11 MAJOR DRAINAGE SYSTEM DESIGN CRITERIA

The requirements of QUDM – Section 5.08 shall apply except freeboard used as Major System Design Criteria shall be in accordance with section 8.9 above.

8.12 GULLY INLETS, FIELD INLETS AND MANHOLES

The requirements of QUDM – Section 5.10 and 5.11 shall apply.

Provision for Blockage recommended in QUDM - Table 5.10.1 shall be adopted.

Inlet capacities for standard catch pits are included in Appendix M.

Manhole location in roadways to be:

- 1.5m off invert of kerb for 6.0m wide roads, kerb to kerb.
- 2.0m off invert of kerb for 8.0m wide roads, kerb to kerb.
- 2.0m off invert of kerb for greater than 8.0m wide roads, kerb to kerb

Inlet capacities for standard gully inlets shall be based on QUDM Volume 2, Appendix 3 Inlet Capacity Charts S5, S7, S9 and S10 for Stormway with stormcover.

8.13 DRAINAGE INFRASTRUCTURE

Stormwater drainage infrastructure in accordance with Caboolture Shire Council standard drawings is to be used unless otherwise approved in writing.

Any proprietary product to be used in Caboolture Shire must be submitted to Council for assessing its suitability for a particular application. When Council is satisfied that a particular product has conformed to all the technical specifications, performance and maintenance objectives, the proprietor or manufacturer will be advised in writing of its suitability of use. Notwithstanding this acceptance advice, Caboolture Shire Council reserves the right to withdraw the approval for use of any product at any time.

All pipelines in sandy locations (Bribie Island, Beachmere, etc) are to be rubber ring jointed. Reinforced concrete box culverts are not permitted in these locations unless alternate steps are taken during construction to prevent the ingress of sand through joints.

Where flush jointed pipes are used sandbands are required.

Special consideration shall be given to material selection in areas affected by tidal waters at levels less than RL1.5 mAHD.

8.14 HYDRAULIC CALCULATIONS

The requirements of QUDM – Section 5.21 shall apply.

When computer programs are used, sensitivity analysis shall be carried out so that the sensitivity of the program's performance in any given situation can be measured against variation in uncertain parameters.

Queensland Urban Drainage Manual – Section 5.21

Where computer analysis programs are used, copies of the final data files shall be provided on submission of the design to Council.

8.15 ROOF AND ALLOTMENT DRAINAGE

The requirements of QUDM – Section 5.18 shall apply.

Queensland Urban Drainage Manual – Section 5.18

Where less than 100% of an allotment slopes towards a road, QUDM Level 3 Rear of allotment drainage shall be adopted. Rational Method calculations shall be used

to determine pipe sizes based on a 5 minute storm duration and ARI = 10 years. Table 5.18.6 shall not be used to determine pipe sizes.

Where the allotment slopes towards a reserve, QUDM Level 2 allotment drainage may be accepted

Easements are required over inter allotment drainage.

8.16 DISCHARGE TO TIDAL AND OTHER WATERWAYS

The requirements of QUDM – Section 7 shall apply except minimum tailwater Levels for discharge to Tidal Waterways shall be as follows:

Queensland Urban Design Manual – Section 7.0

Design Condition	Design Tailwater Level
Minor Storm	0.6m AHD + 0.3m greenhouse effect
Major Storm	1.0m AHD + 0.3m greenhouse effect

8.17 OPEN CHANNELS

The requirements of QUDM – Section 8 shall apply. In addition the following criteria shall apply:

a. Afflux due to bridges, culverts and other structures shall be calculated using methods outlined in Austroads – Waterway Design – A guide to the hydraulic design of Bridges, Culverts and Floodways, 1994.

b. In the analysis of soft faced channels two roughness coefficients must be used representing the well maintained and revegetated state to check velocity and freeboard requirements respectively.

c. All hydrologic and hydraulic calculations for the purpose of determining ultimate flood levels and development fill and flood levels shall be based on 100 year ARI flows for a fully developed catchment and a fully vegetated waterway corridor using minimum Manning's n of 0.15, unless otherwise approved by Council.

d. Freeboard shall be in accordance with flood immunity levels in section 8.9.

e. A maximum velocity of 2m/s is to be maintained within grassed sections of the drain. Where drop structures are used within the grassed section of open drains to dissipate energy and ensure velocities do no exceed 2m/s details of proposed energy dissipation measures must be submitted to Council for approval.

Queensland Urban Design Manual – Section 8.0

f. Within open drains a low-flow drainage pipe is required which complies with the following criteria.

g. Nominal one half of the one year ARI capacity.

h. Minimum diameter 375mm.

i. Surcharge manholes into the open channel.

j. Maximum velocity within pipe 6m/s.

In lieu of low-flow drainage pipe, a formed concrete invert (vee or dished) may be used which meets the following criteria:

k. minimum width 2m.

l. maximum velocity 2m/s.

m. Energy dissipation at drop structures.

n. At least 1m wide strip of turf each side of invert.

o. Minimum longitudinal grade 1 in 200.

p. Open drains are to be grassed with robust native grasses that form a mat of grass rather than growing in clumps. Maximum side slopes 1 in 4 with batters between 1 in 4 and 1 in 6 turfed.

q. Open drains within private property should follow the property boundaries. Where this criteria cannot be achieved then open drains across the property are not permitted within the initial 40 metres of the allotment measured from the road frontage. Under no circumstances can open drains straddle allotment boundaries.

r. Except where open drains follow a property boundary or as otherwise approved in writing the applicant is required to construct a vehicle crossing of the open drain. Calculations showing the impact on the drainage design are required.

s. A combined system using a low flow drainage pipe and concrete invert will be required where the minimum channel grade 1 in 200 cannot be achieved in the overland flow path.

t. Overland flowpaths must be located immediately opposite sag points.

u. All concrete aprons are to have cut-off walls a minimum of 600 mm in depth.

v. Stormwater quality treatment devices may be required prior to overland stormwater flow entering a stream, creek, park, etc.

w. All systems are to be designed with approved erosion protection measures.

x. Where pathways are designed as overland flowpaths they are to be provided with a concrete footpath of width 1.5m and the remainder of the pathway shaped and turfed to provide a suitable flowpath.

The above requirements are not intended to exclude alternative designs, which would result in water quality treatment benefits.

8.18 STORMWATER DETENTION

A detention facility shall be provided to control the discharge of stormwater from a developed area so as to restrict the post-development flows to pre-development flows, for all storm events up to and included the 100 year ARI event, where:

a. a development is likely to increase runoff to such an extent that the downstream drainage channel cannot cater for the additional capacity or adverse impacts are created.

b. required under conditions of development application approvals.

c. downstream discharge approval and associated easements have not been obtained.

1. Regional Detention Versus Site Detention

The Applicant shall ascertain Council's requirements with respect to the type of stormwater detention for the subject development – regional or site based.

Regional stormwater detention facilities are intended to be part of an integrated Stormwater and Local Park Master Plan. The broad criteria for a regional stormwater detention facility are:

a. Availability of a sustainable site for the facility, with typographic slopes generally less than 10 percent and preferably less than 5 percent.

b. Feasibility of delivering both major and minor runoff to the facility from a number of developed lots approximately as indicated in the following table:

Typical Lot Size (m^2.)	Number of Lots for Typical Land Slope at Basin Site				
	Up to 3%	4%	6%	8%	10%
450	280	250	140	85	60
600	240	215	120	70	50
800	210	190	105	60	45
1,500	160	145	80	50	35
3,000	100	90	65	40	30

Where a regional stormwater detention facility has already been constructed on the subject site, Council will generally require the subject development's runoff to be discharged into that facility and provision to be made within the subject site for the ultimate delivery of runoff to the facility from external sites, in accordance with the design intent of the facility.

Where a regional stormwater detention facility has already been designed for a location in the subject site, but has not yet been constructed, Council will generally require that facility (including its provision for acceptance of runoff from external sites) to be constructed as part of the subject development and any necessary easements to be dedicated to Council. Compensation for the loss of developable land and the cost of constructing the facility may be negotiated with Council.

Where a regional detention facility has already been constructed on an immediately adjoining site, with the intention of accepting runoff from the subject site, Council will generally require the subject development's runoff to be conveyed to that facility, including provision for the ultimate conveyance of flows from other adjoining sites to the detention facility, in accordance with that facility's design intent. Appropriate infrastructure charges may be applied by Council.

Where a regional detention facility has already been constructed, but not on a site immediately adjoining the subject site, or where a regional detention facility has already been designed for an adjoining site but has not yet been constructed, Council will generally require the design of the subject development to accord with that facility's design intent in terms of ultimately being able to deliver its runoff, together with any intended external runoff, to that facility. Council may also require the construction of a temporary detention facility within the subject site itself, as part of the subject development, with a discharge location suitably arranged so as to not adversely affect adjoining properties, to operate until such time as the connection is ultimately made to the regional detention facility. Infrastructure charges shall be paid in respect of the regional detention facility, but Council may allow an adjustment to the lot densities in the subject development to compensate for the impost of the infrastructure charges on top of the provision of a temporary facility.

Where Council requires the subject development to drain to a regional detention facility that has not yet been designed, the Applicant will be required to design and document that regional facility in accordance with the broad criteria on the previous page(s) of this Manual and in accordance with the detailed criteria described hereafter, for a site chosen to Council's agreement. With the regional detention facility thereby designed, the planning of the subject development can then proceed in accordance with the appropriate requirements in the immediately preceding paragraph of this Manual.

Where Council has no requirement for a regional detention facility, the subject

development shall provide for its own stormwater detention within the subject site itself.

The design requirements of QUDM (2007) – Section 5.0 shall apply. The following criteria shall also apply. Where the following criteria may be inconsistent with the requirements of QUDM, the following criteria shall prevail.

2. Design Objective

To control the discharge of stormwater from the developed site so as to restrict the post-development peak flows to pre-development peak flows for all flows that may affect downstream interests, up to the 100 year ARI flood contour. In instances where site runoff discharges overland onto downstream properties, this objective may include flows as low as $Q_{0.25}$. Any discharge onto downstream properties must not result in an increase of concentration of the stormwater.

The objective is to ensure no worsening of the site discharge. Where a site discharges to a floodway in a much larger external catchment, the objective will remain as non-worsening of the site runoff, rather than non-worsening of the major floodway flow, unless otherwise accepted by Council.

3. General Constraints

a. For dry detention basins, no part of the basin including the embankment is to be closer than 3 metres from any adjoining property boundary or road reserve. This criterion may be wavered where the side slopes of the basin are constructed at slopes of 1 in 10 or flatter.

b. For wet detention basins, no part of the basin including the embankment is to be closer than 10 metres from any adjoining property boundary or road reserve (see also Item 5).

c. Grassed embankment slopes to be 1 in 6 or flatter. Landscaped batters or structural elements at steeper slopes will be subject to Council approval in particular instances.

d. Ongoing maintenance requirements must be minimised.

e. The design and layout of detention basins in parks must consider useability as park, integration into surrounding landscape, and wheelchair access.

f. Floor slopes to accord with QUDM (2007) Section 5.0, unless otherwise accepted by Council.

g. Disabled access designed in accordance with AS1428 must be provided for detention basins in parks.

h. The floor of the detention basin is to be self-draining at a minimum grade of 1 in 100.

4. Flow Calculations and Volume Determinations

a. The Rational Method shall be the basis for defining the amount of flow attenuation required. The design of a detention volume to achieve that flow attenuation shall then be undertaken by an appropriate storage-routing model; - the initial sizing equations in QUDM shall not be used to determine the volume.

The design intent shall be to provide the development's detention volume, as derived above, over and above any existing floodway storage and/or existing attenuation volume (e.g. farm dam). The alternative design strategy of directly applying a hydrologic and/or hydraulic model to the pre and post development scenarios, to show that the time separation of the impervious and previous runoff from the site or the time separation of the site runoff

from the external runoff can lessen or remove the need for a detention basin, will not be accepted, Where existing floodway storages or attenuation volumes will be impacted by the development, the Applicant shall demonstrate that the overall storage volume on the site, post development will exceed the overall predevelopment storage volume by at least the amount of the calculated site detention (or developed area detention for regional) requirement.

b. Where the subject development (or regional development) will alter the transmission time of any external runoff through the site (for example by piping that external runoff or reducing the volume of floodway storage traversed by that runoff):

   Both the external catchment and the development area shall be included in the calculations and the calculations for the post development case shall allow for the paving of the development area and the reduction of the overall catchments time of concentration. Where there is already a significant flow attenuation facility in the subject catchment (farm dam or other), the existing flow regime shall be calculated by an appropriate storage routing model which shall firstly be calibrated (without such facilities) to the Rational Method calculations for the predevelopment scenario. The proposed detention basin shall then be designed by an appropriate storage routing model, after firstly calibrating that model to the Rational Method calculations of the post development flows, and that detention volume shall then be provided over and above and existing floodway storage.

c. Where the subject development (or regional development) will not alter the transmission time for any external runoff through the site:

   The attenuation requirement and the consequent detention volume should be calculated on the basis of just the subject development area's increased paving and that area's changed time of concentration. Where there is already a significant flow attenuation facility in the subject catchment (farm dam or other), the existing outflow regime should be calculated by an appropriate storage routing model which should firstly be calibrated (without such facilities) to the Rational method calculations for the pre development scenario. The detention volume required for attenuation of just the development's runoff (or the regional development's runoff) should then be determined by calibration of a storage routing model to the Rational Method calculation of the post development flows and that detention volume should then be provided over and above any existing floodway storage.

d. Where the detention basin is proposed to be located in an existing floodway, the basin's outlet works must be designed to ensure that the required detention volumes are achieved, over and above the existing floodway volumes at the same ARI's, while also passing the flows at the same ARI's from the ultimate development of any external catchment.

e. Notwithstanding the above requirements with respect to provision of site detention, volumes over and above existing site storage volumes, Council may also require the application of a hydraulic routing model (EXTRAN, MIKE11 or similar) to both the pre developed and post developed scenarios to verify nil adverse impact in cases where the basin is proposed to be formed by an alteration to an existing floodway.

   Rational Method calculation of peak flows:

   I. In calculation of pre development flows, overland sheet flow time should

be calculated by Friend's equation as described in QUDM (2007) Section 4.06.6(c). In calculation of post development flows, QUDM standard inlet times should be adopted or sheet flow times should be calculated by Friends' equation and combined with segmental travel times, whichever is more appropriate to the particular circumstances.

II. Rainfall Intensity Tabulation for Caboolture should be used. Intensity for $Q_{0.25}$ can be assumed 50 percent of I_1.

III. Coefficient of Runoff should be calculated using QUDM (2007) Table 4.05.3(a). The runoff coefficient for the $Q_{0.25}$ storm should be compiled from a coefficient of 0.30 for the pervious fraction and a coefficient of 0.90 for the impervious fraction.

IV. Percentage Impervious Verus Development Category should be as per the table below.

Development Category	Fraction Impervious
Road Reserves	Fraction of width paved
Park / Rural	0.0
Rural Residential, 3,000m^2 + Lots	0.15
Rural Residential, 1,500m^2 Lots	0.30
Urban Residential Low Density Average Lot 750m^2	0.45
Urban Residential Low Density Average Lot 600m^2 to 750m^2	0.50
Urban Residential Low Density Average Lot <600m^2	0.60
Urban Residential High Density	0.7 to 0.9
Commercial / Industrial / CBD	0.9 to 1.0

f. Runoff routing computer models:

I. Computer models such as ILSAX (except where associated with storage routing routines in software such as DRAINS) may be used only for fully urbanised catchments that do not have significant natural floodways. Catchments having significant rural areas and/or significant natural floodway volumes will generally necessitate the use of a non-linear runoff routing model (RORB, URBS, RAFTS or similar).

II. Model parameters should be chosen such that the prediction of the peak flow (for the model's critical storm duration) matches the Rational Method calculation of the peak inflow (for the time of concentration for the catchment).

III. Calculate inflow hydrographs for ARIs for a range of storm durations using Australian Rainfall and Runoff (ARR)Temporal Patterns for Zone 3. Where necessary to achieve model calibration, the rainfall loss rates may be varied across the ARIs, although the initial loss rates for pervious areas should preferably be within the range 10mm to 30mm. The variation in the ARR temporal patterns at the 30 year ARI mark may be ignored, to assist model calibration.

IV. Simplified assumptions regarding the hydrograph shape (e.g. triangular) are not acceptable.

7. Assessment of Basins Attenuation performance

a. The sizing of the basin should be carried out in accordance with QUDM Section 6.06.2.

b. Preliminary sizing methods are not acceptable.

8. Existing site storage

a. The impact of the development on existing floodways must not result in a net loss of flood storage. The impacts of the proposed development on the existing storage of floodways conveying flow through the site must be considered. The basin volume required for detention of the site runoff is in addition to the natural floodway storage.

b. Where a basin is proposed to be located in a natural floodway, the required detention volume shall be provided over-and-above the natural floodway volume.

9. Consider flow spread from basin outlet to downstream property

a. Any discharge onto downstream properties must not result in an increase of concentration on the stormwater.

b. Hydraulic calculation should be carried out to determine the pre developed width of flow at the downstream property boundary and compared to the width of flows following the development. The outlet of the basin will need to be located far enough from the property boundary (min 10 metres), such that the pre developed flow width at the boundary is achieved (i.e. no increase in concentration of the stormwater).

10. Public Safety Issues

The basin depth should be restricted to 1.2m at the 20 year ARI level. Greater depths may be permitted, subject to Council agreement, where public access to the basin will be restricted or prevented.

11. Embankment Protection / Freeboard

At least 0.3m freeboard must be provided above the 100 year ARI storage depth to protect embankment crest.

8.19 STORMWATER QUALITY IMPROVEMENT DEVICES (SQIDs)

For the purpose of this document Stormwater Quality Improvement Devices shall be defined as: 'Any device (natural, biological or structural) that specifically aims to reduce the concentration of particular target pollutants in stormwater'.

SQIDs should be used to target stormwater pollutants including nutrients, sediments, Organic Matter, Gross Litter, Hydrocarbons and other pollutants depending upon site characteristics.

Stormwater quality improvement devices shall be provided, where appropriate, as part of an effective, integrated approach to site based stormwater management. The installation of a SQID is required

a. Where the release of stormwater pollutants from point and/or non-point sources exceed water quality objectives outlined in the relevant Waterway Management Plan or ANZECC Water Quality Guidelines.

b. Where stormwater drainage discharges to a river, creek, watercourse, park or natural channel. In this situation the number of outlet points (and therefore devices) should be designed in order to minimise the maintenance cost to Council.

c. Within all centres zones, industrial zones and residential B zones, proprietary devices targeting nominated pollutants shall be installed in private property and

maintained at no cost to Council as per the Manufacturers specifications.

d. as per conditions of development application approvals

Selection of treatment devices to achieve the water quality performance criteria shall be undertaken in the preparation of a Site Based Stormwater Management Plan (Refer Stormwater Quality Planning Scheme Policy).

SQID design shall address the following:

- Target pollutants and treatment objectives
- Demonstrate that the SQID design achieves the required treatment objectives
- Design Average Recurrence Interval
- Mosquito Control
- Any other relevant environmental concerns for example - impacts on groundwater, impacts of construction activities, aquatic habitat, fish migration, acid sulphate soils, revegetation, aesthetics and amenity
- Maintenance
- Operational and maintenance costs
- Long term functionality
- Safety

The following references should be used (in order of preference) for the selection and design of appropriate Stormwater Quality Improvement Devices.

- Brisbane City Council, 4th November 1999, Design Guidelines for Stormwater quality Improvement Devices
- NSW Environmental Protection Authority, 1997, Managing Urban Stormwater – Treatment Techniques

Where a more recent design guideline would result in a superior outcome then that reference should be used in preference to the above list subject to Council approval.

The design of all Stormwater Quality Improvement Devices shall ensure that:

- Maintenance can be undertaken using locally available equipment and expertise
- Maintenance inspection and clean-out procedures are clearly defined in a Maintenance Plan
- The frequency of maintenance has been specified and justified
- The frequency of inspections is specified and justified
- An assessment of likely average annual maintenance costs have been provided
- Safety issues (including occupational health and safety) have been identified and addressed
- Environmental impacts of maintenance activities (e.g. odour, removing fauna, dewatering, waste disposal, etc) have been identified, assessed and management measures developed as part of the Maintenance Plan
- Maintenance inspections check that the device is operating effectively, it is safe and aesthetic standards are being maintained
- Suitable access is available for maintenance personnel
- The long term functionality of devices is considered.

- Operational and maintenance costs are economically feasible in the long term.
- Expected life span of the device and device components is given
- System failures or problems have been recorded and reported.

Details of the design shall be submitted for approval.

A detailed maintenance schedule must accompany engineering drawings before any approval is given.

Sizing, design and maintenance of proprietary devices shall be as per the manufacturers specifications.

8.20 WATER SENSITIVE URBAN DESIGN

8.20.1 Approval for incorporation of WSUD

Designs proposed to be based on the principles of WSUD and which incorporate swales in lieu of kerb and channel will need the specific approval of Council.

Details of such proposals are to be submitted for Council's consideration preferably at the time of lodging the Development Application or prior to the submission of detailed operational works drawings. It is also recommended that such proposals are discussed with Council's Stormwater Management Engineer prior to submission.

These details are to include:

a. A layout plan indicating the extent of swales and kerb and channel within the road corridor.

b. Finished contours and the minimum and maximum grades of the swales.

c. Intended road cross section, including the intended swale profile and the proposed service allocations.

d. The location and spacing of bollards or other devices provided to prevent vehicular access through the swale.

e. Extent of proposed landscaping within the road reserve. Generally such landscaped areas should be minimal.

f. Fully costed maintenance schedules for all landscaped areas and grassed swales.

g. Results of soil testing that confirms the soil types are suitable for the provision of swales. The provision of swales in locations with dispersive or erodible soils will not be approved.

h. Details of the outlets of roofwater lines.

i. Details of proposed accessways across the swales.

8.20.2 Approval of Operational Works Plans

Following approval for the incorporation of WSUD detailed Operational plans would need to be prepared and submitted to Council for approval.

8.21 STORMWATER QUALITY

A site based stormwater quality management will be required for high risk

developments. High risk developments are classified as follows:

- Development adjacent to a waterway
- Multi unit dwellings or commercial uses with an impermeable surface area (not including roof area) > 2500m2
- Subdivisions > 6 lots
- Industrial activities with > 1000 m2 in uncovered storage/working space
- Impact assessable industrial development
- Uncovered car parks >100 spaces

For low risk developments, a site based stormwater quality management plan will not be required, however best practice stormwater quality management measures shall be adopted.

It is noted that the area required for stormwater quality management measures may impact on the layout of the development, in addition, if it is proposed to incorporate grassed swales in lieu of kerb and channel, specific council approval would be required. Council requirements are outlined in Section 8.20.

SECTION 9 – PUBLIC UTILITIES

9.1 GENERAL REQUIREMENTS

Unless stated otherwise, the Developer is responsible for the design of public utility services including liaison with the relevant public utility authorities, supply and installation of all service conduits, including the provision of all services and/or conduits along the full length of any rear allotment access or access easement. The Developer must also meet the cost of any alterations to the public utility mains, existing mains, services or installations required in connection with the development. This includes the relocation of any fire hydrant and/or valves from within the limits of the development's vehicular crossings, if applicable.

If road widening is required along the frontage of the development, the Developer must relocate the services onto the correct alignment within the verge. In some instances, the services may need to be lowered to provide sufficient cover when the footpath is regraded to the design profile.

9.2 LOCATION OF SERVICES

The service corridors and alignments must conform to the relevant Standard Drawing 01-64 or 01-74.

CSC Standard Drawing 01-64 or 01-74

9.3 STREET LIGHTING

9.3.1 Principal Consultant

The Developer must appoint a suitably qualified Principal Consultant to liaise with Council for the approval of street lighting and electrical reticulation. The Principal Consultant must be a RPEQ and hold professional indemnity insurance to the value

of not less than $1,000.000.

9.3.2 Standards

Unless specified otherwise in this chapter or as directed by Council, the provisions and detailed design of street lighting installations must conform to the following standards.

9.3.3 Lighting Category

The standard of lighting categories applicable to Caboolture Shire are set out below. The lighting categories referred to in *AS 1158* are broadly described as follows:

- Category V lighting. Lighting which is applicable to roads on which the visual requirements of motorists are dominant, e.g. traffic routes.
- Category P lighting. Lighting which is applicable to roads on which the visual requirements of pedestrians are dominant, e.g. local roads and public activity areas.

LIGHTING CATEGORIES

Road Description	***AS 1158 Lighting Category***
Residential, Rural Residential (<2ha lot area), Industrial Access Roads	P5
Industrial Minor Collector and Collector	P4
Arterial Roads (< 16000 V.p.d)	V5
Arterial Roads (> 16000 V.p.d)	V3
Declared Main Roads	*As required by DMR*
Pedestrian Laneway	P4
Pedestrian Tunnel	P10

9.3.4 Alignment

Within access roads serving less than 21 lots, the streetlights are to be located on one side of the street only. Within other access road the streetlights are to be installed alternatively on opposite sides of the street (staggered arrangement).

In minor collector and collector roads the street lighting is to be provided along the same side of the street as the concrete pathway.

The location of light poles should avoid the likely vehicle conflict points, minimise the risk of damage to both poles and vehicles and injury to vehicle occupants, minimise glare complaints, and minimise conflicting with driveway locations.

Standard Drawings 01-64 & 01-74

The following factors should be considered when determining the street lighting alignment:

1. Locating poles on opposite boundaries of ‘battle axe’ allotments is undesirable, due to a higher potential for vehicle collision.
2. Slip base or impact absorbing poles are to be used in locations with underground electricity.
3. Locate street light poles in line with abutting property boundaries or on truncation points at intersections. In cul-de-sac locations, the alignment is measured along a line projected from the footpath back to the centre of the cul-de-sac.

4. Locating poles in cul-de-sac adjacent to narrow property frontages is undesirable due to possible conflict with adjoining driveways.
5. Lighting poles must be located in accordance with the relevant Standard Drawings 01-64 & 01-74.
6. Where the footpath width exceeds 4.0 metres, the centre of the street lighting pole must be located 0.9 metres behind the kerb invert.
7. The preferred configuration of lighting at a roundabout is for the light poles to be located on the approach side of each intersection street without poles in the central median island. Lighting poles must be located as far as practicable, away from the intersection. Council would only consider the installation of central island lights if the poles are of the cantilever (pivot arm) type and if the aforementioned preferred lighting arrangement cannot be achieved.
8. For bikeways, the lighting column must be located 1.2 meters from the edge of the bikeway pavement.
9. The proposed or existing light must be at least 7.0 metres clear from any street trees.

9.4 SUBDIVISIONS/DEVELOPMENTS

The specific requirements of new developments, in particular subdivisions, are as follows:

1. The lighting design must be cost effective in regard to minimising the annual operating costs and where possible, the installation capital costs. The Developer is responsible for all capital costs associated with the design and installation of the street lighting scheme. Where it may be advantageous for the Developer to install lighting work outside the specified limits at the time of development, Council may contribute towards some of the capital costs, but these must be specifically agreed between the Council and the Developer. Council will only bear operating costs under Rate 2 of Energex's *Public Lighting Tariff.*
2. Where the new development adjoins an existing street, the new poles/lights must match the existing types to the maximum practicable extent. This is not applicable when the existing street contains GI poles.
3. Where the development requires partial road construction (typically when the development adjoins an undeveloped site), the lighting must be designed for the full width. However the lights on the development side only would need to be installed (assuming a staggered arrangement is required). In this instance conduits must be placed for future lighting on the non constructed side.
4. Where major traffic routes (i.e. Category V road) are not likely to carry high volumes of traffic until the future stages are developed and occupied, either one of the following options is acceptable.
   - Install half the ultimate lighting with the provision of conduits for the remainder lighting in the future.
   - Install smaller pole/lower wattage luminaries in the final position for upgrading at a later date. The use of base plate mounted columns in this case may be advantageous.
5. The lighting design for the development must integrate aesthetically with the adjoining / developments / estates / stages. Also the design must incorporate as far as practicable, the future planning of the area.

6. An aeroscreen luminary on an integral 0.5 metre outreach must be used on a pedestrian laneway. The light will generally be located midway along the laneway at abutting property boundaries. If the laneway exceeds 60.0 metres then more than one light may be required. Base Plate Mounted (BPM) columns must be used in this instance for maintenance purposes.
7. Underground electricity supply pillars must be provided at 150 metre intervals along park frontages for future supply to internal park lighting and other electrical park equipment.
8. Pedestrian underpasses require special consideration. The Principal Consultant must contact the Council Lighting Officer for site specific requirements before the commencement of design.
9. For subdivisions in the Rural zone, the lighting design must be on the basis of an average of 1 light per every 5 allotments plus lights at intersections, bends and traffic hazards.
10. For subdivisions in the Rural Residential Transition zone with minimum lot areas of 2 ha, the lighting design and all associated conduit installation must be on the basis of 1 light per 150 metres of frontage plus lights at intersections, bends and traffic hazards.
11. Notwithstanding all the above items 1-10, Council may vary the required street lighting category for any street or road in consideration of special circumstances or require additional lighting in the following situations:
    - Intersections.
    - Roundabouts.
    - Sharp bends.
    - Traffic control devices.
    - Pedestrian crossings/refuges.
    - Cul-de-sacs.
    - Bridges (minimum Category V5 at abutments and minimum Category P4 on deck).
    - Night time accident locations.
    - Frequently used night time bus stops.
    - Areas that may generate pedestrian traffic or vehicle night traffic.

9.4.1 Decorative Lighting

Decorative lighting must not be used on Category V traffic routes. Council will not accept any decorative light or supporting pole for the lighting of public roads and laneways unless it is a standard stock item of Energex. At this stage the preferred residential decorative luminary and pole is the M50 Nostalgia on a 4.5 metre high, wide base estate column. If the development is an extension of an existing estate already installed with Nostalgia units, then the Developer must continue to use matching Nostalgia units.

9.5 ELECTRICITY

9.5.1 General

In the context of these guidelines, 'underground electricity' means the installation of conduits and supply of services such as electrical reticulation (up to and including 11 kV), pilot cables, street lighting, traffic signals and public lighting to transport facilities, parks, bikeways and telephone booths, etc. The provision of underground electricity is required within new developments except those in the Rural zone where overhead electricity is acceptable.

9.5.2 Approval Process

All the design and construction work on the electricity supplier's (Energex) assets must be carried out by the electricity supplier or an approved electricity supplier's consultant/contractor.

Prior to signing and sealing of the survey plan, a copy of a letter of agreement from the electricity supplier to provide the necessary services in accordance with approved electricity reticulation plans, must be submitted to Council.

9.5.3 Subdivisions/Developments

The specific requirements of new developments, in particular subdivisions in other than the Rural zone are as follows:

New Dedicated Roads

1. For newly dedicated roads, full underground electricity reticulation including consumer service pillars must be provided within the road reserve to all allotments including adjacent parkland.

Existing Dedicated Roads (Including Road Widening)

2. Where the overhead electricity reticulation exists along the frontage of the development and all the proposed allotments are to take access off the existing dedicated road:
   - The lot voltage (240V) and 11 kV must be converted to underground and all allotments supplied underground from consumer service pillars.
   - Subject to Energex approval redundant overhead lines and power poles must be removed with the exception of small frontage (i.e. the development frontage lies wholly within 2 consecutive electricity poles spaced less than 100.0 metres apart) where the existing overhead lines may remain in parallel.
3. Where the overhead electricity reticulation exists along the frontage of the development, but the proposed allotments are to take access and have electricity supply from an internal road system:
   - The low voltage (240V) component of the existing overhead system along the external frontage of the development must be converted to underground and all allotments supplied underground from consumer service pillars.
   - Subject to Energex approval redundant overhead lines and power poles must be removed with the exception of small frontages (i.e. the development frontage lies wholly within 2 consecutive electricity poles spaced less than 100.0 metres apart) where the existing overhead lines may remain in parallel.
   - Conduits must be installed for either the future undergrounding of the existing 11 kV component or new proposed future 11 kV.
4. Where necessary the Developer must supply conduits across the road, such as

existing properties on the opposite side of the road outside the development boundary, for the extent of any new road construction.

5. If the supply for the new development is to be taken from existing overhead mains, then the supply must be taken underground form the nearest existing overhead pole at or outside the development boundary. It is unacceptable to install new overhead conductors across the road or extend spans of overhead lines down a footpath to new underground termination poles.

Existing Houses/Buildings

6. Where an existing dwelling/building is to remain within the limits of a development, then any existing overhead electricity (and telecommunication) service to the building must be converted to underground.

High Voltage Feeders (33 KV and Higher)

7. All existing conductors of 33 kV or higher may remain overhead. However if the Developer wishes to remove high voltage feeder lines, the necessary approvals must be obtained direct from Energex/Powerlink.

8. New or relocated ≥ 33 kV systems may by overhead at the discretion of Energex/Powerlink.

Transformers (PMT and PT)

9. Generally all new transformers required for a development must be the pad mounted transformer (PMT) type even if their location is remote from the development, except under the following circumstances.

   - Erection of new pole transformers (PT) on an existing pole will only be permitted as an interim measure where the surrounding areas are likely to be developed in future. In this instance, Energex will seek contribution from the Developer towards the replacement of the PT (with a PMT) when the surrounding areas are developed at a later stage.
   - For a small development in a fully developed area, the use of a PT and extension of 11 kV may be considered upon request. This option is mainly restricted to industrial developments.
   - Where Council has agreed to the erection of a temporary PT, drawings must show the proposed future PMT location and the associated spare conduits for future use.
   - Existing pole transformers are not to be upgraded for supply of electricity to new subdivisions.
   - PMT locations are to be in addition to the nominated road reserve. Any PMT's located adjacent to park area are to be excised from the park area.

Low Voltage Supply (11K)

10. Where an existing Low Voltage Overhead supply traverses an existing parcel of land that is to be subdivided into smaller allotments, the supply to the newly created lots is to be serviced through the road fronting the development and any existing low voltage supply traversing the lots to be terminated. Council will not favour wayleave arrangements for electrical supply traversing lots on any new developments.

Spare Conduits

11. Council reserves the right to specify spare conduits for future use on half/full width road crossings for the extension of service to/from adjacent existing and future developments.

12. It is the responsibility of the electricity supplier to ensure that the quantity of conduits installed within the development will also cater for any future mains upgrade. (**Note:** Where "battle axe" blocks with a narrow access easement are proposed, it is important that future electricity and telecommunication conduits are installed for the full length of the access easement before any concrete driveways are installed).

Costs

13. The Developer is responsible for all the design (including that pertaining to item 4 above) and construction costs including any relocation of Energex assets, if required as part of the development.

14 In respect of item 4, Council may elect to engage its own contractor to undertake construction of or otherwise contribute towards the construction costs of:

- Extending the half road crossings.
- All cabling from the connection point out of the new development.
- Undergrounding the house/building service mains.
- Installation of any associated street lighting.

9.6 GAS

If underground gas is to be supplied to the new development, these service conduits must be shown on the engineering plans.

9.7 TELECOMMUNICATIONS

Underground telecommunication services must be provided separate to the electricity service, to all allotments. Where overhead telecommunication lines exists along the development frontage, the same conditions as per overhead electricity will apply (also refer Section 14.5.3).

Prior to signing and sealing of the survey plan, a copy of a letter of agreement from the telecommunication carrier to supply the necessary services must be submitted to Council.

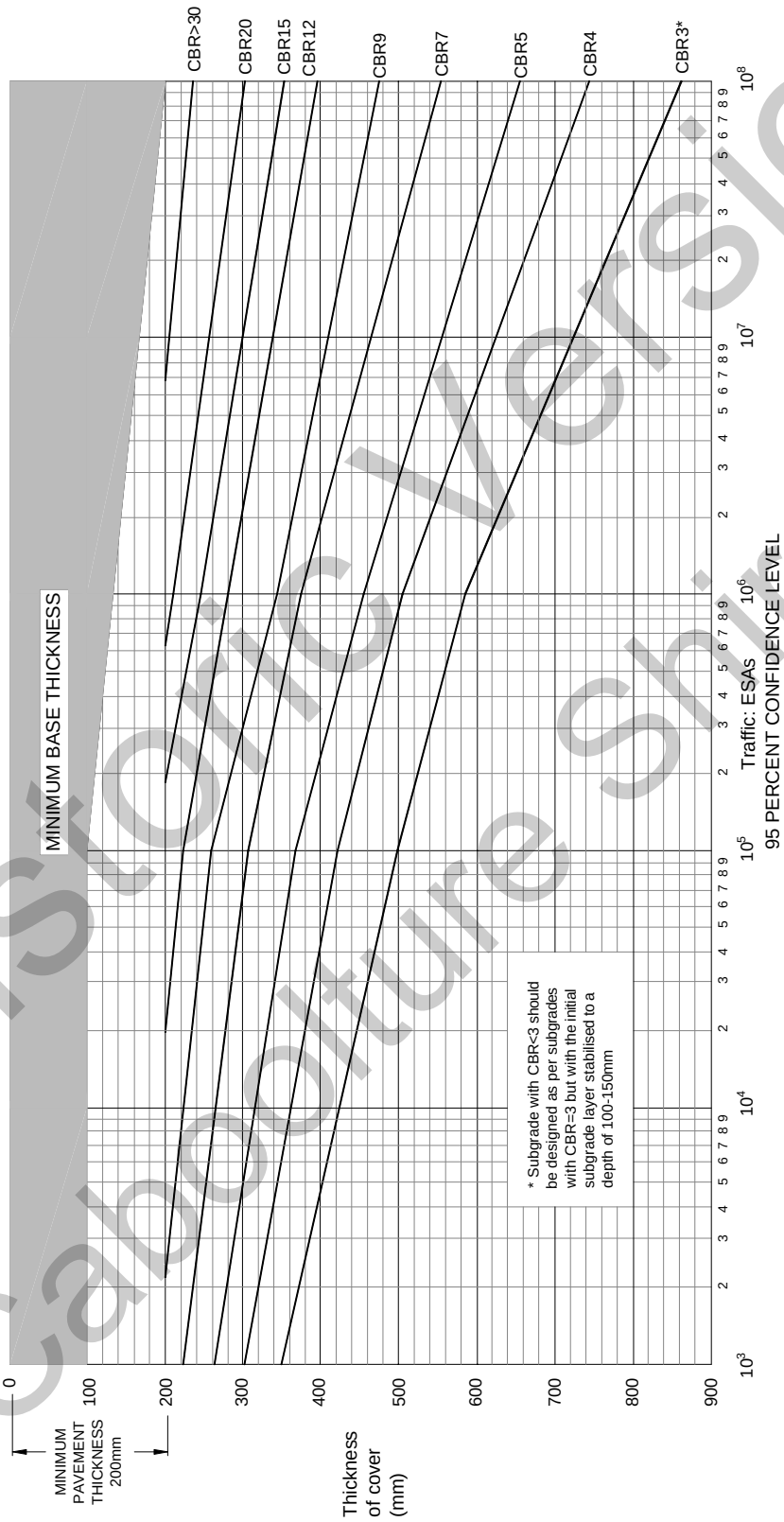
Telecommunication cabinets are to be located in widened sections of the road reserve.

APPENDIX A - PAVEMENT LOADINGS IN EQUIVALENT STANDARD AXLES

The following ESA's are to be used in the design of pavements for Shire Roads/Streets:

Zone	Road Classification	No. of Households	Traffic Volume (AADT)	ESA
Residential, Rural Residential and Rural	A1	Up to 20		1×10^4
	A2	21 to 75		4×10^4
	MC1	76 to 150		2.5×10^5
	MC2	151 to 300		5×10^5
	C	301 to 800		1.4×10^6
Centre and Industry Zones	IA		2000	1×10^6
	IC		8000	4×10^6
All Zones			>8000	As approved

APPENDIX B1 - INTERIM PAVEMENT THICKNESS DESIGN CURVES 95% CONFIDENCE



APPENDIX B2 - INTERIM PAVEMENT THICKNESS DESIGN CURVES 90% CONFIDENCE

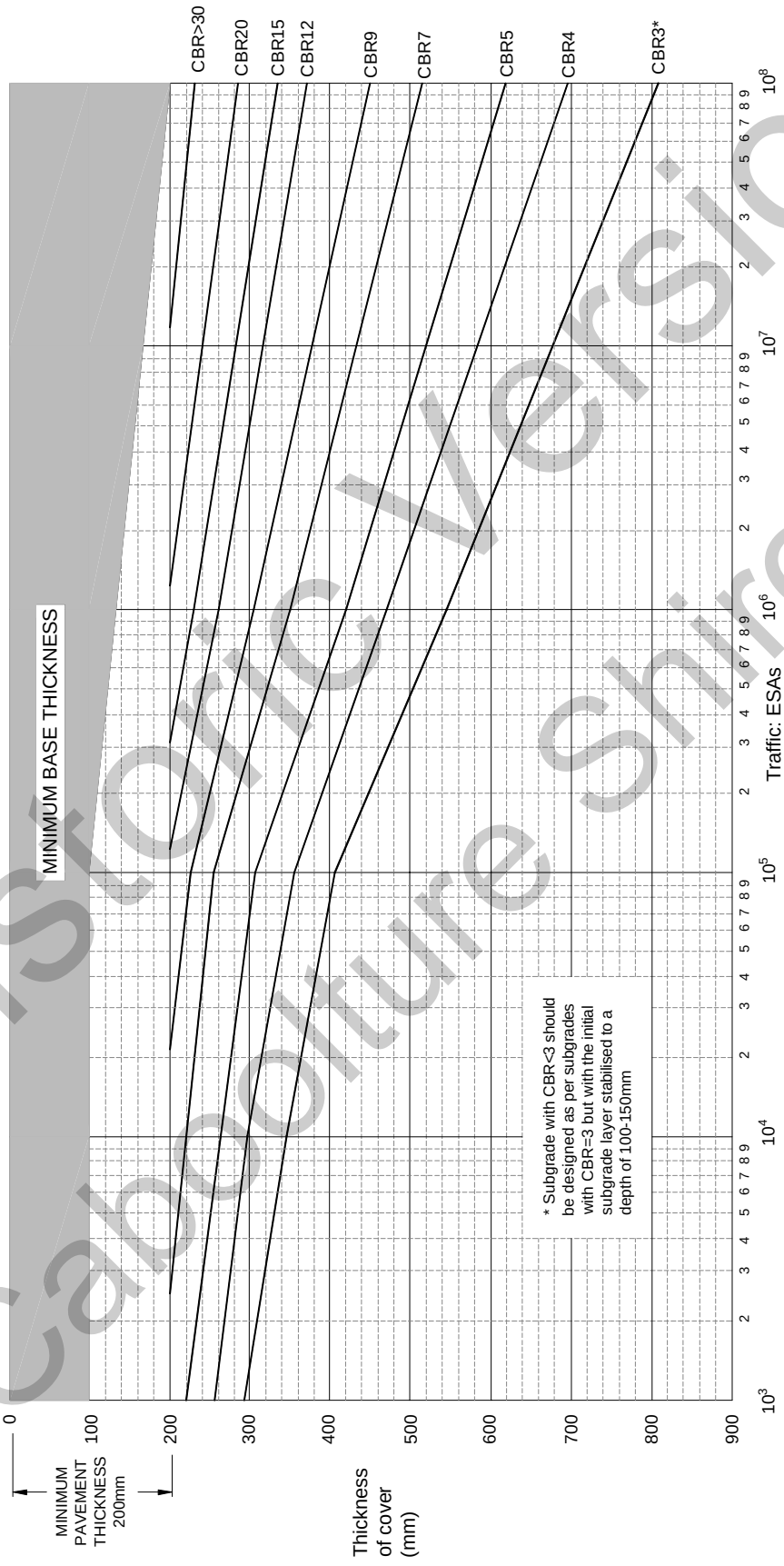


Figure 2 - Design curves for rural roads (non-fixed level) construction. The curves are based on 90% confidence during the design life

Caboolture Shire Council

Form 001

APPENDIX C - PAVEMENT SUBGRADE (Pre-inspection Checklist/Certification)

SUBDIVISION: .....ROADROADS: .....

FILE No .....STAGE .....

Date of inspection: _____ / _____ / _____ Inspected by:

.....Consultant's Representative .....Consultant

..... Contractor's Representative ..... Contractor

	SUBGRADE INSPECTION	WORK PASSED			REMARKS (include reference to chainages)
		Yes	No	N/A	
1.0	***Pavement excavation***				
	(a) Depth in accordance with approved design				
	(b) Width in accordance with approved design				
	(c) Crossfall in accordance with approved design				
	(d)Surface acceptable with tree roots, wet or unsuitable subgrade etc removed				
2.0	***Testing for subgrade with CBR ≥ 3***				
	(a) Load test carried out on base of excavation				
	(b) Compaction tests carried out on base of excavation (copies of results attached)				
3.0	***Testing for subgrade with CBR ≤ 3***				
	(a) Load test carried out after importation of subgrade replacement (CBR15) material at depth equivalent to box for subgrade with CBR = 3				
	(b) Compaction tests carried out on subgrade replacement material (copies of results attached)				
4.0	***Additional comments/details of rectification works***				

I ..... of ..... hereby certify that the subgrade detailed above has been prepared to my satisfaction, that it has been constructed in accordance with the specifications and is fit for its intended purpose. I issue this certification conscientiously believing the same to be true.

Signature: ..... RPEQ No ..... Date: ...../...../.....

This checklist/certification is to be completed and handed to the Council Inspector along with relevant compaction certificates prior to the inspection.

Caboolture Shire Council

Form 002

APPENDIX D - PAVEMENT PRE-SEAL (Pre-inspection Checklist/Certification)

SUBDIVISION: ..... ROADS: ……..

FILE _ .....STAGE ..... ……..

Date of inspection: _____/_____/_____ Inspected by:

Consultant's Representative ……Consultant

.....Contractor's Representative ……Contractor

PRE-SEAL INSPECTION		WORK PASSED			REMARKS (include reference to chainages)
		Yes	No	N/A	
1.0	***Pavement surface***				
	(a) Crossfall as per design				
	(b) Drag broomed and well prepared (tight, uniformly compacted with coarse aggregate slightly exposed)				
	(c) Surface level as per design (to allow for specified thickness of surfacing)				
2.0	***Kerb and channel***				
	(a) Cracks at other than expansion or construction joints				
	(b) Surface damage				
3.0	***Compaction tests (copies of results attached)***				
4.0	***Load test***				
5.0	***Additional comments/details of rectification works***				_____ _____

I ..... of ..... hereby certify that the pavement detailed above has been prepared to my satisfaction, that it has been constructed in accordance with the specifications and is fit for its intended purpose. I issue this certification conscientiously believing the same to be true.

Signature: .....RPEQ _ ..... Date: ...../...../.....

This checklist/certification is to be completed and handed to the Council Inspector along with relevant compaction certificates prior to the inspection.

Caboolture Shire Council

Form 003

APPENDIX E - ASPHALTIC CONCRETE CERTIFICATION

SUBDIVISION: ..... ROADS: .....

FILE No. .....STAGE ....

Date of inspection: _____/_____/_____ Inspected by:

.....Consultant's Representative .....Consultant

..... Contractor's Representative ..... Contractor

LAYING OF ASPHALTIC CONCRETE		WORK PASSED			REMARKS (include reference to chainages)
		Yes	No	N/A	
1.0	***Pavement surface***				
	(a) Power brooming completed				
	(b) Satisfactorily prepared and suitable for laying AC				
	(c) Dry and free of surface water				
	(d) Existing surfacing cut back as specified (minimum of 150mm)				
	(e) Temperature with specified limits				
2.0	***Laying of AC***				
	(a) AC was not placed in the rain or when rain was imminent				
	(b) Temperature of AC prior to placing was within specified limits				
	(c) Rolling technique was in accordance with the specification				
	(d) Finished surface of AC has uniform appearance and is in accordance with specification				
3.0	***AC core tests (copies of results and locality plan attached)***				
4.0	***Additional comments/details of rectification works***				

I ..... of ..... hereby certify that the asphaltic concrete detailed above has been prepared to my satisfaction, that it has been constructed in accordance with the specifications and is fit for its intended purpose. I issue this certification conscientiously believing the same to be true.

Signature: ..... RPEQ _ ..... Date: ...../...../.....

This certification is to be completed and submitted to Council prior to the "on maintenance" inspection.

APPENDIX F - BITUMINOUS (SPRAY) CERTIFICATION

SUBDIVISION: ..... ROADS: .....

FILE _ .....STAGE ....

Date of inspection: _____/_____/_____ Inspected by:

.....Consultant's Representative .....Consultant

..... Contractor's Representative ..... Contractor

BITUMINOUS SURFACING		WORK PASSED			REMARKS (include reference to chainages)
		Yes	No	N/A	
1.0	***Pavement surface***				
	(a) Power brooming completed				
	(b) Satisfactorily prepared and suitable for bituminous surfacing				
	(c) Dry and free of surface water				
	(d) Existing surfacing cut back as specified (minimum of 150mm)				
	(e) Temperature with specified limits				
2.0	***Construction of bituminous surfacing***				
	(a) Work was not carried out in the rain or when rain was imminent				
	(b) Temperature of bitumen prior to spraying was within specified limits				
	(c) Materials used conformed to the specifications (cover material dry)				
	(d) Spraying, spreading and rolling techniques were in accordance with spec.				
3.0	***Bituminous Materials Spraying Record Sheet completed and certified as being true and correct (copy attached)***				
4.0	***Additional comments/details of rectification works***				

I ..... of ..... hereby certify that the bituminous surfacing detailed above has been prepared to my satisfaction, that it has been constructed in accordance with the specifications and is fit for its intended purpose. I issue this certification conscientiously believing the same to be true.

Signature: ..... RPEQ _ ..... Date: ...../...../.....

This certification is to be completed and submitted to Council prior to the "on maintenance" inspection.

APPENDIX G - CERTIFICATE FOR THE CONSTRUCTION OF ROADWORKS, DRAINAGE, SEWERAGE, WATER SUPPLY & LANDSCAPING

COMPLIANCE WITH STANDARDS

FILE _: .....

DATE: _____/_____/_____

CERTIFICATE OF COMPLETION

CONSTRUCTION OF ROADWORKS, DRAINAGE, SEWERAGE, WATER SUPPLY & LANDSCAPING

AT: .....

.....

FOR: .....

.....

I .....of

..... Consulting Engineers being duly authorised in this behalf, do certify that the earthworks, roadworks, drainage, sewerage, water supply, landscaping and associated works constructed in conjunction with the above stage of this development, have satisfied the conditions of the relevant Council approval, and, have been constructed to my satisfaction and in accordance with the approved Operational Works drawings, incorporating any approved amendments, within tolerances, or where not satisfied, within generally accepted engineering tolerances, also in accordance with relevant test certificates, and that the works are fit for the purpose for which they are intended.

I/we make this certificate conscientiously believing that I/we have appropriate procedures for inspection and testing in place to assure the quality of the works and conscientiously believing that these procedures have been followed during the construction of the works.

Signature: .....RPEQ _ ..... Date: ...../...../.....

On behalf of: ..... (Consulting Engineers)

Caboolture Shire Council

Form 006

APPENDIX H – ON MAINTENANCE PRE-INSPECTION CHECKLIST - COMPLIANCE WITH SPECIFICATIONS (ROADS & DRAINAGE)

SUBDIVISION: ..... ROADS: .....

FILE No. .....STAGE ....

Date of inspection: _____/_____/_____ Inspected by:

.....Consultant's Representative .....Consultant

..... Contractor's Representative ..... Contractor

DESCRIPTION		WORK PASSED			REMARKS (include reference to chainages)
		Yes	No	N/A	
	ROADS				
	Earthworks				
(a)	Top & toe of batters contained within road reserve except as otherwise approved				
(b)	Retaining Walls: (i) Clear of road reserve/fully contained within property boundaries				
	(ii) Constructed as per design with subsoil drains and mowing strips				
(c)	Batter Slopes: (i) Shape and slope as per drawings				
	(ii) Stabilised against erosion				
(d)	Interim drainage constructed as per requirements				
(e)	All fill compacted as specified (copies of density test results attached). Depth and location of fill of depth >300mm has been shown on "as constructed" drawings.				
(f)	Siltation/erosion control management system in place as per approved design and operating effectively				
(g)	Grass strike of 8 in 10 square metres achieved.				
	Road Pavements				
(a)	Plan layout and geometry in accordance with approved design				
(b)	Finished surface levels at crown and channel				
(c)	Crossfalls				
(d)	There is no ponding of water on roads				
(e)	Surface finish and thickness of AC OR surface of bituminous seal				
(f)	Joints in seal are flush				

	DESCRIPTION	WORK PASSED			REMARKS (include reference to chainages)
		Yes	No	N/A	
	ROADS (cont'd)				
	Stamped (or other) Concrete				
(a)	Skid resistance acceptable				
(b)	Construction joints (incl. load transfer mechanisms)				
(c)	Concrete coloured full depth				
(d)	Expansion joint material in place between kerb and concrete				
(e)	Reinforcement as specified				
	Concrete Kerb and Channel, and Medians				
(a)	Correct type used in all locations				
(b)	Kerb and channel is not cracked or damaged				
(c)	Water does not pond in channel				
(d)	Transition and connections to existing work are smooth				
(e)	Service markers placed as required				
(f)	Road surface and footpath flush with channel & back of kerb				
(g)	Channelisation and median works completed				
(h)	Subsoil drains in place under all kerb and channel and medians/islands where concrete infill has not been constructed				
(i)	Infill treatment to medians acceptable (concrete infill with expansion joint material or landscaping)				
	Footpaths/Verge				
(a)	Profile				
(b)	Topsoiled and grassed (8 in 10 square metres)				
(c)	Service fixtures at level as per Council requirements				
(d)	Concrete pathways constructed				
(e)	Kerb ramps constructed at required locations				
(f)	Two strips of turf placed behind all kerbs				
(g)	One strip of turf placed along both sides of all concrete pathways, spoon drains etc.				

	DESCRIPTION	WORK PASSED			REMARKS (include reference to chainages)
		Yes	No	N/A	
	ROADS (cont'd)				
	Bikeways				
(a)	Location and width as per drawings				
(b)	Kerb ramps and crossings constructed as per drawings				
(c)	Relevant signs installed				
(d)	Lighting if required.				
	Fencing and Features				
(a)	Entrance features, landscaping, tree plantings completed in accordance with Council approval (copy attached)				
(b)	Entrance features and fences have building approvals (if applicable)				
(c)	All fences required in terms of subdivision approval have been completed				
	(i) Property fences (confirmed on private property)				
	(ii) Sound attenuation fences (confirmed on private property)				
	(iii)Post and rail fences or bollards along frontage to parks (incl. gates)				
	Parks				
(a)	Parkland has been formed/shaped as required				
(b)	Stones and debris have been removed				
(c)	Tree planting and landscaping as specified				
(d)	Grass cover is as specified (8m2 in every 10m2)				
(e)	Park furniture is as specified				
	STORMWATER DRAINAGE				
	Inter-allotment Drainage				
(a)	Inter allotment drainage system constructed where 100% of lot does not grade to the road				
(b)	Inter allotment drainage constructed to line and level				
(c)	Inter allotment drainage flow tested				
(d)	Kerb adaptors installed (2 approved adaptors per lot)				
(e)	Pits are fully contained within property boundaries				
(f)	House connection points: (i) One constructed for each lot where roofwater drainage required				
	(ii) Connection points taped and located >3m from sewer connection				

DESCRIPTION		WORK PASSED			REMARKS (include reference to chainages)
		Yes	No	N/A	
	STORMWATER DRAINAGE (cont'd)				
(a)	Overall system constructed as per design				
(b)	Pipes have been inspected: (i) There are no damaged pipes				
	(ii) Joints and lifting holes plugged or mortared as necessary				
(c)	Manholes and gully inlets (i) Constructed to required size and as per specifications				
	(ii) Connections to pipes mortared flush with walls and no pipe reinforcement exposed.				
	(iii)All joints mortared incl connection to precast roof units				
	(iv) Pipe connections to gullies not constructed in corners such that pipe capacity is reduced				
	(v) Benching to half pipe dia. has been constructed				
	(vi) All lids are satisfactorily seated and not damaged				
	(vii)Grates (where permitted) are satisfactorily seated and bolted down				
(d)	Outlet/inlet structures are satisfactorily const & there is no siltation or erosion				
(e)	The stormwater drainage system is free of debris or siltation				
(f)	Child-proof grates/bars have been installed where required				
	Open Channels				
(a)	Constructed to design slope and profiles				
(b)	Lining (where required) has been constructed as per design				
(c)	Low flow pipe or channel has been constructed as per design				
(d)	Unlined sections are stable with turf/grass/other established				
(e)	Smooth transitions have been provided between new work and existing/natural channels				
(f)	Cut-off walls have been constructed at all concrete channel edges, and outlet/inlet structures				
(g)	The system is free of silt and erosion				
(h)	All necessary silt and erosion controls are in place				

	DESCRIPTION	WORK PASSED			REMARKS (include reference to chainages)
		Yes	No	N/A	
	STORMWATER DRAINAGE (cont'd)				
	Overland Flow Paths				
(a)	Grade and profile is in accordance with design				
(b)	Flow paths are clear of obstructions				
	Drainage (other)				
(a)	Outlets and outfalls have been constructed as per plans				
(b)	Subsoil drains discharge to bullies, manholes, gully pits and other approved points of discharge				
(c)	Subsoil drains have been checked hydraulically and flushing points provided				
(d)	All batters steeper than 1 in 4 have been adequately retained and are able to be maintained				

I ..... of ..... confirm that I have inspected the works, that they have been constructed in accordance with the specification and within tolerance except as otherwise noted on the certificate, and the works are fit for the intended purpose. I issue this certification conscientiously believing the same to be true.

Signature: .....RPEQ _ ..... Date: ...../...../.....

This checklist/certification is to be submitted to Council prior to the "on maintenance" inspection.

Caboolture Shire Council

APPENDIX I - THREE (3) MONTHLY MAINTENANCE INSPECTION (Roadworks & Stormwater Drainage)

SUBDIVISION: ..... Date of inspection: _____/_____/_____

FILE _ ..... STAGE ..... ……Consultant's Signature

ITEM		WORK PASSED			REMARKS (include reference to chainages)
		Yes	No	N/A	
1.0	***Stormwater Drainage System***				
	(a) Pipes and culverts clean				
	(b) Outlets grassed and not scoured				
	(c) Grated inlets clean				
	(d) Open drains operating well, grassed and not scoured				
	(e) Other drainage structures (detention basins, pollutant traps) operational				
2.0	***Roads***				
	(a) AC or bituminous surfacing in good condition				
	(b) Kerb and channel undamaged				
	(c) Ponding on road or in kerb and channel				
	(d) Road signs erected as per design				
	(e) Street names as per plan of survey				
	(f) Linemarking/pavement marking as per design				
	(g) Concrete areas in good repair				
	(h) Subsoil drains operational				
3.0	***General***				
	(a) Backfill to trenches and manholes - no subsidence				
	(b) Safety fencing, guide posts, hazard boards in place				
	(c) Parks, footpaths and unsold lots grassed and slashed				
4.0	***Other***				

Form Authorisation | Manager Engineering Planning

Caboolture Shire Council - Engineering Planning Unit

Details on Subdivisional Development Works

Subdivision Details

File Number

Suburb

Subdivision

Developer

Consultant

Contractor

	Roof water Drainage Details			***Allotment Fill Details***			***Flooding Details***				***Ret. Wall& Easements***	
				For Fill greater than 500mm								
Lot Number	**House Connection Location**	**Roof Water Location**	**Pipe Diameter**	**Allotment Filled (%)**	**Maximum Fill Depth (mm)**	**Location of fill if less than 100%**	**% of Lot Under Q100**	**100 Year Flood Level**	**Recorded Flood Level**	**% Below Recorded Flood Level**	**Retaining Wall [height, location & construction type]**	**Type of Easement & Location**

Other Details

Total Road Length (M)

6m .....

8m .....

10m .....

12m .....

Total Length Of Stormwater Pipes

.....metres

Developed Areas (Square Metres)

Allotment Areas .....

Park Areas .....

Road Reserves .....

Other Areas .....

Official Use												

Footpath	Yes	No

APPENDIX K - CABOOLTURE SHIRE COUNCIL STANDARD DRAWINGS

Drawing No.	Description
ROADS	
01-15	Kerb Ramp
01-18	Intersection Treatment For Rural Road
01-22	Open Trench Crossing, Bitumen Surfaced Road
01-41	Linemarking and R.R.P.M. Details
01-42	Piped Crossing
01-43	Residential & Multi-Residential Crossings, For Footpaths Less Than 5.0m in Width
01-44	Industrial Crossing/Invert, For Footpaths Less Than 5.0m in Width
01-45	Cross Sections, Residential Access, Minor Collector, Residential Collector
01-46	Cross Sections, Rural Residential Access, Rural Residential, Collector
01-48	Cross Sections, Industrial Access, Industrial Collector
01-63	Rural Road, Cross Section
01-64	Footpath Construction, Including Allocations For Public Utilities For Footpaths Less Than 5.0m In Width
01-65	Subsoil Drainage Arrangement
01-68	Precast Splitter Island 600 Wide, For Existing Roads Only
01-69	Cast-In Situ Splitter Island, 1.2m Wide
01-70	Rubber Safety Bar Splitter Island, For Existing Roads Only
01-72	Residential & Multi-Residential Crossings, For Footpaths 5.0m or Greater in Width
01-73	Industrial Crossing/Invert, For Footpaths 5.0m or Greater in Width
01-74	Footpath Construction, Including Allocations For Public Utilities For Footpaths 5.0m Or Greater In Width
01-75	Approved Kerb Ramp Locations & Configuration
01-76	Mountable Traffic Island
01-78	Typical Timber Bollard
01-79	Removable Access Bollard
01-81	Two and Four Lane Sub Arterial and Arterial Road Typical Cross Section
01-83	Road Construction Criteria
STORMWATER DRAINAGE	
02-11	Back Entry Catch Pit, With Precast Extended Kerb Inlet (on grade conditions)
02-18	Back Entry Catch Pit, With Precast Extended Kerb Inlet (sag conditions)
02-22	Pipe Culvert, Inlet & Outlet, Plan & Elevation
SEQ-D-082	Drainage Culvert Inlet Screen

IPWEAQ STANDARD DRAWINGS

Drawing No.	Description
ROADS	
R-0080	Kerbs and Channels - Profiles and Dimensions for - B1/300, B5, SM3, SM5, M3 and Invert
R-0130	Street Signs
R-0141	Subsoil Drainage at Median Islands
R-0160	Water Service Conduits
STORMWATER DRAINAGE	
D-0010	Access Chambers
D-0011	Access Chambers Roof Slabs
D-0012	Access Chambers Roof Slabs Extended
D-0013	Access Chambers Roof Slabs Rectangular
D-0030	Excavation, Bedding etc. of Drainage Pipes
D-0031	Excavation, Bedding etc. of Box Culverts
D-0040	Sediment Fence and Sediment Trap
D-0041	Sediment Control-Inlets, Dams and Banks
D-0050	Field Inlet and Overflow Gully
D-0060	Gully – Roadway Type, General Arrangement, Kerb in Line (Use where footpath is < 4.5m wide)
D-0061	Gully – Roadway Type, Precast Lintel Details, Kerb in Line
D-0062	Gully – Roadway Type, Grate and Frame
D-0063	Gully – Roadway Type, General Arrangement, Channel Lip in Line (Use where footpath is > 4.5m wide)
D-0110	Roofwater Inspection Chamber
GENERAL	
G-0100	Tree Planting including Root Barriers

DISCLAIMER.

It is the responsibility of the user of the standard drawings referenced above to ensure they are current issue.

Refer to Institute of Public Works Engineering Australia.

QUEENSLAND DEPARTMENT OF MAIN ROADS STANDARD DRAWINGS

Drawing No.	Description
1045	Treatment of Cutting Batters
1356	Road Edge Guide Posts - Installation Details
1357	Road Edge Guide Posts - Post Spacing Details
1174	RC Box Culverts 150-600 high - Headwalls
1303	RC Box Culverts - Wingwalls, Headwalls
1304	RC Pipes - Wingwalls/Apron < 2400 diameter
1305	RC Pipe Culverts - Headwalls General Arrangement
1316	RC Box Culverts - General Arrangement
1317	RC Box Culverts - Bases with Nibs
1318	RC Box Culverts - Bases with Recesses
1319	RC Box Culverts - 750 - 2400 high – Headwalls

DISCLAIMER.

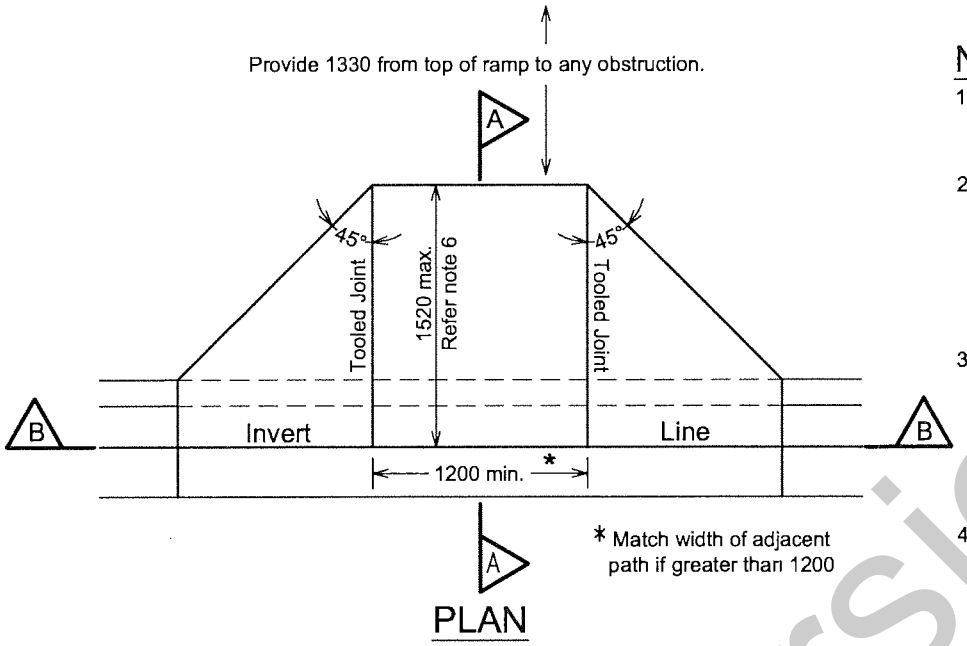
It is the responsibility of the user of the standard drawings referenced above to ensure they are current issue.

Refer to Queensland Department of Main Roads.

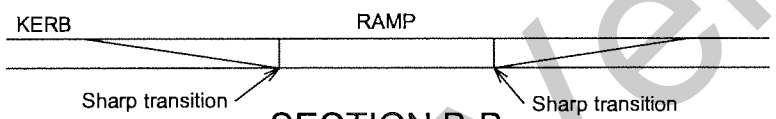
APPENDIX L - RAINFALL INTENSITIES IN MM/HR FOR VARIOUS DURATIONS AND RETURN PERIODS FOR CABOOLTURE SHIRE

RETURN PERIOD							
DURATION	1 YEAR	2 YEAR	5 YEAR	10 YEAR	20 YEAR	50 YEAR	100 YEAR
(MINS)							
5.00	120.16	153.35	190.53	212.48	242.45	282.20	312.94
6.00	112.42	143.56	178.79	199.54	227.85	265.46	294.59
7.00	106.08	135.52	169.03	188.74	215.62	251.36	279.08
8.00	100.74	128.74	160.71	179.52	205.17	239.28	265.75
9.00	96.14	122.89	153.51	171.53	196.08	228.76	254.11
10.00	92.12	117.77	147.17	164.49	188.08	219.48	243.84
12.00	85.35	109.15	136.48	152.61	174.55	203.78	226.43
14.00	79.82	102.10	127.73	142.87	163.46	190.90	212.15
16.00	75.17	96.18	120.37	134.69	154.14	180.07	200.14
18.00	71.19	91.11	114.07	127.68	146.15	170.79	189.85
20.00	67.72	86.68	108.58	121.57	139.20	162.72	180.90
22.00	64.66	82.78	103.74	116.19	133.07	155.61	173.02
24.00	61.93	79.30	99.43	111.40	127.62	149.28	166.01
26.00	59.47	76.17	95.56	107.10	122.72	143.60	159.72
28.00	57.25	73.33	92.06	103.20	118.29	138.46	154.04
30.00	55.22	70.75	88.87	99.66	114.26	133.79	148.86
35.00	50.84	65.18	81.99	92.02	105.58	123.72	137.73
40.00	47.23	60.58	76.32	85.73	98.43	115.43	128.57
45.00	44.18	56.70	71.55	80.42	92.40	108.46	120.87
50.00	41.56	53.37	67.45	75.88	87.25	102.48	114.27
55.00	39.29	50.48	63.90	71.94	82.77	97.30	108.54
60.00	37.30	47.94	60.77	68.47	78.83	92.74	103.51
70.00	33.94	43.67	55.52	62.65	72.22	85.08	95.06
80.00	31.23	40.21	51.26	57.92	66.85	78.87	88.20
90.00	28.97	37.35	47.73	54.00	62.40	73.71	82.51
100.00	27.07	34.92	44.74	50.69	58.63	69.34	77.68
110.00	25.44	32.85	42.18	47.84	55.39	65.59	73.53
120.00	24.03	31.05	39.95	45.36	52.57	62.32	69.92
130.00	22.79	29.47	37.99	43.19	50.10	59.44	66.74
140.00	21.69	28.07	36.26	41.25	47.90	56.89	63.92
150.00	20.71	26.82	34.71	39.53	45.93	54.60	61.39
160.00	19.83	25.70	33.31	37.98	44.16	52.54	59.11
170.00	19.04	24.68	32.05	36.57	42.56	50.68	57.04

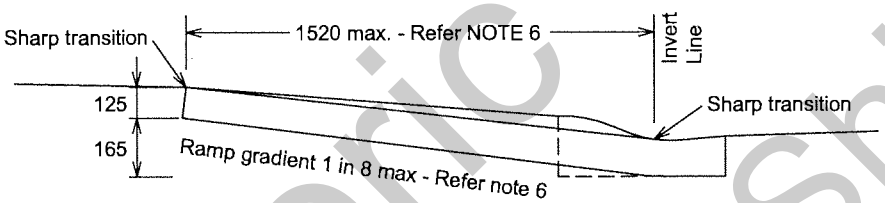
RETURN PERIOD							
DURATION (HRS)	1 YEAR	2 YEAR	5 YEAR	10 YEAR	20 YEAR	50 YEAR	100 YEAR
3.00	18.32	23.76	30.90	35.29	41.09	48.97	55.16
3.50	16.50	21.44	28.00	32.05	37.39	44.66	50.37
4.00	15.07	19.61	25.70	29.48	34.45	41.22	46.56
4.50	13.91	18.13	23.83	27.39	32.05	38.42	43.44
5.00	12.95	16.90	22.28	25.64	30.05	36.07	40.83
5.50	12.15	15.86	20.97	24.17	28.35	34.08	38.61
6.00	11.45	14.97	19.84	22.90	26.89	32.36	36.70
7.00	10.33	13.53	18.00	20.82	24.50	29.55	33.55
8.00	9.46	12.40	16.56	19.19	22.61	27.32	31.05
9.00	8.75	11.49	15.39	17.86	21.08	25.50	29.02
10.00	8.17	10.74	14.42	16.76	19.80	23.99	27.33
11.00	7.69	10.11	13.60	15.83	18.72	22.71	25.89
12.00	7.27	9.57	12.90	15.03	17.79	21.60	24.64
15.00	6.32	8.33	11.29	13.18	15.64	19.03	21.74
18.00	5.64	7.45	10.13	11.86	14.09	17.17	19.64
21.00	5.13	6.79	9.26	10.84	12.90	15.75	18.04
24.00	4.73	6.26	8.56	10.04	11.96	14.62	16.75
30.00	4.13	5.47	7.51	8.83	10.53	12.89	14.79
36.00	3.69	4.89	6.74	7.93	9.48	11.62	13.34
42.00	3.34	4.44	6.14	7.23	8.65	10.62	12.20
60.00	2.63	3.50	4.88	5.76	6.92	8.52	9.82
72.00	2.29	3.06	4.28	5.07	6.12	7.54	8.70



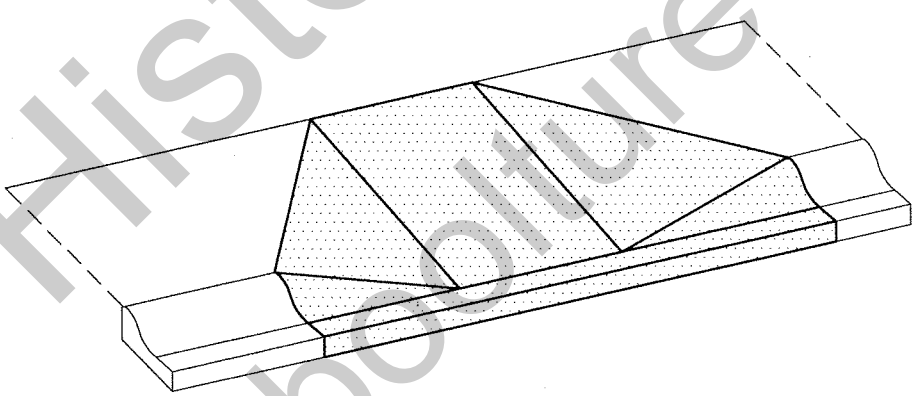
PLAN



SECTION B-B



SECTION A-A



PERSPECTIVE VIEW

(STANDARD M3 TYPE KERB)

NOTES

1. Kerb ramps shall be provided at approved sites at intersection corners and established mid block sites.
2. The number and exact positions shall be determined with regard to the location of existing or proposed traffic signal posts, drainage structures and pedestrian desire lines. Ramp is to be located 1.0m minimum clear of obstructions.
3. The location of kerb ramps should be carefully planned to ensure that users are not put at risk from traffic of any kind, bearing in mind that a person with a disablity may have a reaction time greater than that of a person having full mobility.
4. Kerb ramps should be installed in the kerb in a manner which will direct the user (particularly people with a vision disability) across the adjacent roadway by the most direct route.
5. The sides of the kerb ramp shall be graded plane surfaces.
6. The maximum gradient of a ramp exceeding 1520mm in length shall be 1:14.
7. Wherever possible discharge point from kerb ramps should be located so as to integrate use by both people with a disability and able bodied persons.
8. The ramp and sloping sides should be slip resistant.
9. Concrete to be N32.
10. Refer STD dwg 01-75 for approved kerb ramp location and configurations.
11. KERB RAMP WINGS - The required kerb ramp wing angle is 45°. Subject to the approval of the superintendent, wings may be angled at less than 45° if pedestrians do not walk over the side of the ramp and the wing is required to be clear of traffic signals hardware, other kerb ramp wings or utility pits/manholes. Kerb Ramp wing angle may also be reduced at obtuse angled intersections. Wings shall have a width between 600mm and 1200mm. A max slope of 1 in 4 (25%) is to be maintained on the wings at the kerb face (ie 600mm wide wing for a 150mm kerb).

*** TACTILE INDICATORS SHALL BE INSTALLED AS PER AS 1428.4 -2002 AS ADVISED ***

SCALE: N.T.S

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

CABOOLTURE SHIRE COUNCIL

KERB RAMP

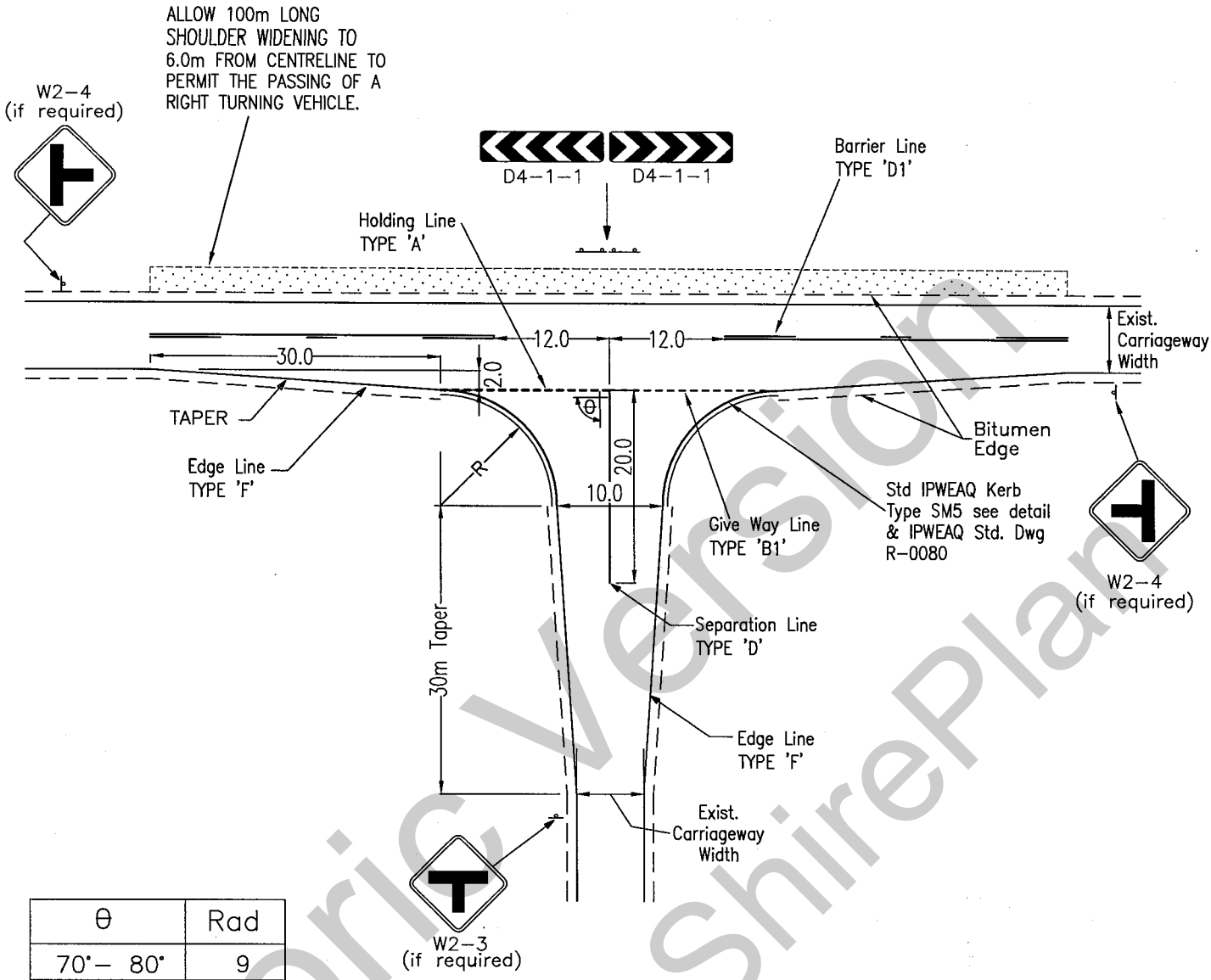
DRAWING No. 01-15 | REV. H

ORIGINAL SHEET SIZE A4

	REVISIONS	DRAWN	DATE
H	NOTES AMENDED	J.N.	08/07
F	PERSPECTIVE VIEW ADDED	J.N.	03/05
E	MISC. CHANGES		04/04
X	ORIGINAL ISSUE		

Tech. Officer	Design Office Co-Ordinator	Engineer	Manager(s)
	JRe 8/07	BA 8/07	24.8.07

Field Book	
Level Book	-
Job File No.	
Survey File	
Road No.	



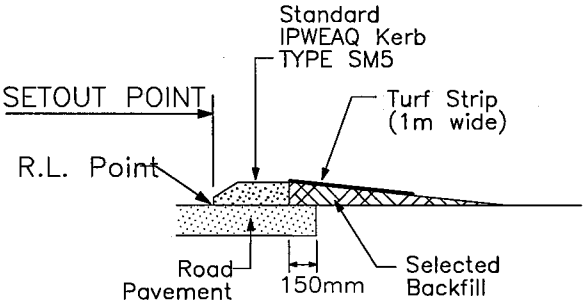
θ	Rad
70°– 80°	9
80°–100°	12
100°–110°	15

TURNOUT RADIUS

SETOUT PLAN

NOTES

1. SIZE AND POSITION OF WARNING SIGNS TO BE IN ACCORDANCE WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.
2. ALLOW DRAINAGE THROUGH MEDIAN KERB AT LOW POINTS IF REQUIRED



DETAIL

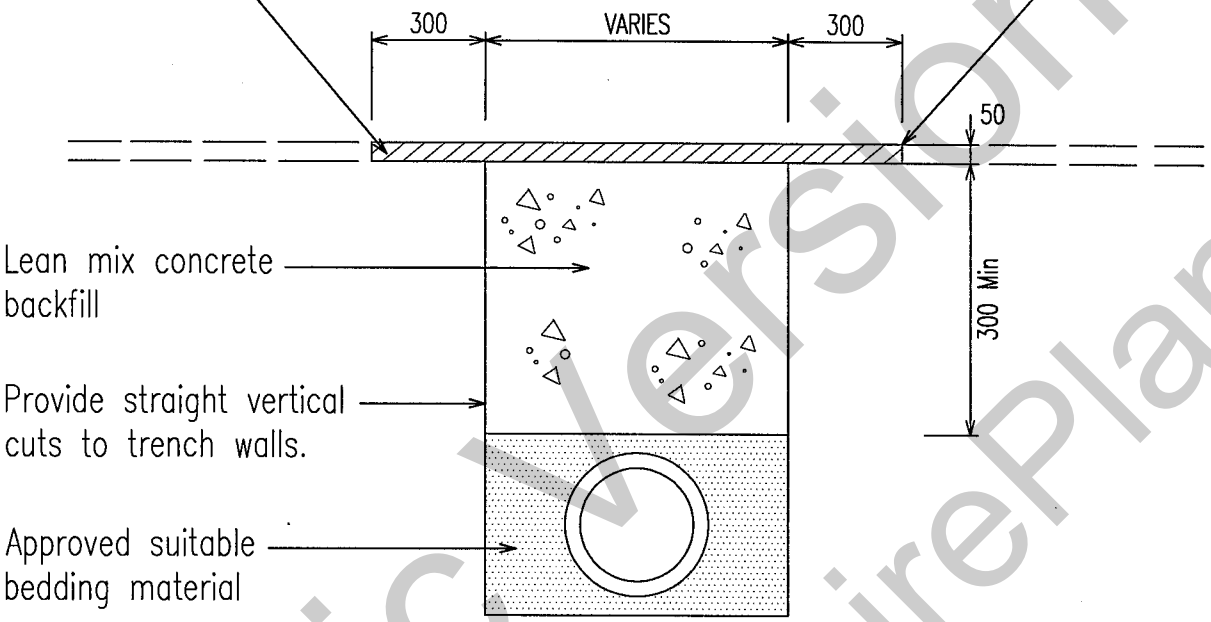
SCALE N.T.S.

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PEOPLE WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

27/5/2004 Manager Transport Planning	5/04 Engineer	Chief Draftsman / Designed	CABOOLTURE SHIRE COUNCIL	INTERSECTION TREATMENT FOR RURAL ROAD	04/04 08/03 DATE	Linemarking Changes VARIOUS CHANGES REVISION	B A NO.
					STANDARD DRAWING NO. 01-18 B		

50mm Asphalt Surfacing, BCC TYPE 2
(Premix is permitted as a substitute where hot asphalt is not available) over the application of Emulsion Seal or Bitumen Tack Coat.

All broken edges are to be saw cut square and straight before resurfacing



NOTE:
Restoration is to be from tabledrain to tabledrain for rural roads.

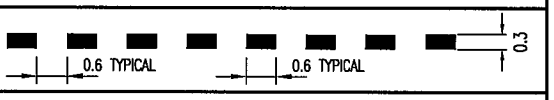
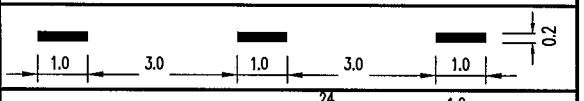
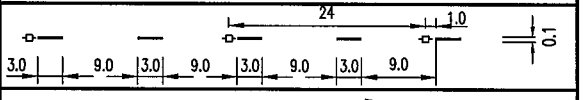
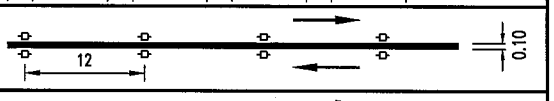
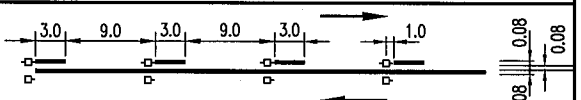
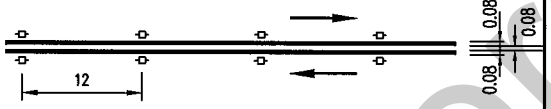
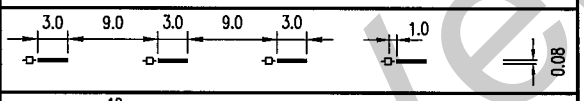
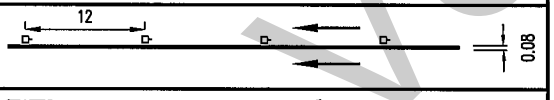
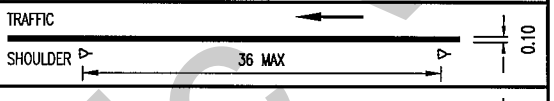
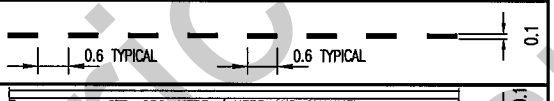
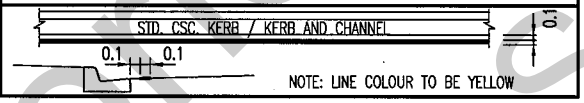
Sawcut trench prior to excavation.

SCALE N.T.S.

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PEOPLE WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

2.10.03 Manager Transport Planning	11/03 Engineer	10/03 Chief Draftsman; 9/10/03 Designed	CABOOLTURE SHIRE COUNCIL	OPEN TRENCH CROSSING BITUMEN SURFACED ROAD	08/03	Various Changes	B
					05/02	Tack Seal	A
					09/99	ORIGINAL ISSUE	
					DATE	REVISION	NO.
				STANDARD DRAWING NO. 01-22 B			

09/10/2003 09:55:39

TYPE	DESCRIPTION	DIMENSIONS
A	HOLDING LINE	
B1	GIVE WAY LINE	
B2	CONTINUITY LINE	
C	SEPARATION LINE	
D	SEPARATION LINE UNBROKEN (REFER NOTE 3)	
D1	BARRIER LINE ONE DIRECTION	
D2	BARRIER LINE BOTH DIRECTIONS	
E1	LANE LINE	
E2	LANE LINE UNBROKEN	
F	EDGE LINE LEFT AND RIGHT SIDE	
G	TURN LINE	
P1	NO STANDING LINE	

RRPM LEGEND

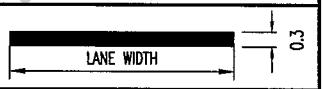
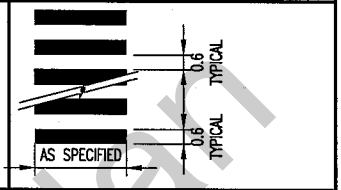
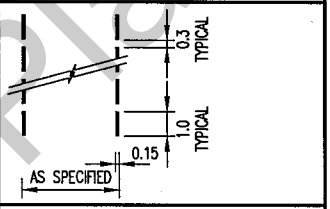
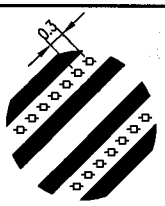
- UNIDIRECTIONAL – WHITE
- UNIDIRECTIONAL – RED
- BIDIRECTIONAL – WHITE
- BIDIRECTIONAL – BLUE

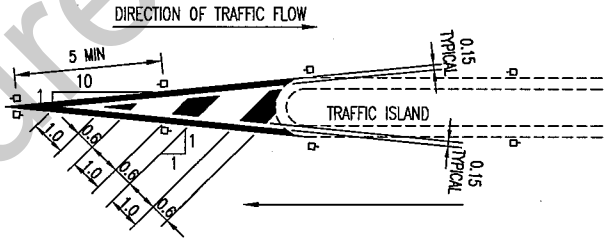
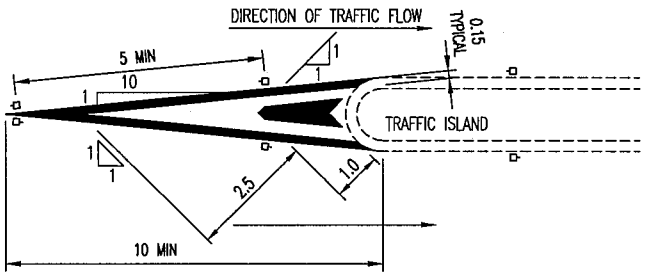
* BLUE RETRO-REFLECTIVE PAVEMENT MARKERS ARE TO BE PLACED 100mm HYDRANT SIDE OF THE ROAD CENTRELINE MARKING, FOR ALL HYDRANT LOCATIONS.

NOTES:

1. ALL DIMENSIONS ARE IN METRES
2. REFER TO MAIN ROADS 'MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES' FOR APPLICATION OF LINETYPES.
3. LINE THICKNESS FOR SEPARATION LINES TO BE 0.15m FOR MULTILANE ROADS.

SCALE: N.T.S.

TYPE	DESCRIPTION	DIMENSIONS
H	STOP BAR	
PC1	PEDESTRIAN CROSSING, (ZEBRA), UNSIGNALIZED	
PC2	PEDESTRIAN CROSSING, SIGNALIZED.	
R1	REFLECTORIZED RAISED PAVEMENT MARKERS, CHEVRON PLACEMENT	 WHITE BIDIRECTIONAL RRPM'S TO BE INSTALLED IN CHEVRONS IN EVERY SECOND GAP AT 300mm SPACINGS.

TYPE	DESCRIPTION	DIMENSIONS
CH1	CHEVRON, SINGLE APPROACH	
CH2	CHEVRON, SPLAYED APPROACH	

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PEOPLE WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

CABOOLTURE SHIRE COUNCIL

LINEMARKING AND R.R.P.M. DETAILS

STANDARD DRAWING No. 01-41B

A | B

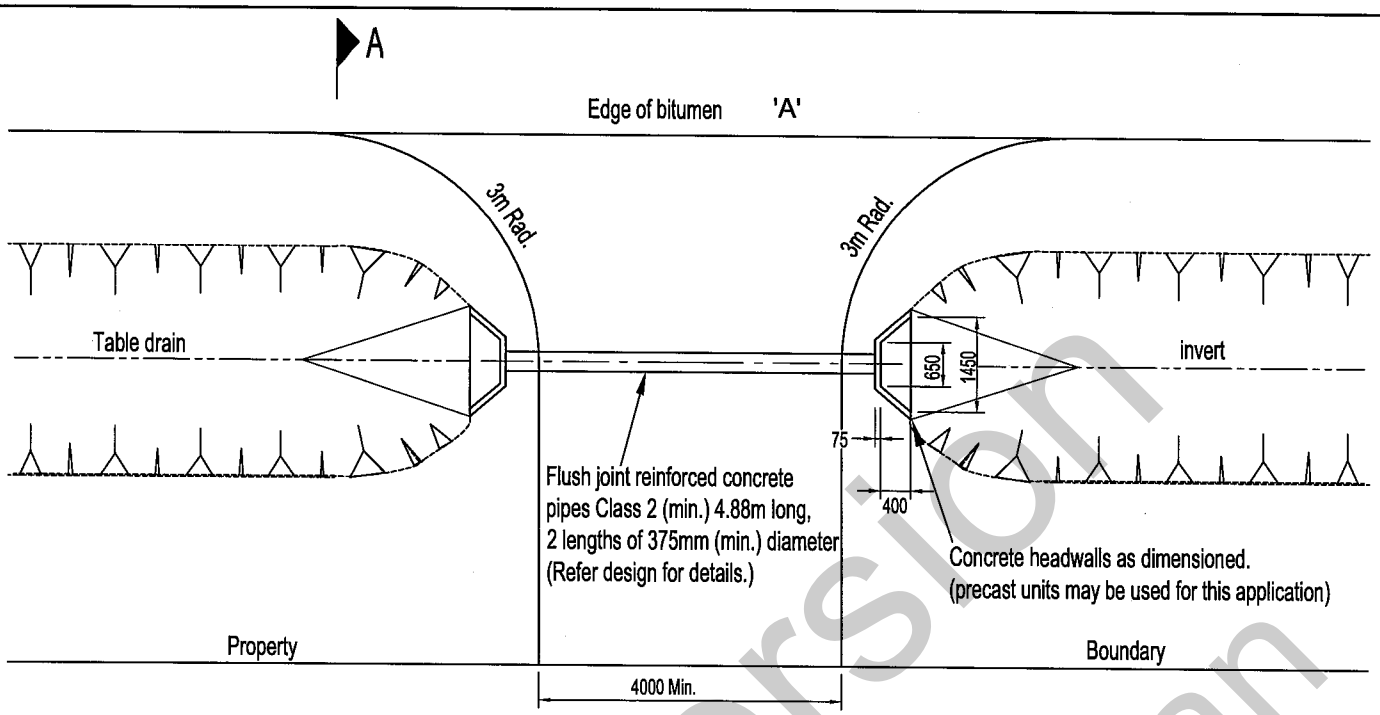
DATE:

REVISIONS		DRAWN	DATE
B	VARIOUS CHANGES.	D.B.	08/03
A	RRPM's AND DIVIDING LINE ADDED TO STD.	P.J.J.	05/00
X	ORIGINAL ISSUE		

Manager	Engineer	Chief Draftsman	Designed
Dec 03	11/03	14/03	9/10/03

Field Book	
Level Book	
Job File	
Survey File	
Road No.	

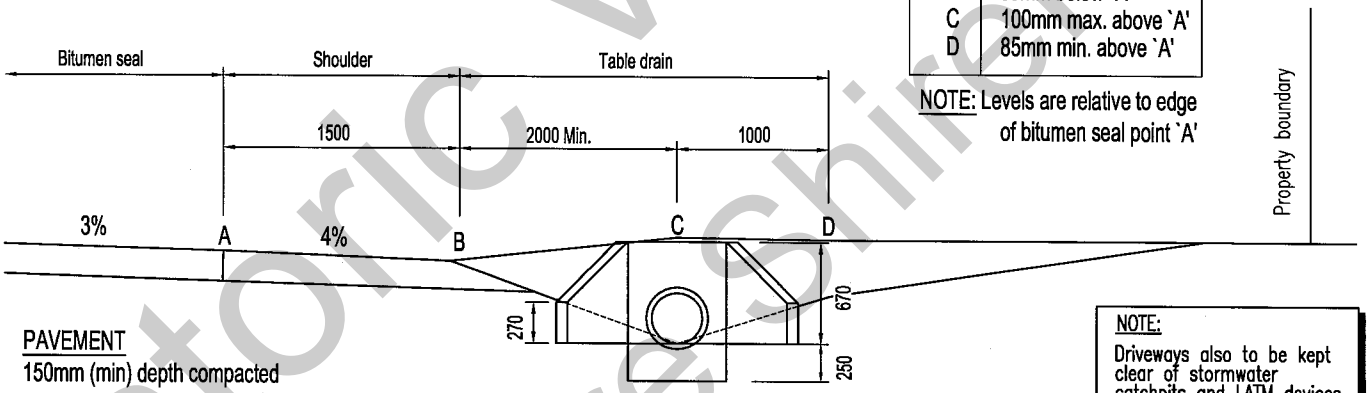
06/10/2003 02:05:54



PLAN 1:100

LEVELS	
POINT	REMARKS
B	60mm below `A'
C	100mm max. above `A'
D	85mm min. above `A'

NOTE: Levels are relative to edge of bitumen seal point `A'

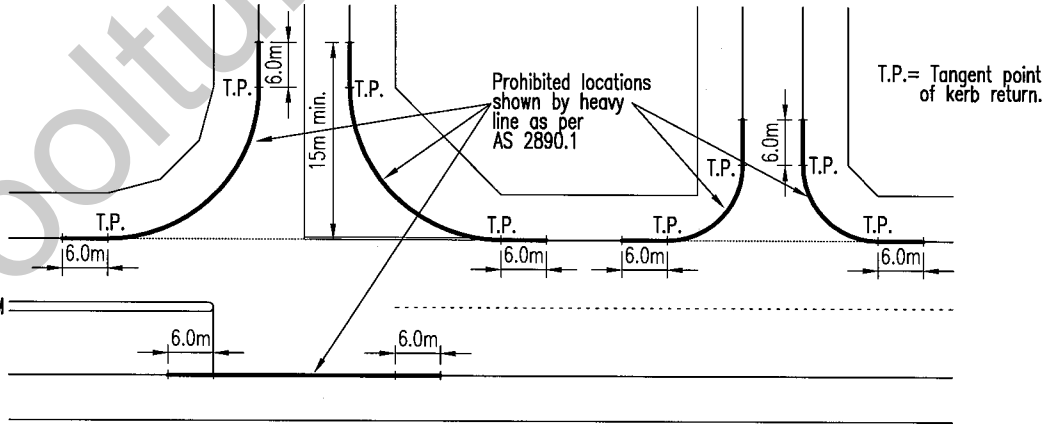


SECTION A-A 1:50

PAVEMENT
150mm (min) depth compacted Class 2.5 min. gravel (From point B to property boundary). Area from point A to point B to match existing road pavement depth.

NOTES
1. Pavement to be sealed with a prime/primerseal plus a 2 coat bitumen spray seal if required.
2. Sloping headwalls to be provided on Collector and above roads.
3. Check visibility for all proposed locations.
4. This crossing is only suitable for minor drainage flows.

NOTE:
Driveways also to be kept clear of stormwater catchpits and LATM devices. These devices will not be moved for driveways.



SCALE N.T.S.

PROHIBITED LOCATION OF DRIVEWAYS *

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PEOPLE WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

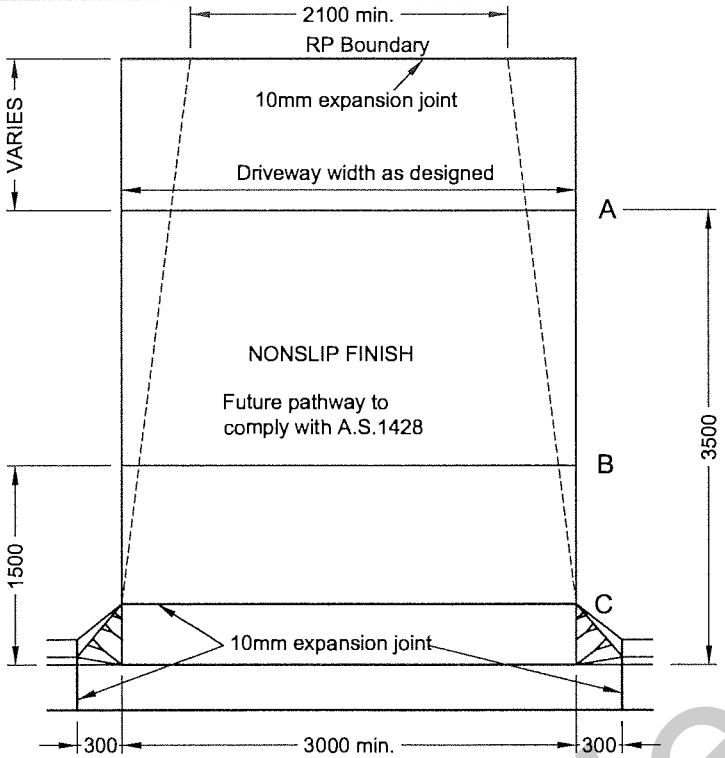
Manager(s)	Engineer	Design Office Co-ordinator	Tech.Officer
14/11/05	11/05		

CABOOLTURE SHIRE COUNCIL

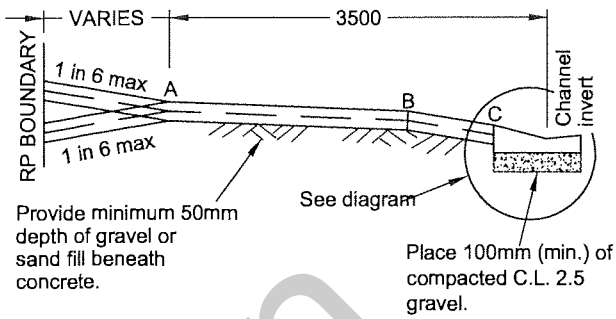
PIPED CROSSING

DATE	REVISION	NO.
11/05	Notes Added	F
07/04	Prohibited Driveway Locations Added	E
12/03	Various Changes	D
08/03	Various Changes	C
02/00	Note Added	B
09/99	Title Change	A

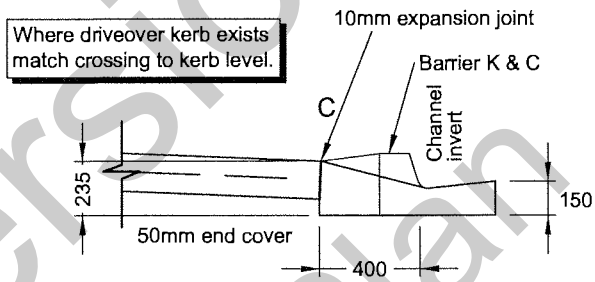
STANDARD DRAWING NO.
01-42 F



PLAN

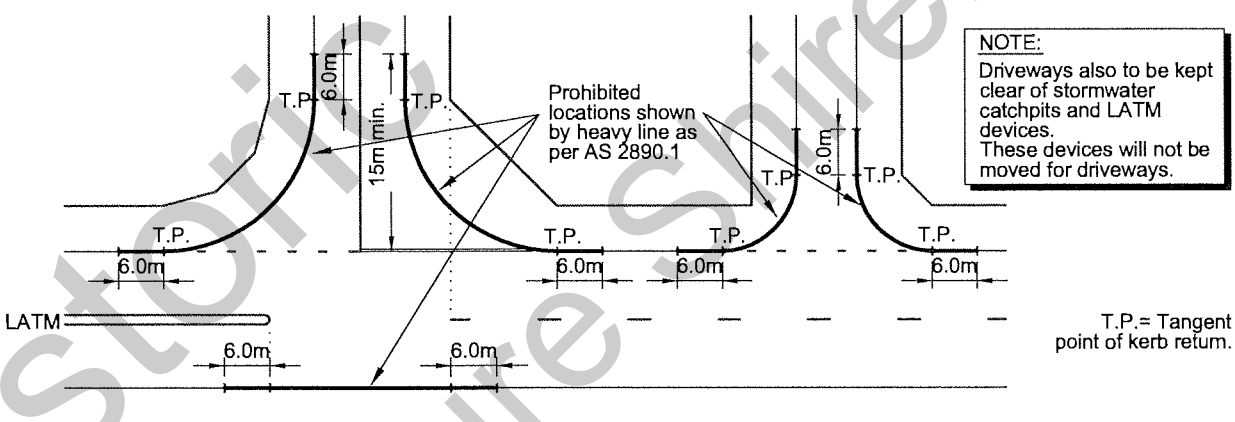


CROSS SECTION



DIAGRAM

- Grade invert to match levels of channel at both ends.
- Kerb and channel to be saw cut at each end and broken out over this area to allow crossing to be constructed. Where driveover kerb exists match crossing to kerb level.
- Provide 1 in 10 batter from driveway to natural surface level.
- Wheel tracks will be accepted between point A and the RP boundary for residential crossings.



*PROHIBITED LOCATION OF DRIVEWAYS

METHOD OF CONSTRUCTION

1. Driveway is to be constructed in two sections with an expansion joint along Line C. Joint to be 10mm wide and filled with mastic.
2. Measure back 400mm from existing channel invert to establish Line C. Excavate and place form boards so that board at LINE C is 110mm above the invert of the kerb and channel.
3. Measure back 1.5m from existing channel invert to establish Line B. Excavate and place form boards so that board at LINE B is 40mm above the existing top of kerb.
4. Measure back 3.5m from existing channel invert to establish Line A. Excavate and place form boards so that board at LINE A is 90mm above the existing top of kerb.
5. Place required mesh with 40mm top cover.
6. Concrete to be 125 thick and have SL72 mesh as a minimum.
7. Remove existing kerb and channel for width of driveway plus 300mm each side. Provide a 10mm expansion joint at each join.
8. Council Officer is to inspect boxing and reinforcement before concrete is placed, however, Engineers Certification may be required in lieu of this inspection. Telephone 07 54200100 to arrange this inspection. 48hrs notice is required.
9. Concrete strength to be N32 minimum

   Width of invert - 3.6 min.
   - 6.0 max.
10. Crossfall of existing road pavement adjacent to driveway is to be checked. If crossfall exceeds 3%, driveway may have to be redesigned to ensure satisfactory clearance for vehicles.

SCALE: N.T.S

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

CABOOLTURE SHIRE COUNCIL

RESIDENTIAL AND MULTI-RESIDENTIAL CROSSINGS

FOR FOOTPATHS LESS THAN 5.0m IN WIDTH

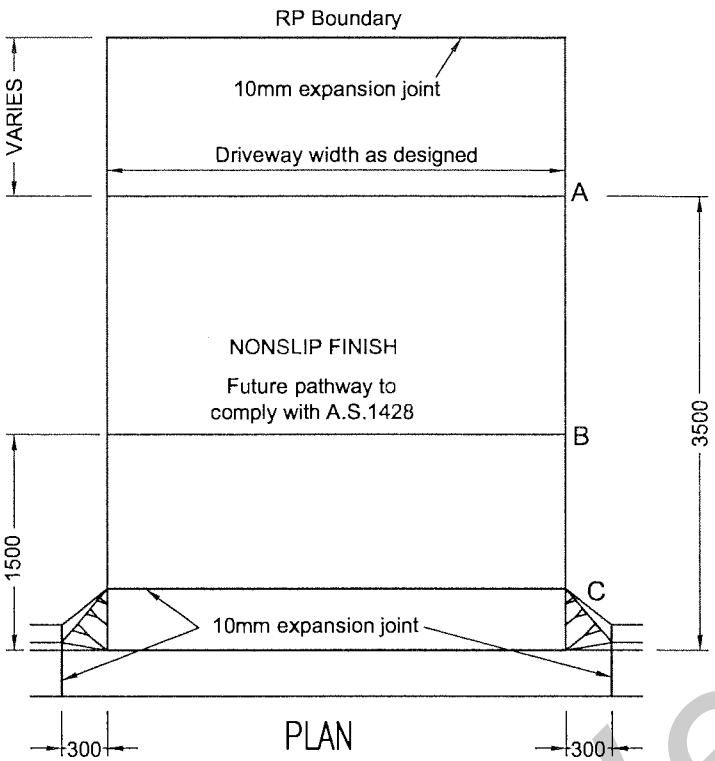
DRAWING No. 01-43 | REV. F

ORIGINAL SHEET SIZE A4

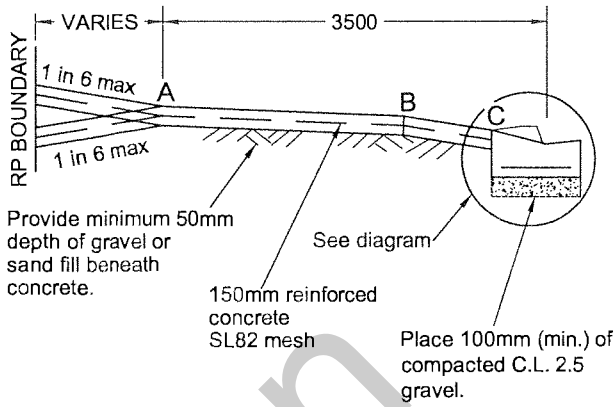
	REVISIONS	DRAWN	DATE
D	CONSTRUCTION DETAIL CHANGES	J.N.	08/07
E	PROHIBITED LOCATIONS ADDED		08/03
F	DIMENSIONS CHANGED		07/00
X	ORIGINAL ISSUE		

Tech. Officer	Design Office Co-Ordinator	Engineer	Manager(s)
	JRC 8/07	8/07	24.8.07

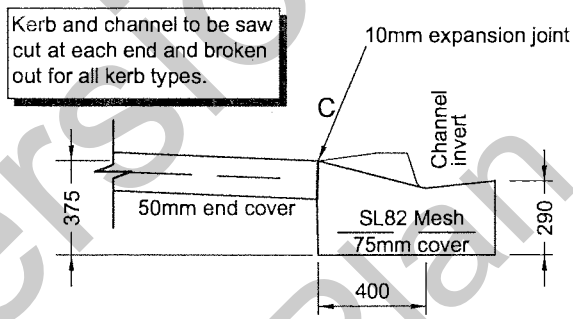
Field Book	
Level Book	-
Job File No.	
Survey File	
Road No.	



PLAN

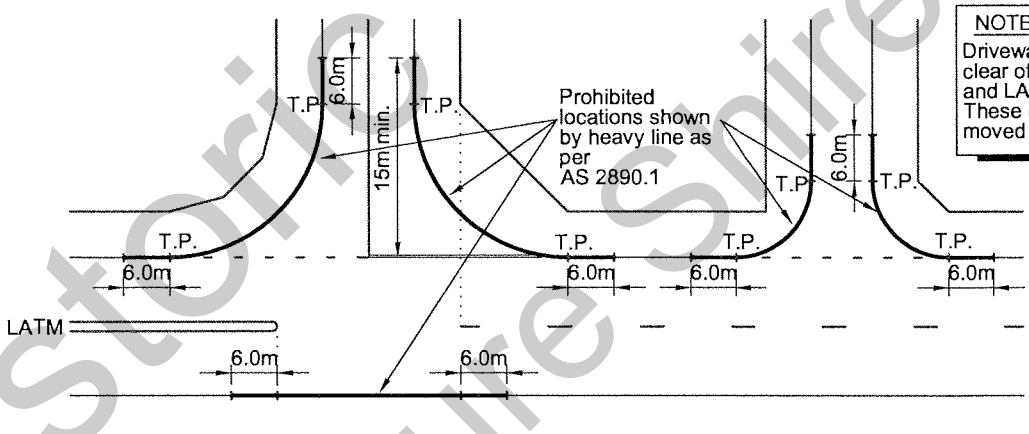


CROSS SECTION



DIAGRAM

- Grade invert to match levels of channel at both ends.
- Kerb and channel to be saw cut at each end and broken out over this area to allow crossing to be constructed.
- Provide 1 in 10 batter from driveway to natural surface level.



NOTE:
Driveways also to be kept clear of stormwater catchpits and LATM devices. These devices will not be moved for driveways.

T.P.= Tangent point of kerb return.

*PROHIBITED LOCATION OF DRIVEWAYS

METHOD OF CONSTRUCTION

1. Driveway is to be constructed in two sections with an expansion joint along Line C. Joint to be 10mm wide and filled with mastic.
2. Measure back 400mm from existing channel invert to establish Line C. Excavate and place form boards so that board at LINE C is 110mm above the invert of the kerb and channel.
3. Measure back 1.5m from existing channel invert to establish Line B. Excavate and place form boards so that board at LINE B is 40mm above the existing top of kerb.
4. Measure back 3.5m from existing channel invert to establish Line A. Excavate and place form boards so that board at LINE A is 90mm above the existing top of kerb.
5. Remove existing kerb and channel for width of driveway plus 300mm each side. Provide a 10mm expansion joint at each join.
6. Council Officer is to inspect boxing and reinforcement before concrete is placed however Engineers Certification may be required in lieu of this inspection. Telephone 07 54200100 to arrange this inspection. 48hrs. notice is required.
7. The concrete is to conform with the following requirements :
   Thickness - 150mm
   Strength - N32 minimum
   Reinforcing - SL82 mesh placed with 40mm topcover
8. Crossfall of existing road pavement adjacent to driveway is to be checked. If crossfall exceeds 3%, driveway may have to be redesigned to ensure satisfactory clearance for vehicles.

SCALE: N.T.S

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

CABOOLTURE SHIRE COUNCIL

INDUSTRIAL CROSSING / INVERT

FOR FOOTPATHS LESS THAN 5.0m IN WIDTH

DRAWING No. 01-44 | REV. E

ORIGINAL SHEET SIZE A4

REVISIONS		DRAWN	DATE
E	NOTE CHANGED	J.N.	08/07
D	PROHIBITED LOCATIONS ADDED		08/03
C	NOTE CHANGED		06/00
X	ORIGINAL ISSUE		

Tech. Officer	Design Office Co-Ordinator	Engineer	Manager(s)
	29/11/07	11/07	28/11/07

Field Book	
Level Book	-
Job File No.	
Survey File	
Road No.	

NOTES:

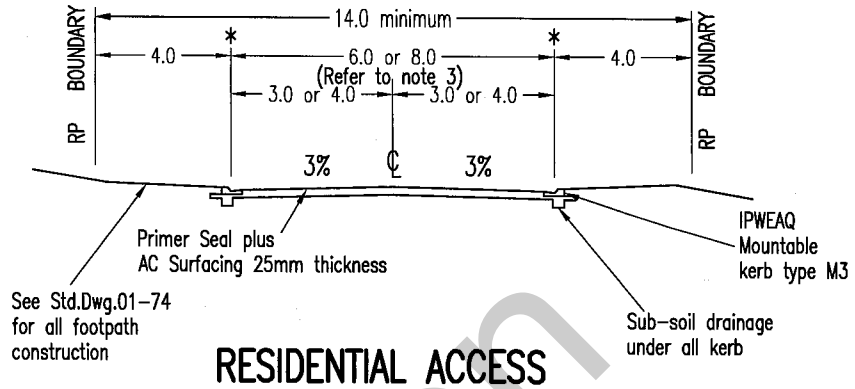
1. Provide 75mm topsoil and turf to all footpaths and batters up to 1 in 4 slope.
   In areas greater than 1 in 4 slope, grouted stone pitching is required unless otherwise approved by the Manager of Engineering Planning.

2. Extend Sub base class 2.3 min. 150mm behind kerb.
   125mm min. depth under kerb and channel.

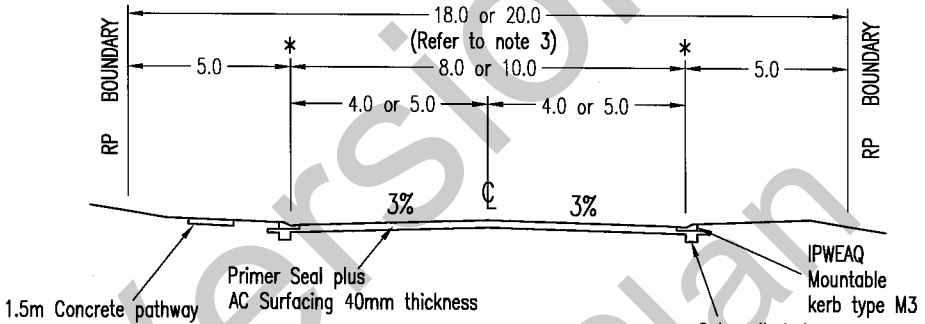
3. Refer to Caboolture Shire Council, Design and Development Manual for details on appropriate lane widths.

4. Pavement depths to be determined by approved pavement design based on subgrade soil tests. (min. 200mm).

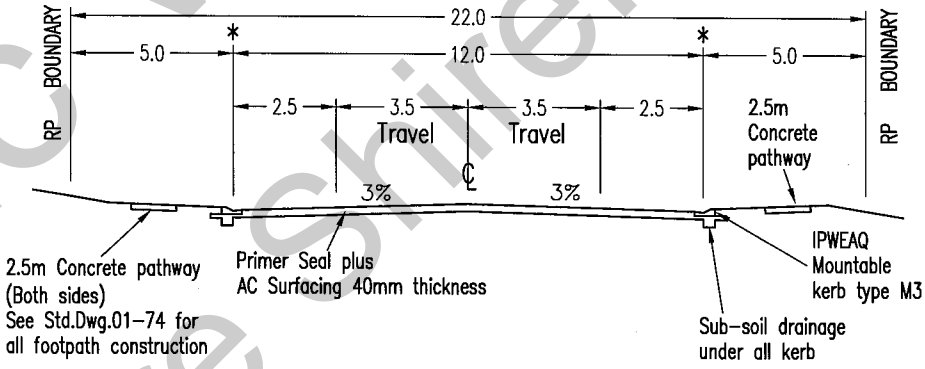
* Kerb invert for set out



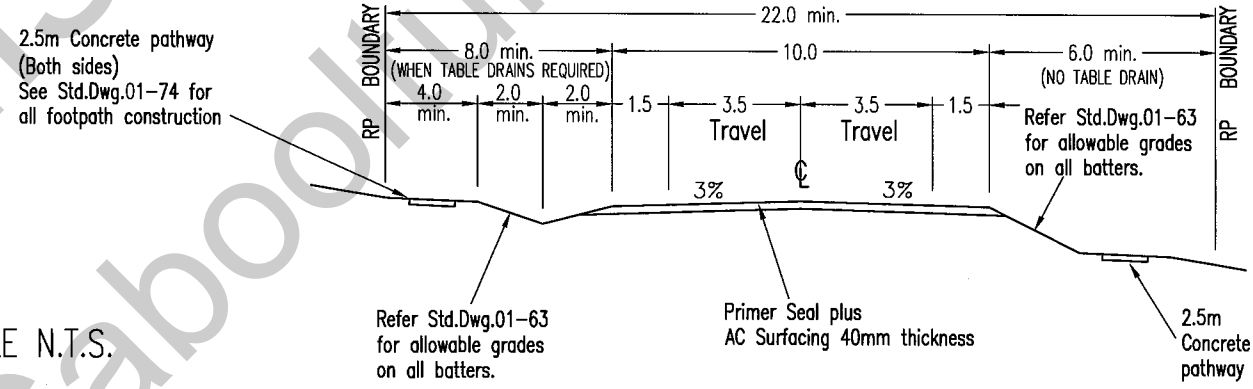
RESIDENTIAL ACCESS



MINOR COLLECTOR



RESIDENTIAL COLLECTOR (with access)



SCALE N.T.S.

RESIDENTIAL COLLECTOR (without access)

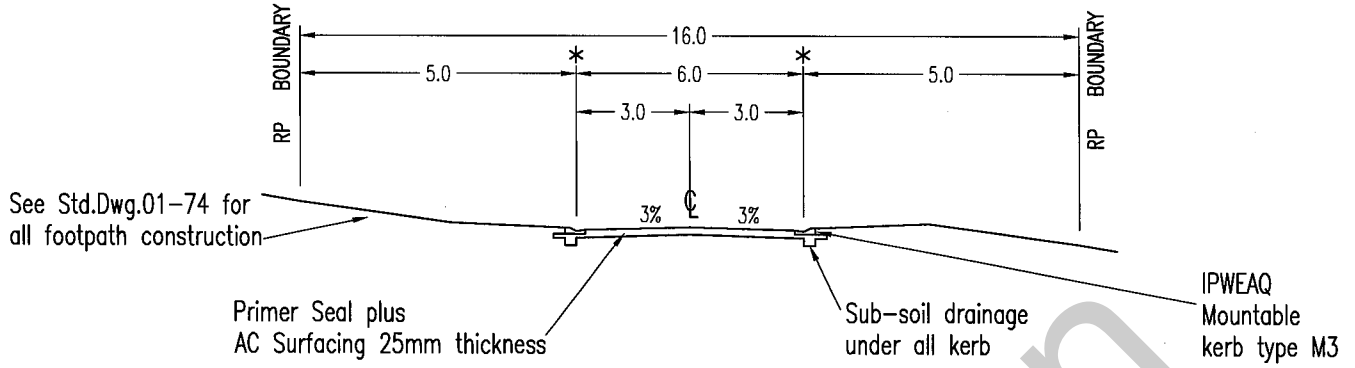
CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PEOPLE WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

Manager(s)	Engineer	Tech.Officer	CABOOLTURE SHIRE COUNCIL
16.11.05	11/05	Design Office Co-ordinator 11/05	

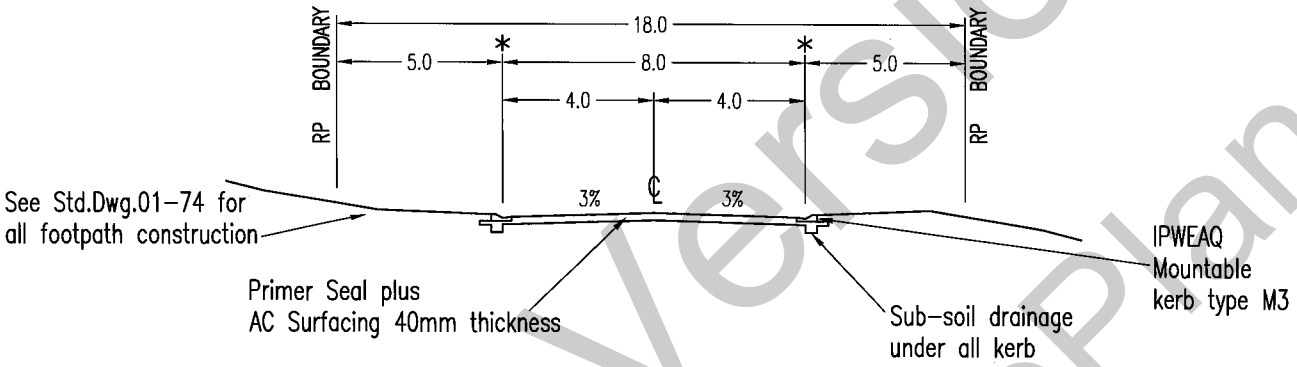
CROSS SECTIONS
RESIDENTIAL ACCESS
MINOR COLLECTOR
RESIDENTIAL COLLECTOR

DATE	REVISION	NO.
11/05	Detail Added	C
08/03	Various Changes	B
06/99	Footpath grade revised	A
09/99	ORIGINAL ISSUE	

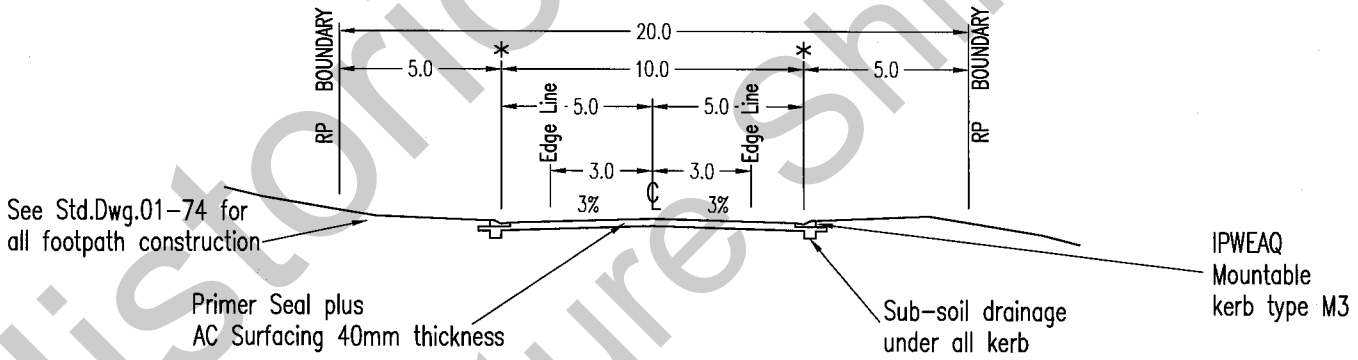
STANDARD DRAWING NO.
01-45 C



RURAL RESIDENTIAL ACCESS



RURAL RESIDENTIAL MINOR COLLECTOR



RURAL RESIDENTIAL COLLECTOR

NOTES:

Provide 75mm topsoil and turf to all footpaths

Extend Sub base class 2.3 min. 150mm behind kerb.
125mm min. depth under kerb and channel.

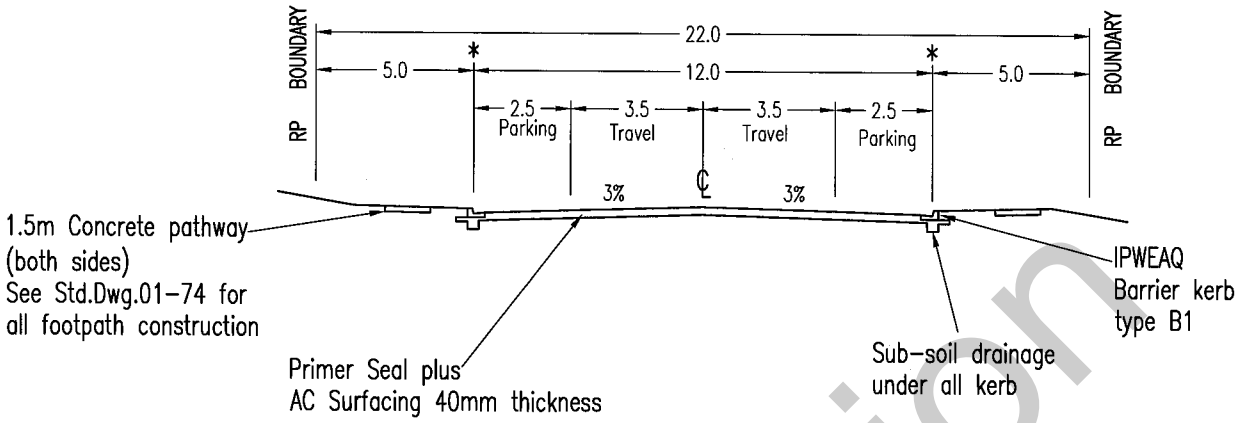
Pavement depths to be determined by approved pavement design based on subgrade soil tests. (min. 200mm)

* Kerb invert for set out

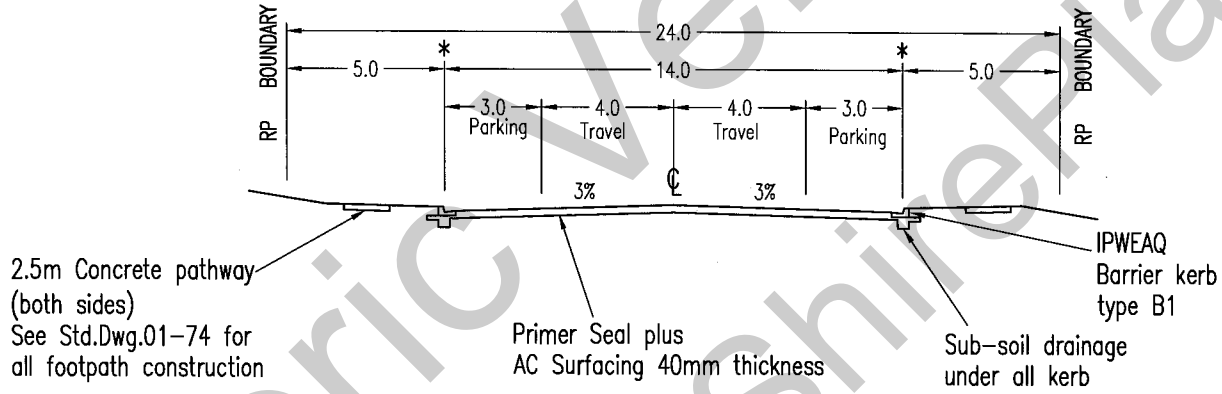
SCALE N.T.S.

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PEOPLE WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

16.11.05 Manager(s)	11/05 Engineer	11/05 Design Office Co-ordinator	CABOOLTURE SHIRE COUNCIL	CROSS SECTIONS RURAL RESIDENTIAL ACCESS RURAL RESIDENTIAL COLLECTOR	11/05 08/03 06/99 09/99	Notes Updated Various Changes Grades Modified ORIGINAL ISSUE	C B A
		11/05 Tech.Officer			DATE	REVISION	NO.
					STANDARD DRAWING NO. 01-46 C		



INDUSTRIAL ACCESS



INDUSTRIAL COLLECTOR

NOTES:

Provide 75mm topsoil and turf to all footpaths

Extend Sub base class 2.3 min. 150mm behind kerb.
125mm min. depth under kerb and channel.

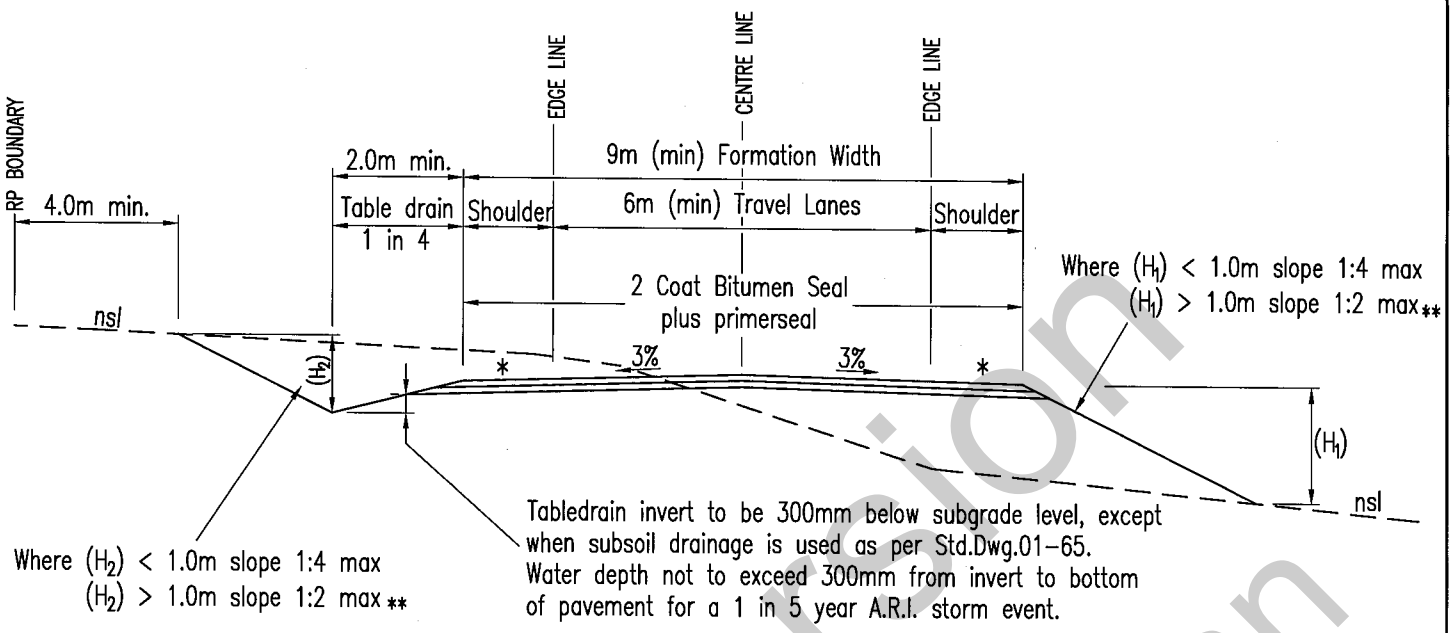
Pavement depths to be determined by approved pavement design based on subgrade soil tests.
(200mm min. for Industrial Access & 250mm min. for Industrial Collector).

* Kerb invert for set out

SCALE N.T.S.

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PEOPLE WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

16.11.05 Manager(s)	16/11/05 Engineer	11/05 Design Office Co-ordinator; 11/05 Tech.Officer	CABOOLTURE SHIRE COUNCIL	CROSS SECTIONS INDUSTRIAL ACCESS INDUSTRIAL COLLECTOR	11/05 Footpath Details C 08/03 Various Changes B 05/99 Grades Modified A 09/99 ORIGINAL ISSUE	DATE / REVISION / NO.
					STANDARD DRAWING NO. 01-48 C	



* A shoulder is to be constructed to full width using base and sub base materials and thickness identical to pavement design. Alternatively subsoil drainage is to be provided as per Std.Dwg.01-65.

** Provide 75mm topsoil and turf or hydromulch to all footpaths and batters up to 1 in 4 slope. In areas greater than 1 in 4 slope, grouted stone pitching is required unless otherwise approved by the Manager of Engineering Planning.

*** Unless otherwise advised.

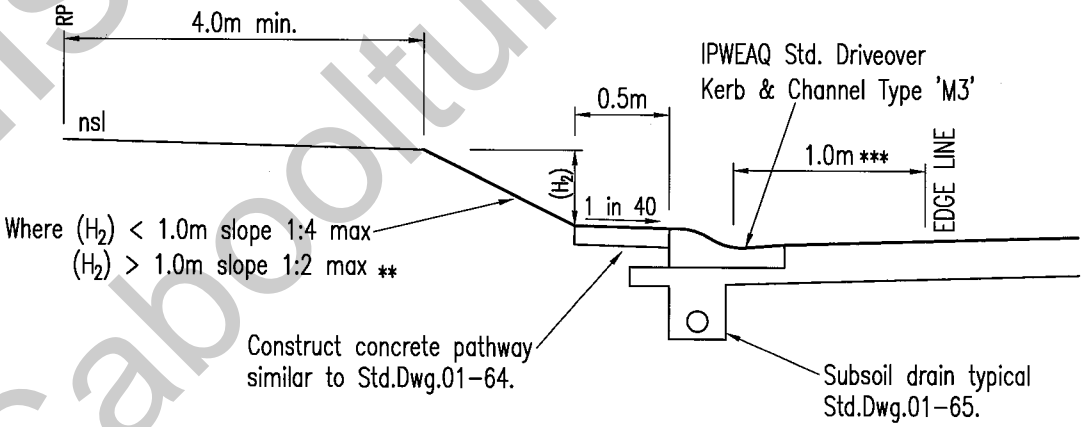
NOTES: A safety barrier is to be provided as dictated by A.S. 3845 in particular clause 1.6, also refer Main Roads, Road Design Manual Part 8.

Pavement depths to be determined by approved pavement design based on subgrade soil tests. (min. 200mm).

Road is to be located centrally within the Road Reserve.

Formation width may be reduced to 7m for roads serving up to 15 lots.

TYPICAL RURAL ROAD CROSS SECTION



SCALE N.T.S.

ALTERNATE CUTTING TREATMENT

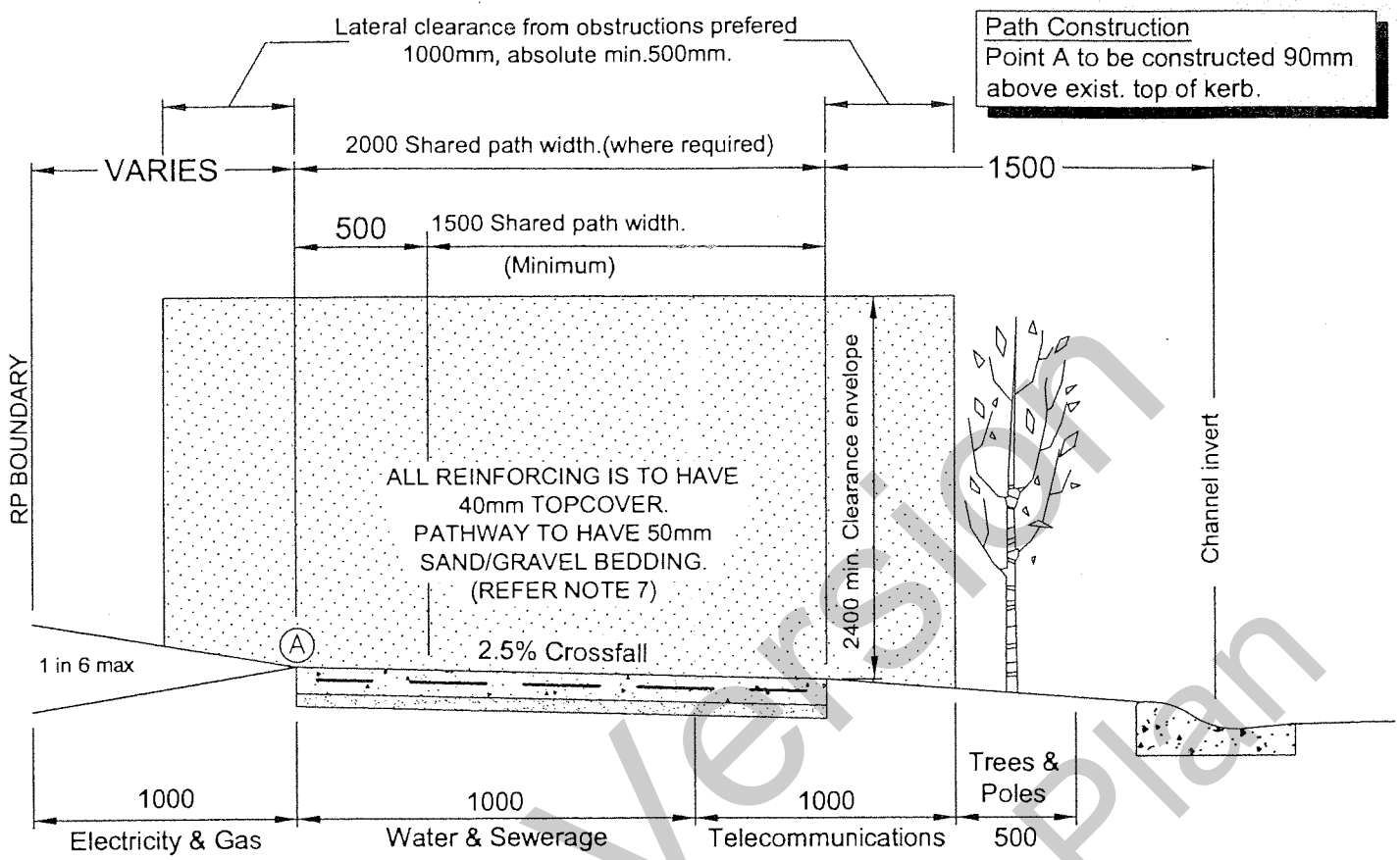
CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PEOPLE WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

Manager(s)	Engineer	Design Office Co-ordinator / Tech.Officer	CABOOLTURE SHIRE COUNCIL
16/11/05	11/05	5/5/05 / 11/05	

RURAL ROAD & RURAL RESIDENTIAL (without kerb, No Lot Access.) CROSS SECTION

DATE	REVISION	NO.
11/05	Changes to Batters	D
08/03	Various Changes	C
12/99	Various Changes	B
04/99	Various Changes ORIGINAL ISSUE	A

STANDARD DRAWING NO. 01-63 D



TYPICAL CROSS SECTION - STANDARD PATHWAY

PATHWAY CONSTRUCTION DETAILS

STANDARD PATHWAY	125mm THICK N32 CONCRETE WITH SL72 REINFORCING
PATHWAYS ADJACENT RESIDENTIAL LOTS CONTAINING EXISTING DWELLINGS AND LANDSCAPING. (DRIVEWAYS MUST USE THE HIGHER STANDARD)	100mm THICK N32 CONCRETE WITH SL62 REINFORCING
WHERE FOOTPATH CROSSES COMMERCIAL OR INDUSTRIAL DRIVEWAY. (REFER CSC STANDARD DRAWING 01-44)	150mm THICK N32 CONCRETE WITH SL82 REINFORCING
AC AND GRAVEL PATH LOCATIONS AND DEPTHS TO BE APPROVED BY MANAGER ENGINEERING PLANNING IN LOCATIONS WITHOUT KERB AND CHANNEL	25mm AC ON APPROVED DEPTH CL 2.3 GRAVEL

NOTES:

1. Provide tooled joint every 2.5m. Provide Connelly Key Joint or equivalent at all construction joints. Provide 10mm expansion joint at 10m maximum spaces.
2. Expansion joints to be filled with approved filler and provided with 12mm dia. plain galv. dowels at 300 centres with 20mm O.D. greased P.V.C. sleeve and end cap at one end.
3. Expansion joints are to be provided in concrete pathway adjacent to all concrete property crossings and where any variations occur.
4. Ensure Service boxes etc. are modified to finish flush with top of path surface.
5. Pathway grades are to comply with the requirements of AS1428.1 where practical.
6. Pathway widths less than 2.00m are to be approved by the Manager of Engineering Planning.
7. 50mm sand / gravel bedding may be removed, as approved by superintendent.

* TACTILE INDICATORS SHALL BE INSTALLED AS PER AS 1428.4 -2002 *

SCALE: N.T.S

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

CABOOLTURE SHIRE COUNCIL

FOOTPATH CONSTRUCTION

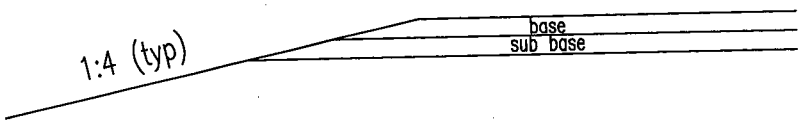
INCLUDING ALLOCATION FOR PUBLIC UTILITIES
FOR FOOTPATHS LESS THAN 5.0m IN WIDTH

DRAWING No. 01-64 | REV. F

ORIGINAL SHEET SIZE A4

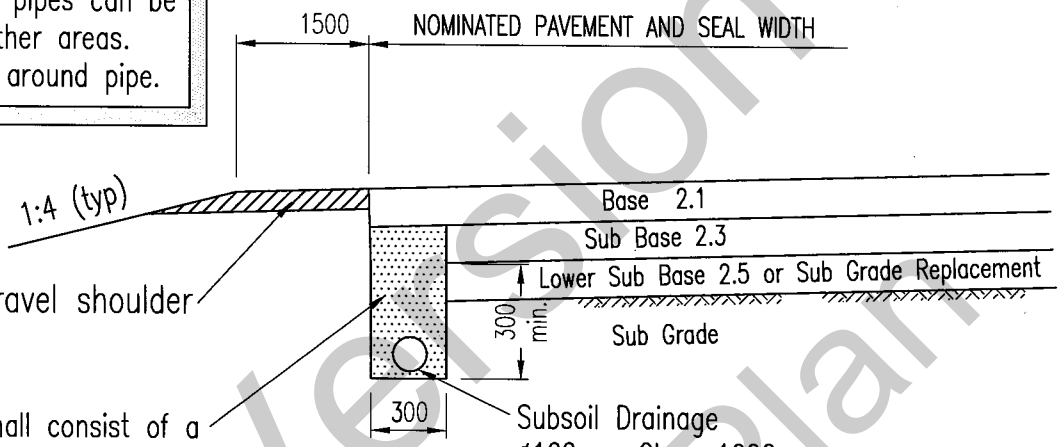
REVISIONS		DRAWN	DATE
F	REINFORCING DETAILS AMENDED	J.N.	08/07
E	CONCRETE DETAILS AMENDED		11/05
D	REINFORCING DETAILS AMENDED		11/05
X	ORIGINAL ISSUE		

Tech. Officer | Design Office Co-Ordinator: JRC 8/07 | Engineer: BA 8/07 | Manager(s): 24.8.07



Note: Subsoil Drainage Class
Class 1000 subsoil drainage pipes to be used under all sealed surfaces.
Class 400 subsoil drainage pipes can be used under kerb and all other areas.
No geofabric to be placed around pipe.

PREFERRED



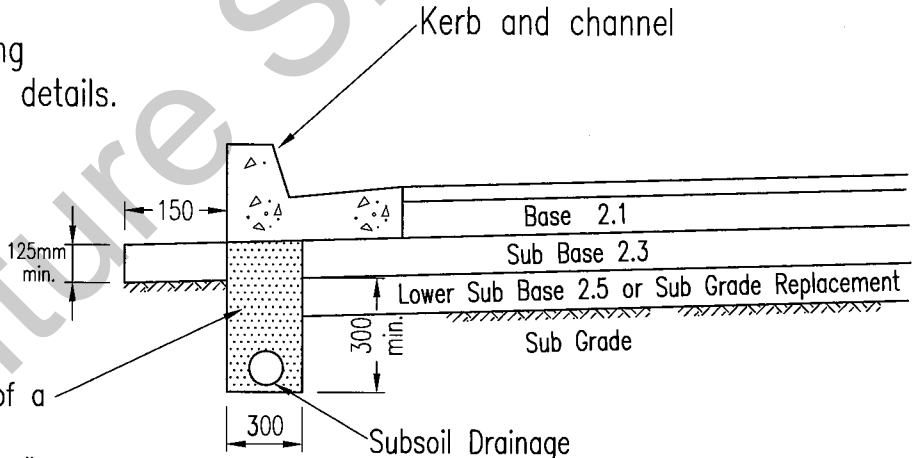
Trench backfill material shall consist of a nominal 5mm aggregate.
Refer "Table 6–Particial Size Distribution" Department of Main Road Standard Specification MRS11.22, 12/99

Subsoil Drainage
ø100mm Class 1000
No geofabric to be placed around pipe.

ALTERNATIVE

RURAL – Without kerb and channel

Note:
Refer to IPWEAQ Standard drawing R–0140 for other sub soil drain details.



Trench backfill material shall consist of a nominal 5mm aggregate.
Refer "Table 6–Particial Size Distribution" Department of Main Road Standard Specification MRS11.22, 12/99

Subsoil Drainage
ø100mm Class 400
No geofabric to be placed around pipe.

URBAN – With kerb and channel

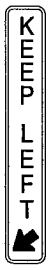
SCALE N.T.S.

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PEOPLE WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

15.11.05 Manager(s)	BA 15/11/05 Engineer	15/11/05 Design Office Co-ordinator; 11/05 Tech.Officer	CABOOLTURE SHIRE COUNCIL	SUBSOIL DRAINAGE ARRANGEMENT	11/05 08/03 07/01	Subsoil Drain Location Various Changes Shoulder added ORIGINAL ISSUE	C B A
					DATE	REVISION	NO.
					STANDARD DRAWING NO. 01-65 C		

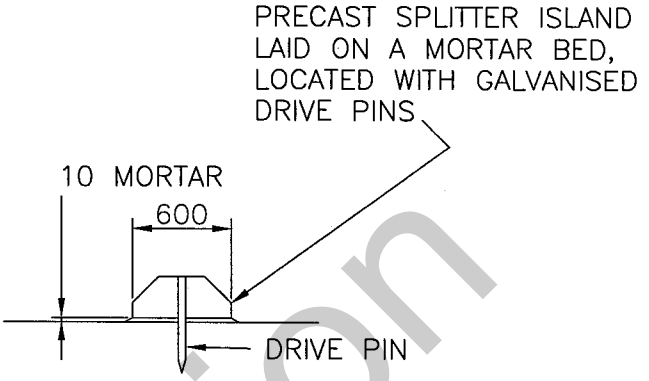
NOTES:

1. RAISED RETRO–REFLECTIVE PAVEMENT MARKERS ARE TO BE INSTALLED AT 5.0m SPACING.
2. SIGNS AND LINE MARKING ARE TO BE PLACED IN ACCORDANCE WITH THE M.U.T.C.D. & STD.DWG.01–41.

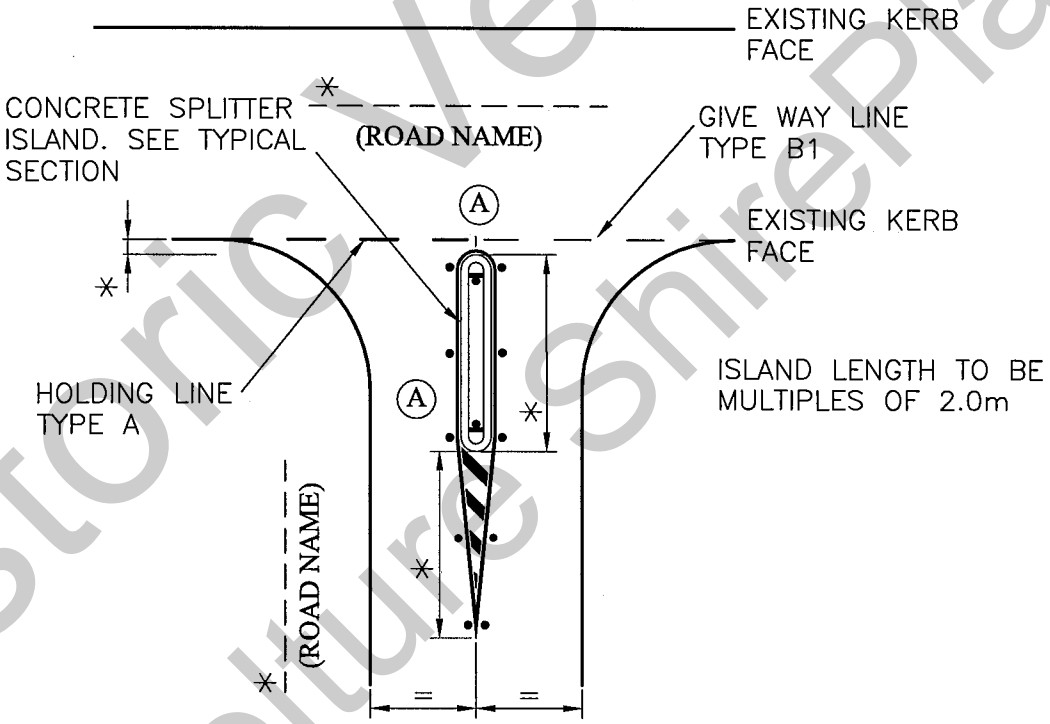


TC9265

Ⓐ



PRE-CAST ISLAND TYPICAL SECTION



✳ DETAILS TO BE COMPLETED FOR EACH PROJECT

600mm WIDE RAISED CONCRETE SPLITTER ISLAND

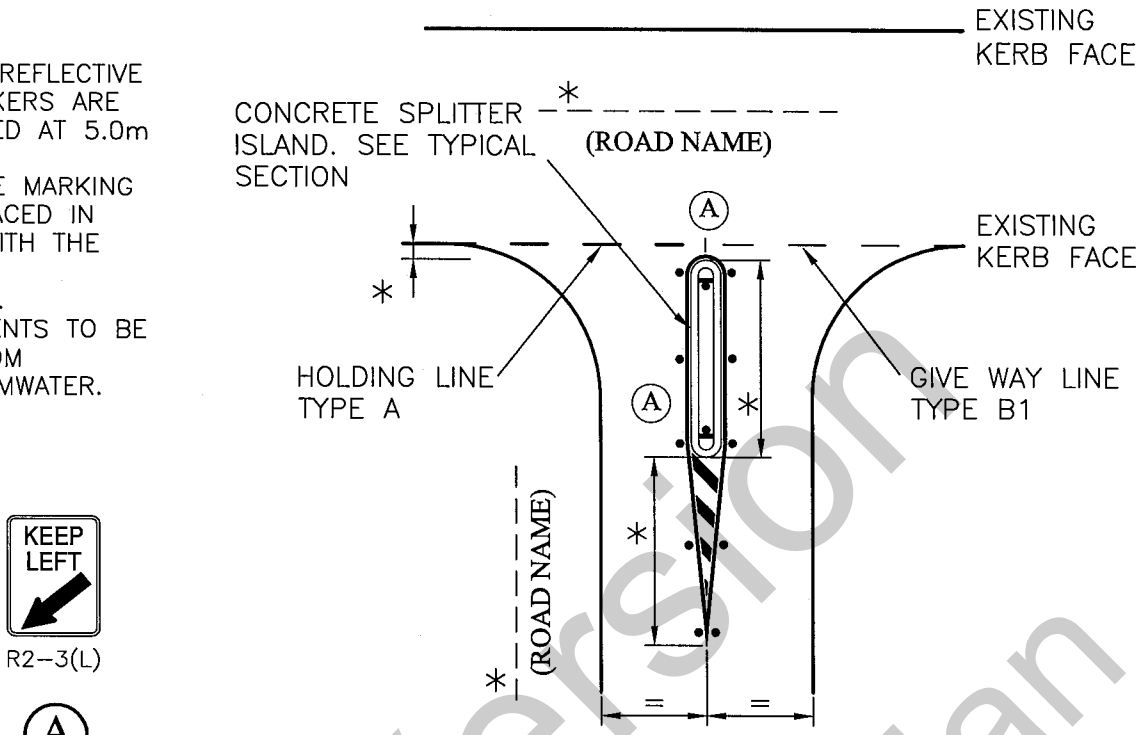
SCALE N.T.S.

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PEOPLE WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

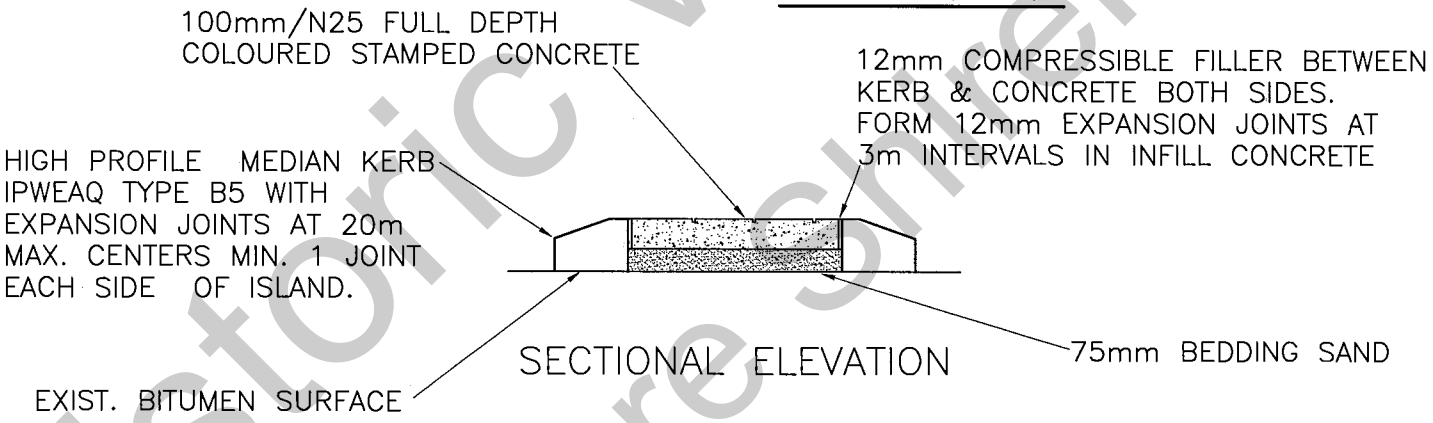
Manager Transport Planning	Engineer 11/03	Chief Draftsman 10/03	CABOOLTURE SHIRE COUNCIL	PRECAST SPLITTER ISLAND 600 WIDE. 600 WIDE. FOR EXISTING ROADS ONLY	08/03 10/99 DATE	Various Changes ORIGINAL ISSUE REVISION	A NO.
		Designed 9/10/03			STANDARD DRAWING NO. 01-68 A		

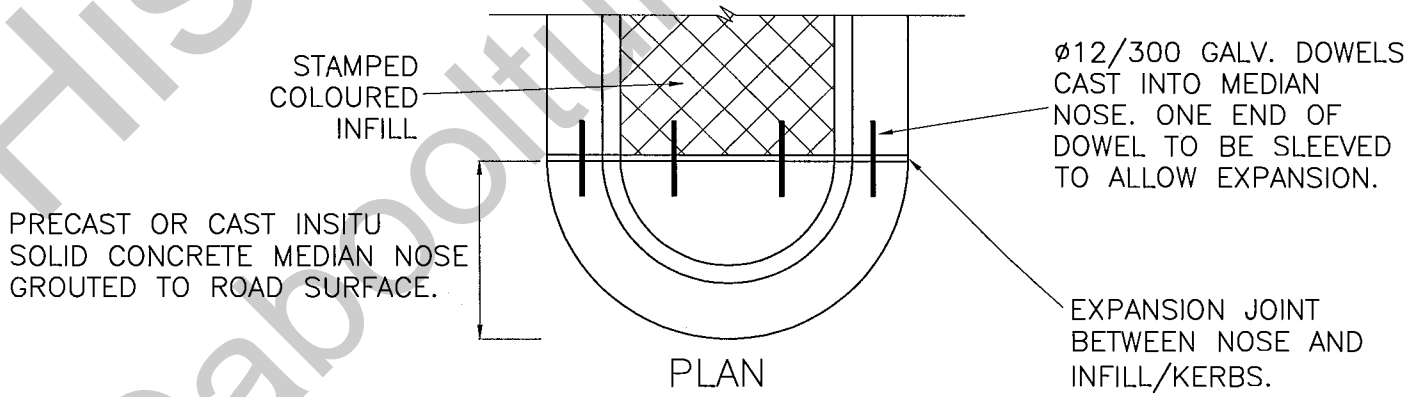
NOTES:

1. RAISED RETRO-REFLECTIVE PAVEMENT MARKERS ARE TO BE INSTALLED AT 5.0m SPACING.
2. SIGNS AND LINE MARKING ARE TO BE PLACED IN ACCORDANCE WITH THE M.U.T.C.D. & STD.DWG.01-41.
3. COLOURING AGENTS TO BE PREVENTED FROM ENTERING STORMWATER.



1.2m CAST-IN SITU CONCRETE SPLITTER ISLAND





SCALE N.T.S.

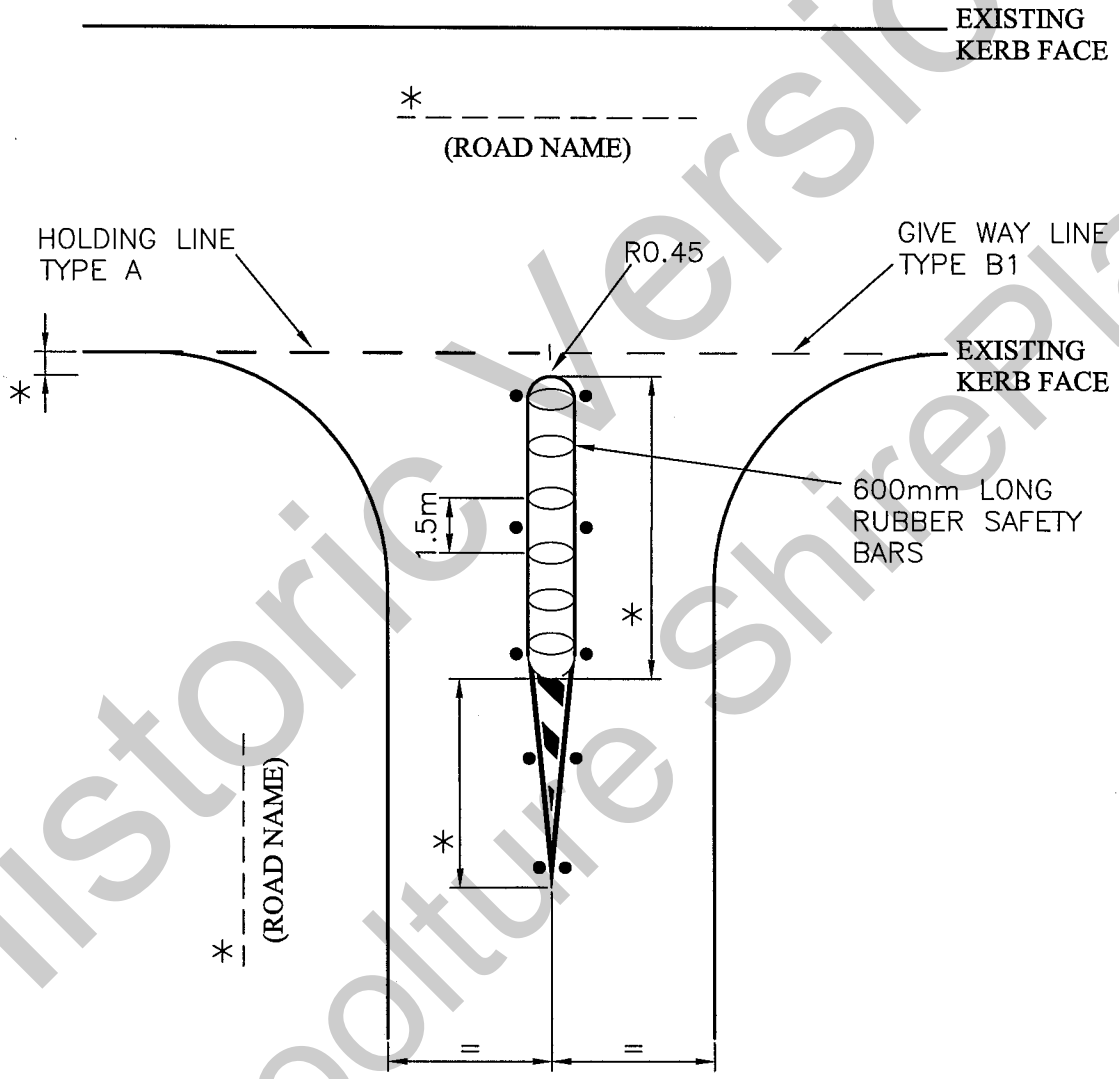
TYPICAL SECTION TROUGH TRAFFIC ISLAND

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PEOPLE WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

Manager Transport Planning	Engineer 12/03	Chief Draftsman 11/03	CABOOLTURE SHIRE COUNCIL	CAST-IN SITU SPLITTER ISLAND 1.2m WIDE	08/03 10/99	Various Changes ORIGINAL ISSUE	A
		Designed 28/11/03			DATE	REVISION	NO.
					STANDARD DRAWING NO. 01-69 A		

28/11/2003 09:30:23

NOTES:–
1. RAISED RETRO–REFLECTIVE PAVEMENT MARKERS ARE TO BE INSTALLED AT 5.0m SPACING.
2. LINE MARKING TO BE IN ACCORDANCE WITH THE M.U.T.C.D. & C.S.C. STD.DWG.01–41



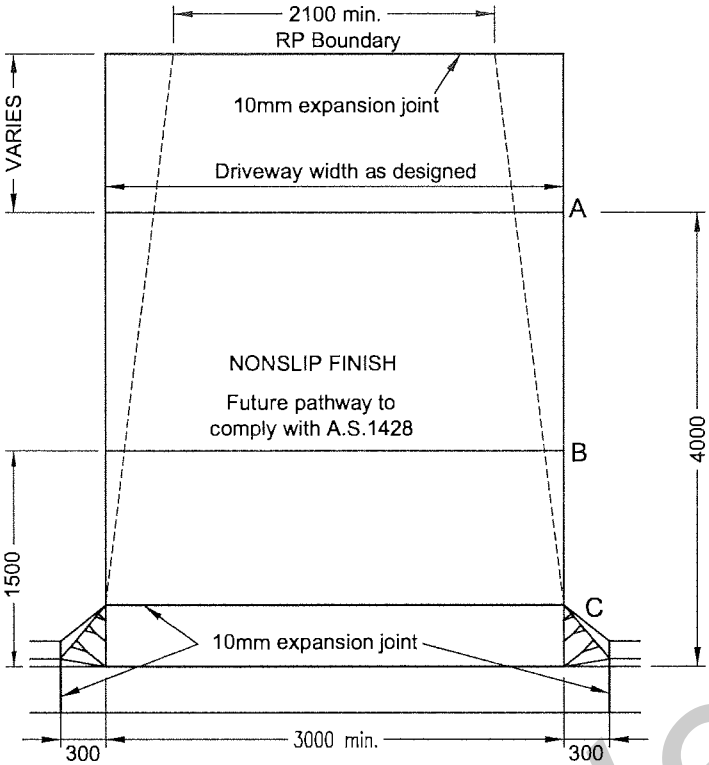
* DETAILS TO BE COMPLETED FOR EACH PROJECT

RUBBER SAFETY BAR SPLITTER ISLAND

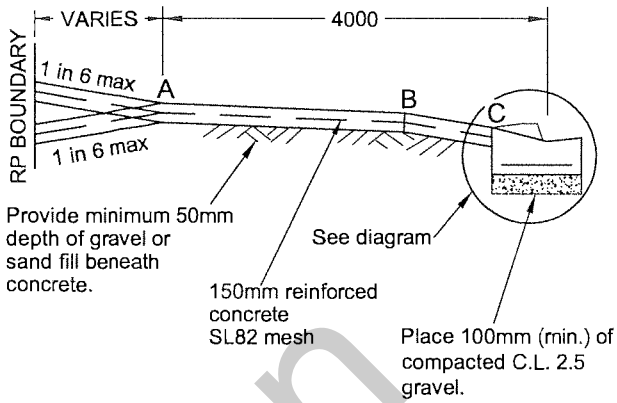
SCALE N.T.S.

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PEOPLE WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

Manager Transport Planning	Engineer	Chief Draftsman	CABOOLTURE SHIRE COUNCIL	RUBBER SAFETY BAR SPLITTER ISLAND FOR EXISTING ROADS ONLY	08/03 10/99	Various Changes ORIGINAL ISSUE	A
		Designed			DATE	REVISION	NO.
					STANDARD DRAWING NO. 01-70 A		

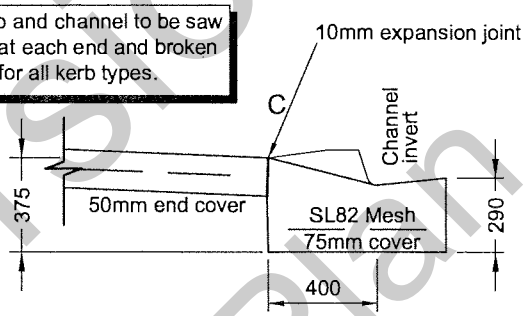


PLAN



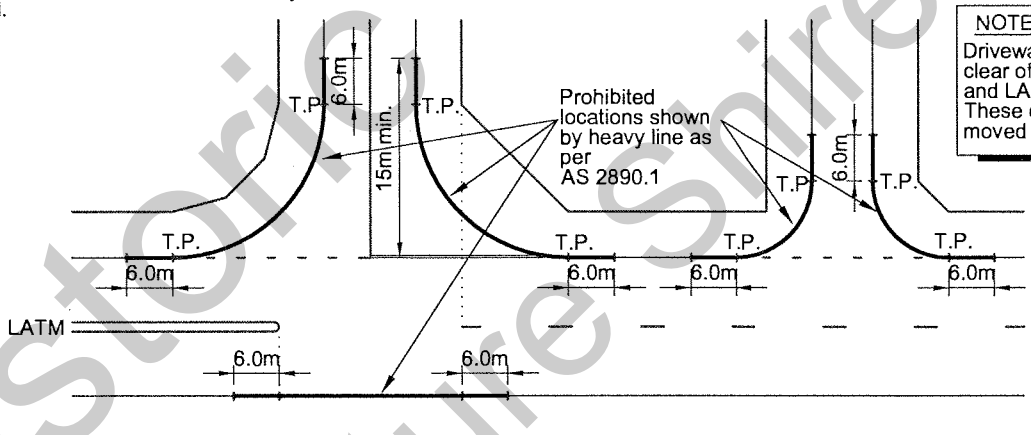
CROSS SECTION

Kerb and channel to be saw cut at each end and broken out for all kerb types.



DIAGRAM

- Grade invert to match levels of channel at both ends.
- Kerb and channel to be saw cut at each end and broken out over this area to allow crossing to be constructed.
- Provide 1 in 10 batter from driveway to natural surface level.



NOTE:
Driveways also to be kept clear of stormwater catchpits and LATM devices. These devices will not be moved for driveways.

T.P.= Tangent point of kerb return.

*PROHIBITED LOCATION OF DRIVEWAYS

METHOD OF CONSTRUCTION

1. Driveway is to be constructed in two sections with an expansion joint along Line C. Joint to be 10mm wide and filled with mastic.
2.
3. Measure back 400mm from existing channel invert to establish Line C. Excavate and place form boards so that board at LINE C is 110mm above the invert of the kerb and channel.
4. Measure back 1.5m from existing channel invert to establish Line B. Excavate and place form boards so that board at LINE B is 40mm above the existing top of kerb.
5. Measure back 4.0m from existing channel invert to establish Line A. Excavate and place form boards so that board at LINE A is 100mm above the existing top of kerb.
6. Place required mesh with 40mm top cover.
7. Concrete to be 125 thick and have SL72 mesh as a minimum.
8. Remove existing kerb and channel for width of driveway plus 300mm each side. Provide a 10mm expansion joint at each join.
9. Council Officer is to inspect boxing and reinforcement before concrete is placed, however, Engineers Certification may be required in lieu of this inspection. Telephone 07 54200100 to arrange this inspection. 48hrs notice is required.
10. Concrete strength to be N32 minimum
    Width of invert - 3.6 min.
    - 6.0 max.
11. Crossfall of existing road pavement adjacent to driveway is to be checked. If crossfall exceeds 3%, driveway may have to be redesigned to ensure satisfactory clearance for vehicles.

SCALE: N.T.S

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

CABOOLTURE SHIRE COUNCIL

RESIDENTIAL AND MULTI-RESIDENTIAL CROSSINGS

FOR FOOTPATHS 5.0m OR GREATER IN WIDTH

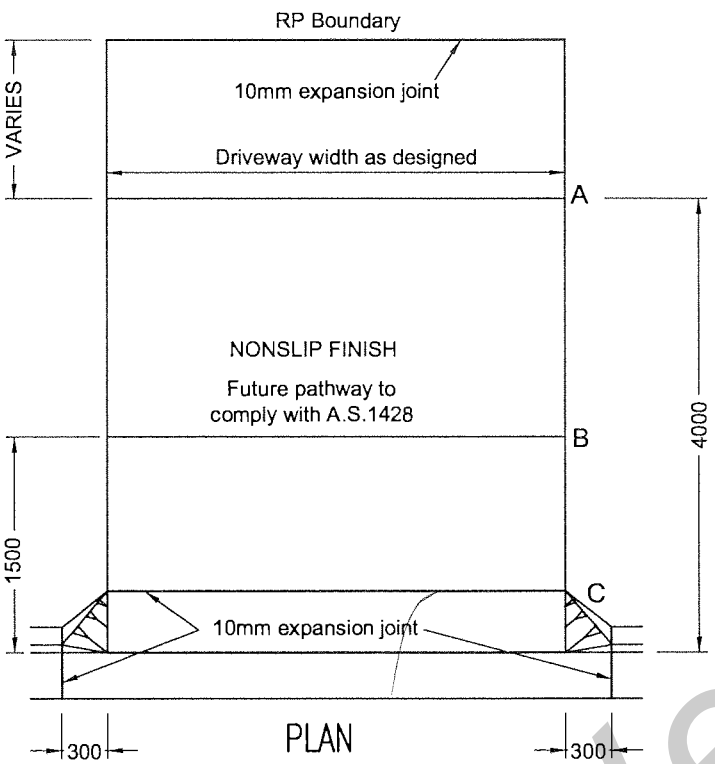
DRAWING No. 01-72 | REV. A

ORIGINAL SHEET SIZE A4

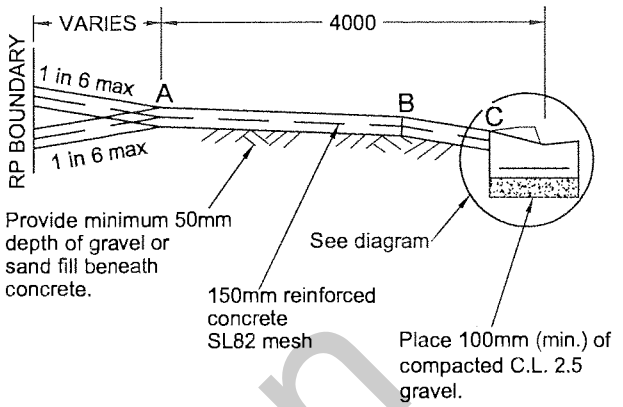
REVISIONS	DRAWN	DATE
A NOTES CHANGED	J.N.	08/07
X ORIGINAL ISSUE		

Tech. Officer	Design Office Co-Ordinator	Engineer	Manager(s)
	29/11/07	11/07	29 Nov 07

Field Book	
Level Book	-
Job File No.	
Survey File	
Road No.	

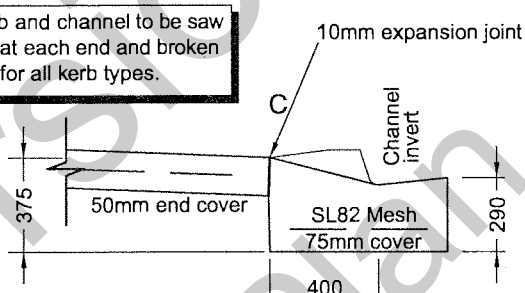


PLAN



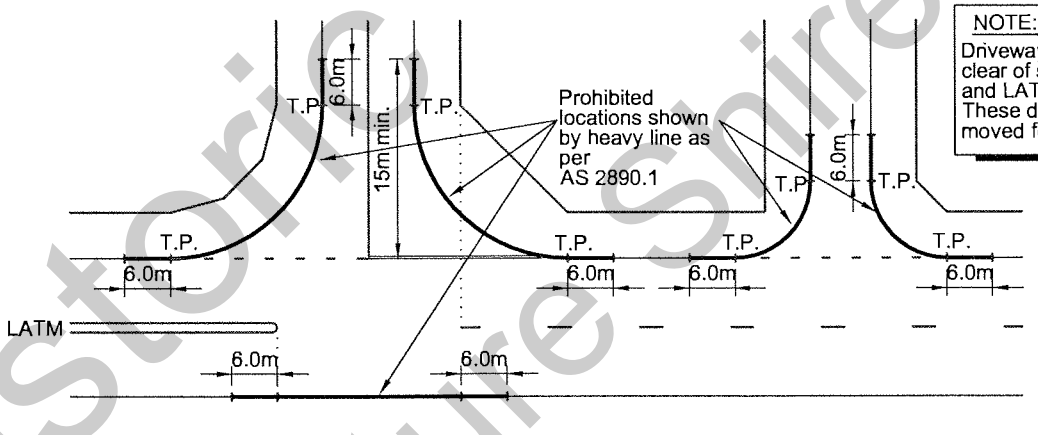
CROSS SECTION

Kerb and channel to be saw cut at each end and broken out for all kerb types.



DIAGRAM

- Grade invert to match levels of channel at both ends.
- Kerb and channel to be saw cut at each end and broken out over this area to allow crossing to be constructed.
- Provide 1 in 10 batter from driveway to natural surface level.



NOTE:
Driveways also to be kept clear of stormwater catchpits and LATM devices. These devices will not be moved for driveways.

T.P.= Tangent point of kerb return.

*PROHIBITED LOCATION OF DRIVEWAYS

METHOD OF CONSTRUCTION

1. Driveway is to be constructed in two sections with an expansion joint along Line C. Joint to be 10mm wide and filled with mastic.
2. Measure back 400mm from existing channel invert to establish Line C. Excavate and place form boards so that board at LINE C is 110mm above the invert of the kerb and channel.
3. Measure back 1.5m from existing channel invert to establish Line B. Excavate and place form boards so that board at LINE B is 40mm above the existing top of kerb.
4. Measure back 4.0m from existing channel invert to establish Line A. Excavate and place form boards so that board at LINE A is 90mm above the existing top of kerb.
5. Remove existing kerb and channel for width of driveway plus 300mm each side. Provide a 10mm expansion joint at each join.
6. Council Officer is to inspect boxing and reinforcement before concrete is placed however Engineers Certification may be required in lieu of this inspection. Telephone 07 54200100 to arrange this inspection. 48hrs. notice is required.
7. The concrete is to conform with the following requirements :
   Thickness - 150mm
   Strength - N32 minimum
   Reinforcing - SL82 mesh placed with 40mm topcover
8. Crossfall of existing road pavement adjacent to driveway is to be checked. If crossfall exceeds 3%, driveway may have to be redesigned to ensure satisfactory clearance for vehicles.

SCALE: N.T.S

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

CABOOLTURE SHIRE COUNCIL

INDUSTRIAL CROSSING / INVERT

FOR FOOTPATHS 5.0m OR GREATER IN WIDTH

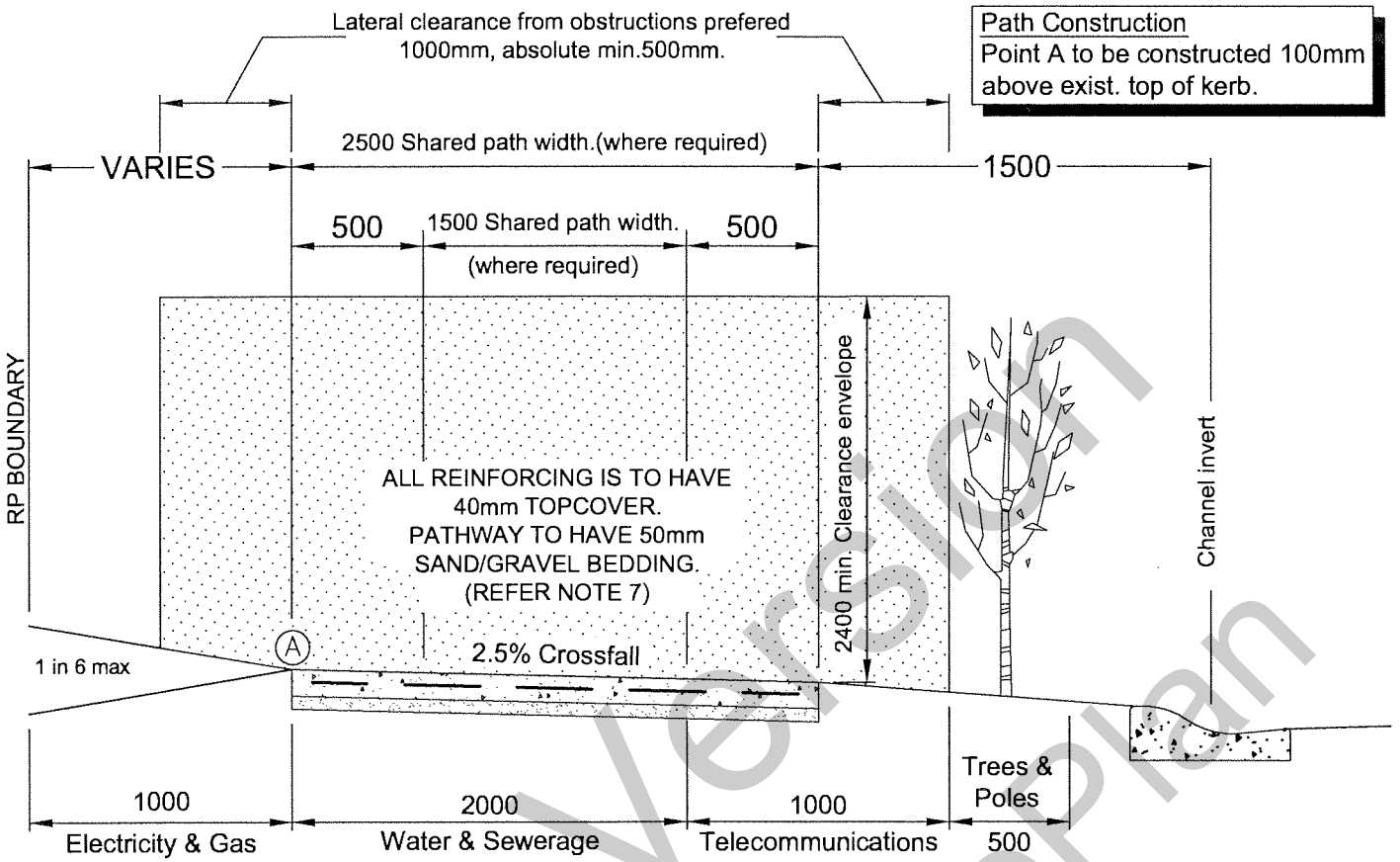
DRAWING No. 01-73 | REV. A

ORIGINAL SHEET SIZE A4

REVISIONS		DRAWN	DATE
A	NOTES CHANGED	J.N.	08/07
X	ORIGINAL ISSUE		

Tech. Officer	Design Office Co-Ordinator	Engineer	Manager(s)
	JRe 29/11/07	11/07	29 Nov 07

Field Book	
Level Book	-
Job File No.	
Survey File	
Road No.	



TYPICAL CROSS SECTION - STANDARD PATHWAY

PATHWAY CONSTRUCTION DETAILS

STANDARD PATHWAY	125mm THICK N32 CONCRETE WITH SL72 REINFORCING
PATHWAYS ADJACENT RESIDENTIAL LOTS CONTAINING EXISTING DWELLINGS AND LANDSCAPING. (DRIVEWAYS MUST USE THE HIGHER STANDARD)	100mm THICK N32 CONCRETE WITH SL62 REINFORCING
WHERE FOOTPATH CROSSES COMMERCIAL OR INDUSTRIAL DRIVEWAY. (REFER CSC STANDARD DRAWING 01-44)	150mm THICK N32 CONCRETE WITH SL82 REINFORCING
AC AND GRAVEL PATH LOCATIONS AND DEPTHS TO BE APPROVED BY MANAGER ENGINEERING PLANNING IN LOCATIONS WITHOUT KERB AND CHANNEL	25mm AC ON APPROVED DEPTH CL 2.3 GRAVEL

NOTES:

1. Provide tooled joint every 2.5m. Provide Connelly Key Joint or equivalent at all construction joints. Provide 10mm expansion joint at 10m maximum spaces.
2. Expansion joints to be filled with approved filler and provided with 12mm dia. plain galv. dowels at 300 centres with 20mm O.D. greased P.V.C. sleeve and end cap at one end.
3. Expansion joints are to be provided in concrete pathway adjacent to all concrete property crossings and where any variations occur.
4. Ensure Service boxes etc. are modified to finish flush with top of path surface.
5. Pathway grades are to comply with the requirements of AS1428.1 where practical.
6. Pathway widths less than 2.00m are to be approved by the Manager of Engineering Planning.
7. 50mm sand / gravel bedding may be removed, as approved by superintendent.

* TACTILE INDICATORS SHALL BE INSTALLED AS PER AS 1428.4 -2002 *

SCALE: N.T.S

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

CABOOLTURE SHIRE COUNCIL

FOOTPATH CONSTRUCTION

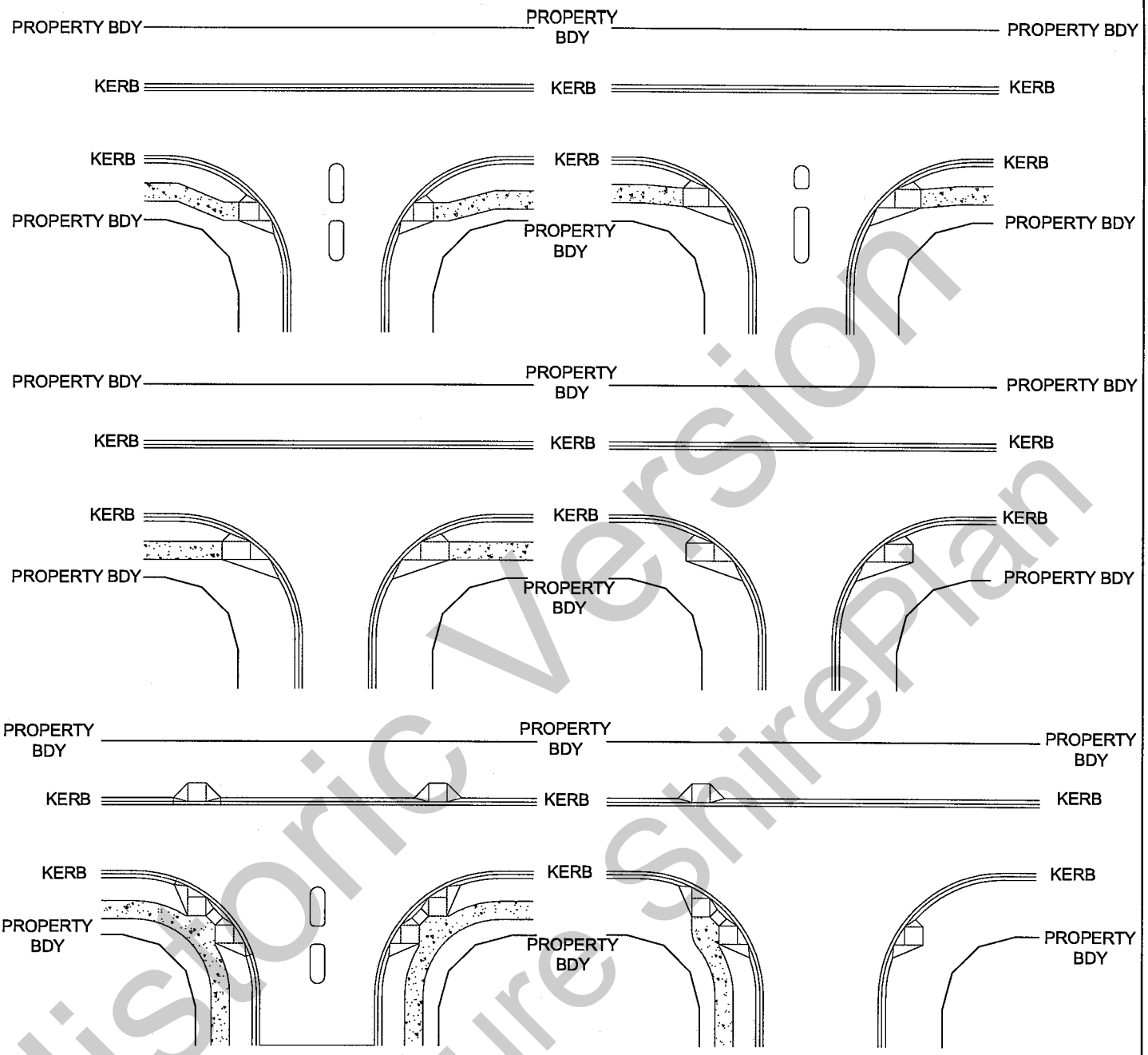
INCLUDING ALLOCATION FOR PUBLIC UTILITIES
FOR FOOTPATHS 5.0m OR GREATER IN WIDTH

DRAWING No. 01-74 | REV. B

ORIGINAL SHEET SIZE A4

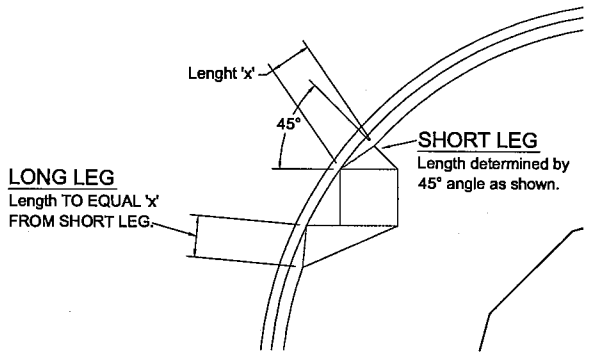
	REVISIONS	DRAWN	DATE
B	REINFORCING DETAILS AMENDED	J.N.	08/07
A	REINFORCING DETAILS AMENDED		11/05
X	ORIGINAL ISSUE		10-03

Tech. Officer	Design Office Co-Ordinator	Engineer	Manager(s)
	JRC 8/07	DA 8/07	24.8.07



NOTE: KERB RAMPS MUST ALWAYS FACE THE OPPOSITE KERB RAMP.

THIS STANDARD HAS BEEN PREPARED IN ACCORDANCE WITH THE INTENT OF THE CABOOLTURE SHIRE COUNCIL GUIDELINES FOR ACCESSIBILITY (FEBRUARY 2002)



RECOMMENDED LENGTH OF TRANSITION.

SCALE: 1:500

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

APPROVED KERB RAMP LOCATIONS & CONFIGURATION

DRAWING No. 01-75

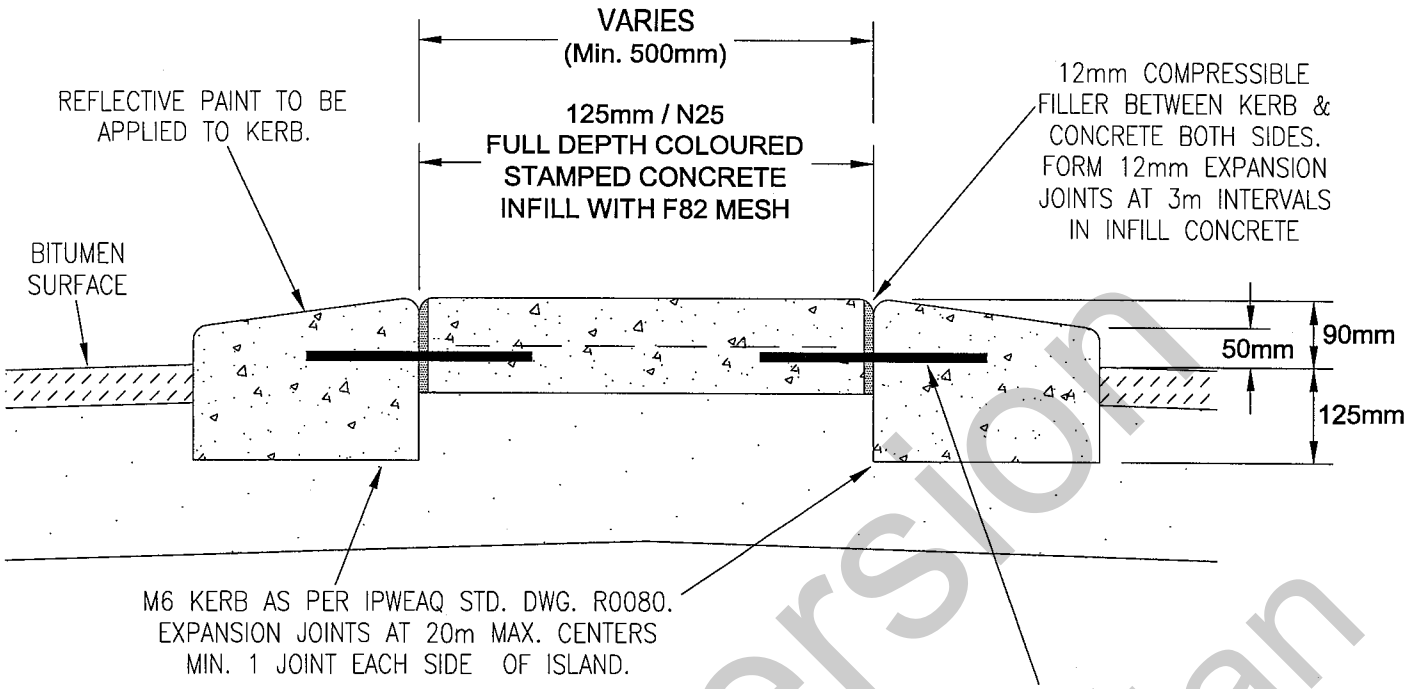
DATE: 01/05

REVISIONS	DRAWN	DATE
ORIGINAL ISSUE	D.B.	01/05

Manager	Engineer	Design Office Co-Ordinator	Designed
28 Jun 05	1/05	1/05	01/05

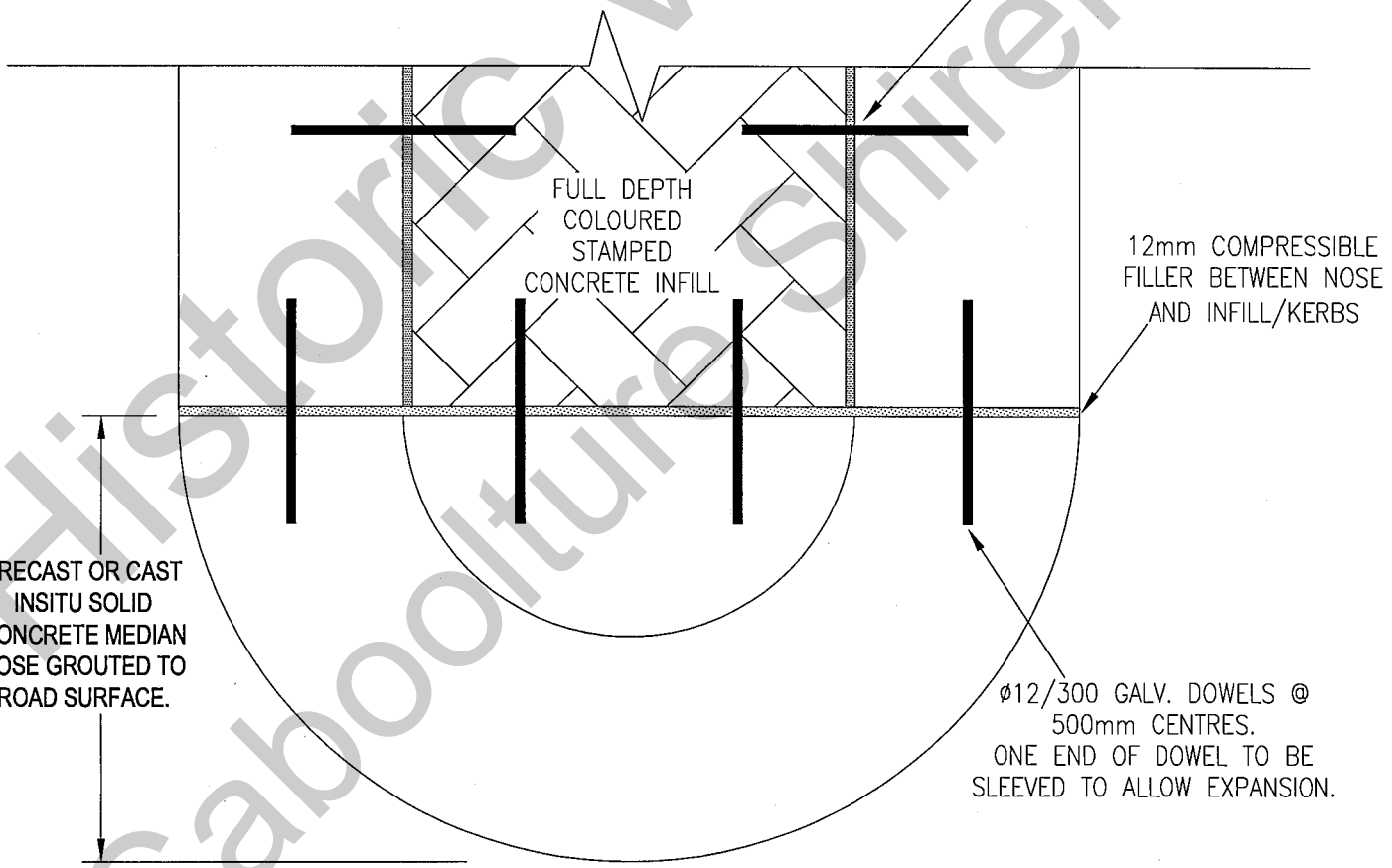
Field Book	
Level Book	
Job File	
Survey File	
Road No.	

CABOOLTURE SHIRE COUNCIL



SECTIONAL ELEVATION

SCALE 1:10



PLAN

SCALE 1:10

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

MOUNTABLE TRAFFIC ISLAND

DRAWING No. 01-76

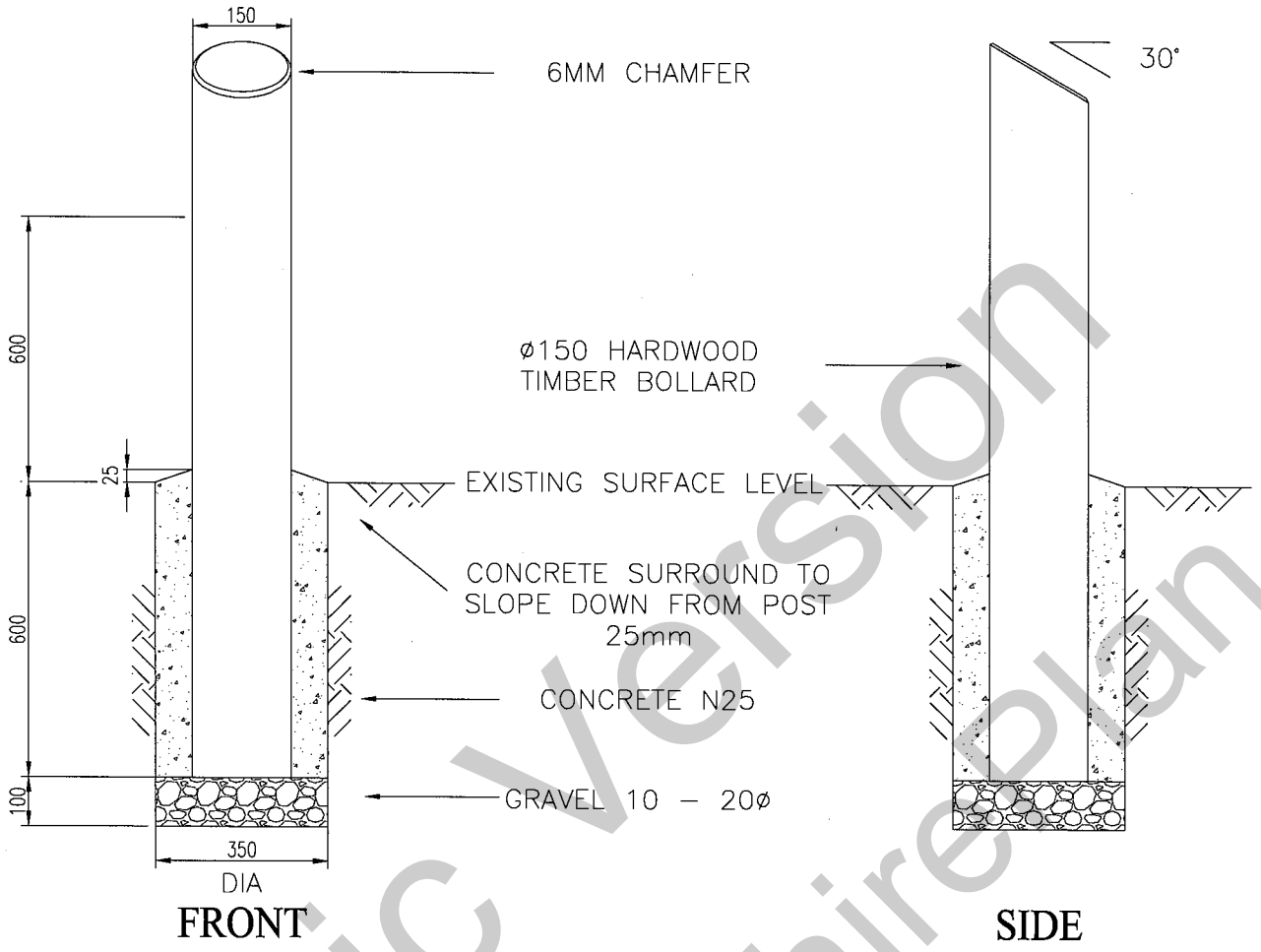
DATE:

REVISIONS	DRAWN	DATE
ORIGINAL ISSUE		

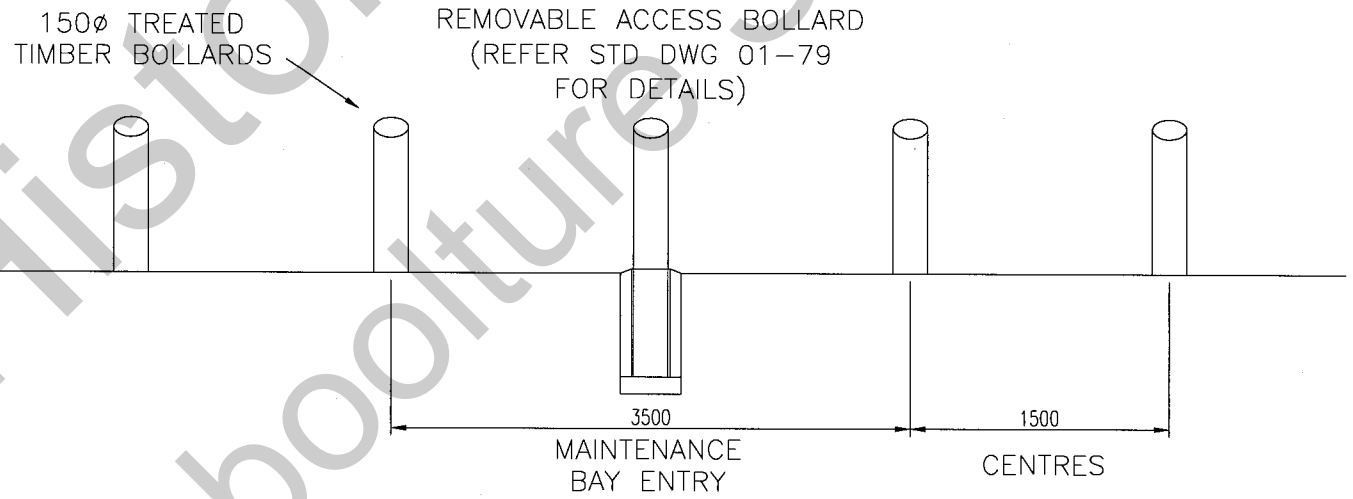
Manager	Engineer	Design Office Co-Ordinator	Designed
4 Feb 05	2/05	1/05	01/05

Field Book	
Level Book	
Job File	
Survey File	
Road No.	

CABOOLTURE SHIRE COUNCIL



TYPICAL TIMBER BOLLARD



STANDARD TIMBER BOLLARD LAYOUT

SCALE: N.T.S.

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

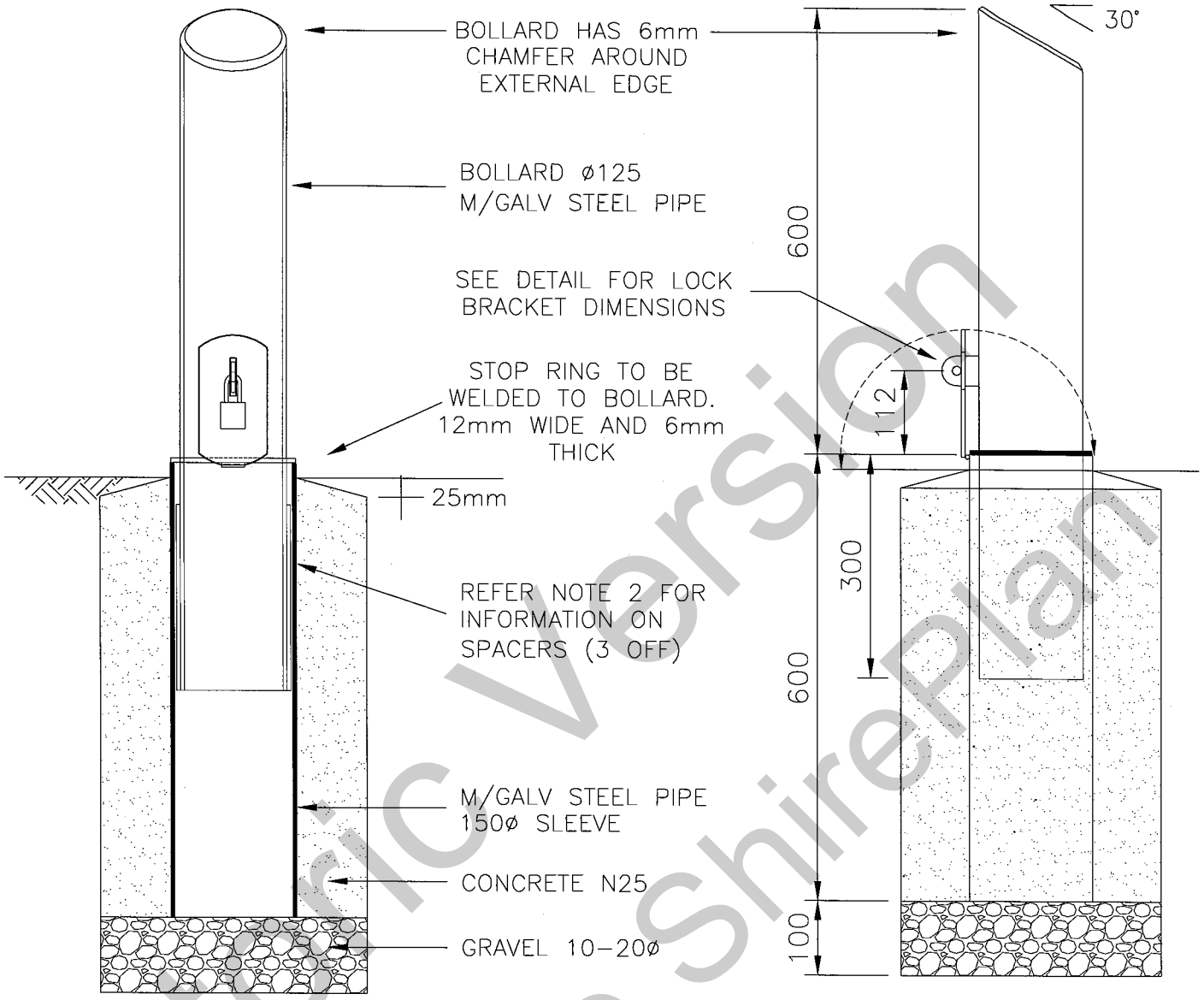
CABOOLTURE SHIRE COUNCIL

TYPICAL TIMBER BOLLARD

DRAWING No. 01-78

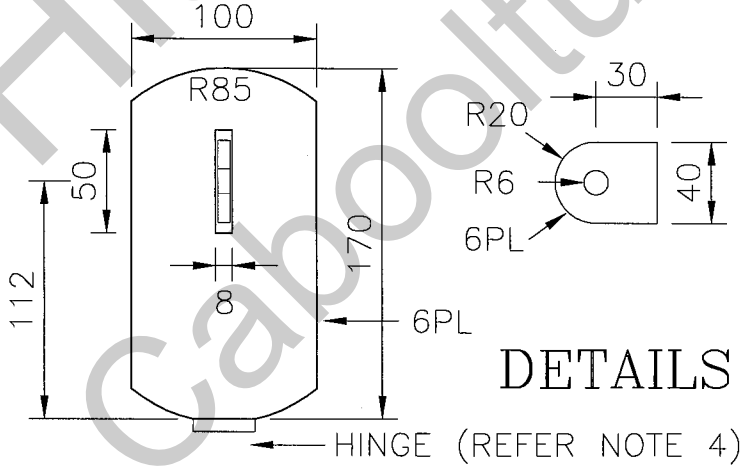
DATE: 02 / 03 / 2005

REVISIONS	DRAWN	DATE					
			20.6.05	8/05	6/05	02.06.2005	Field Book
							Level Book
							Job File
					Design Office		Survey File
☒ ORIGINAL ISSUE	J.N	02/03/05	Manager	Engineer	Co-Ordinator	Designed	Road No.



SECTIONAL VIEW

SIDE VIEW



DETAILS

NOTES:

1. ACCESS BOLLARD 125ø STEEL, 900mm LONG.
2. SPACERS (3 OFF) 6PL 250mm LONG, WELDED TO BOLLARD FOR UPRIGHT SUPPORT.
3. BOLLARDS APPROX 18KG'S EACH.
4. HINGE FOR THE LOCK BRACKET TO BE SPECIFIED BY DESIGNER TO SUIT CONDITIONS OF INSTALLATION.
5. ALL HOT DIPPED GALVANISED AFTER FABRICATION
6. FOR PLACEMENT DETAILS AND STANDARD BOLLARD SEE STANDARD DRAWING 01–78
7. TIMBER BOLLARD MAY BE USED INSTEAD OF GALV BOLLARD IF APPROVED

SCALE: 1:1000

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

CABOOLTURE SHIRE COUNCIL

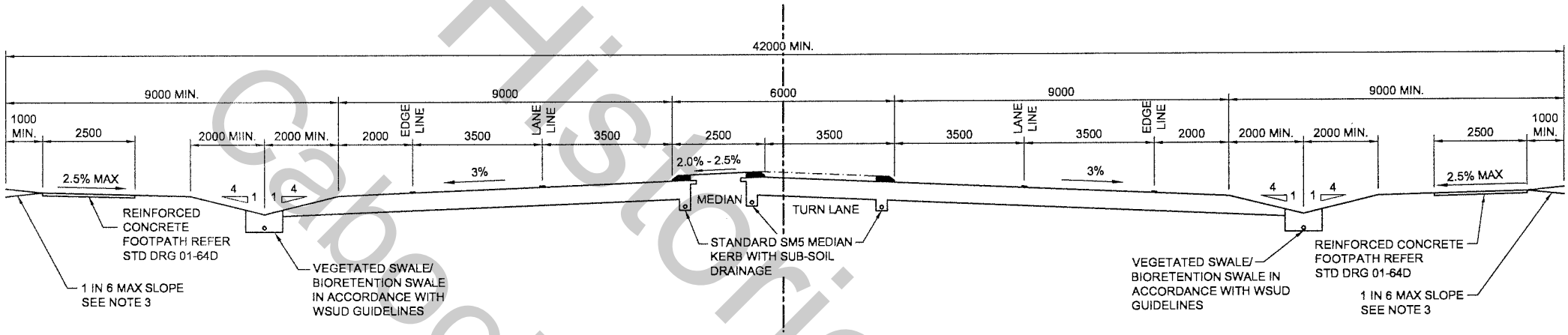
REMOVABLE ACCESS BOLLARD

DRAWING No. 01-79

DATE: 14/11/2005

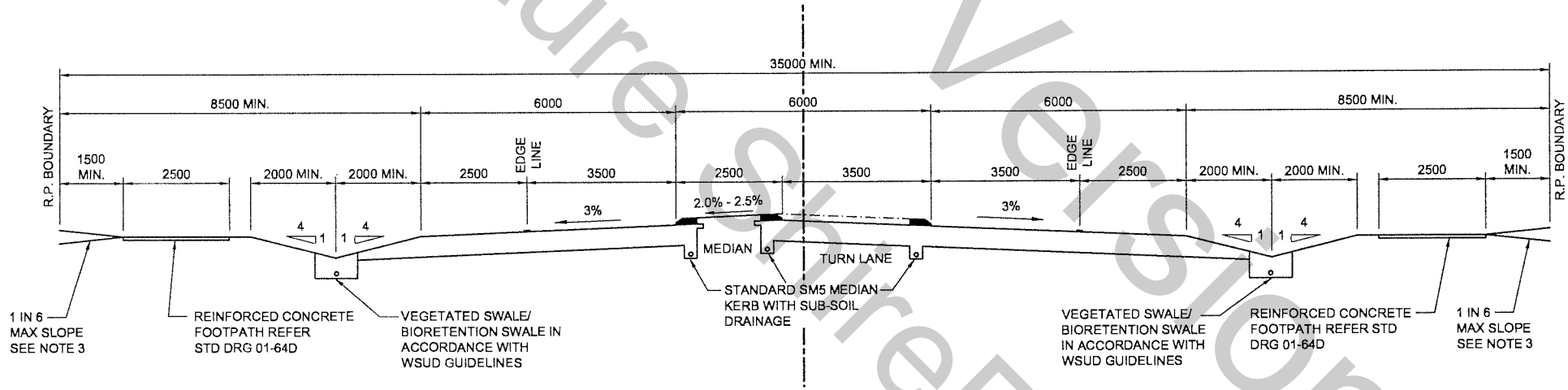
REVISIONS	DRAWN	DATE	Manager	Engineer	Design Office Co-Ordinator	Designed
ORIGINAL ISSUE	J.N	14/11/05				

Field Book	
Level Book	
Job File	
Survey File	
Road No.	



FOUR LANE ROAD

NOT TO SCALE



TWO LANE ROAD

NOT TO SCALE

NOTES
1 PAVEMENT DEPTH TO BE DETERMINED DURING DESIGN
2 EXTRA WIDTH MAY BE NEEDED TO ACCOMMODATE SIDE SLOPE
3 SLOPE TO BE FULLY CONTAINED WITHIN ROAD RESERVE

SCALE: NTS

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

	REVISIONS	DRAWN	DATE
A	CROSS SECTIONS AMENDED	J.N.	16-08-07
X	ORIGINAL ISSUE	J.N.	06/05

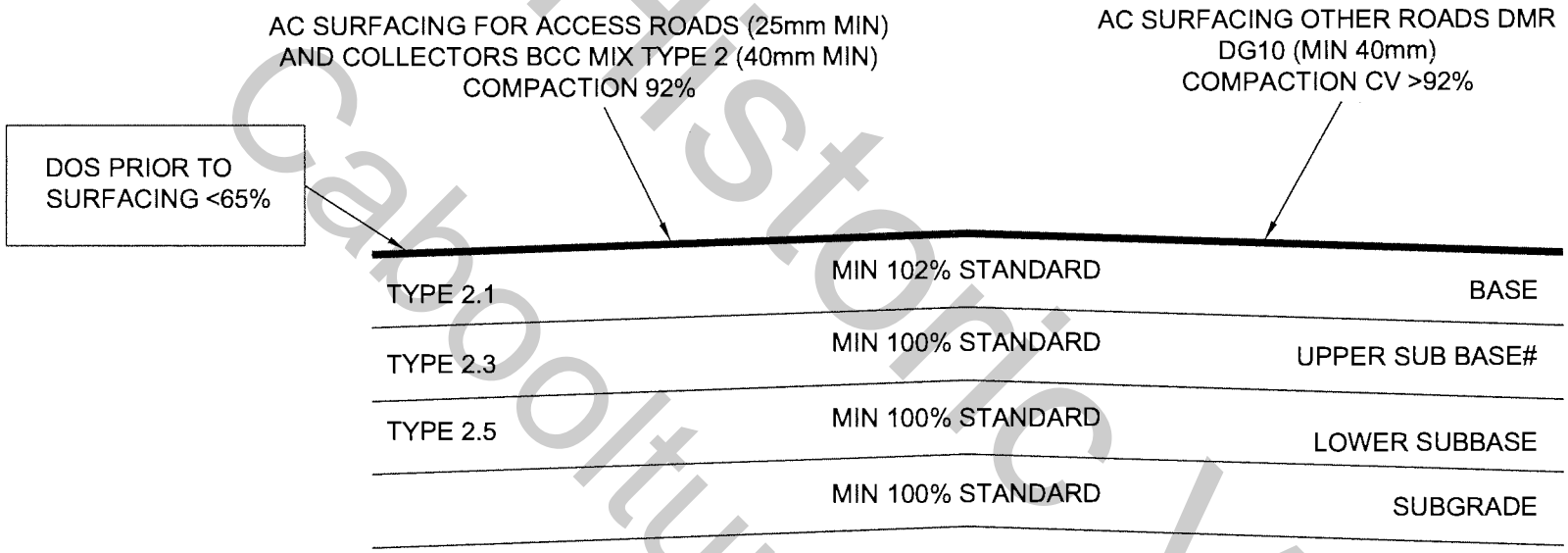
CABOOLTURE SHIRE COUNCIL

Tech. Officer | Design Office Co-Ordinator 10/07 | Engineer MT 10/07 | Manager(s) 11-10-07

TWO AND FOUR LANE
SUB ARTERIAL AND ARTERIAL ROAD
TYPICAL CROSS-SECTION

DRAWING No. 01-81 | REV. A

ORIGINAL SHEET SIZE A4

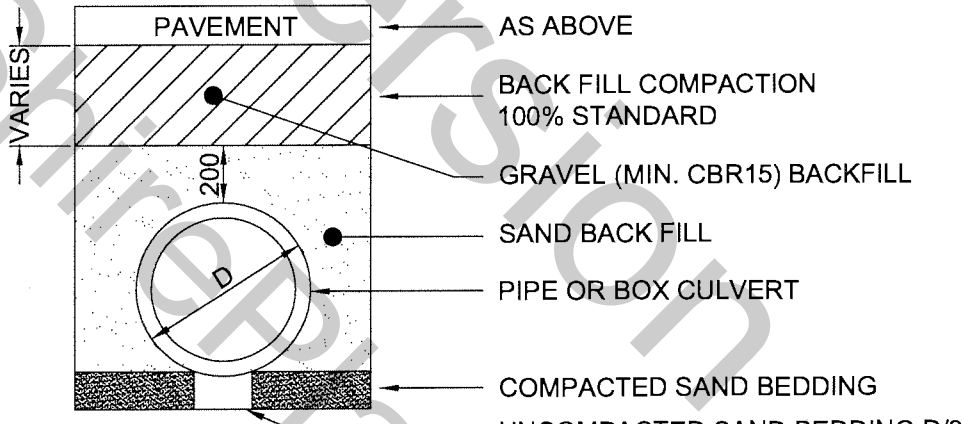


WHERE A SINGLE SUBBASE LAYER IS NOMINATED, TYPE 2.3 MATERIAL SHALL BE UTILISED

ALL WORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH MAIN ROADS SPECIFICATIONS FOR ROADWORKS WITH THE EXCEPTION OF ASPHALT SURFACING FOR ACCESS AND COLLECTOR ROADS WHICH SHALL BE IN ACCORDANCE WITH BRISBANE CITY COUNCIL SPECIFICATIONS 5310 (SUPPLY OF DENSE GRADED ASPHALT) AND 5320 (LAYING OF ASPHALT)

NOTE: WHERE DISCREPANCY OCCURS BETWEEN THE DESIGN AND DEVELOPMENT MANUAL AND THE ABOVE SPECIFICATIONS, THE PROVISIONS OF THE DESIGN MANUAL SHALL APPLY

CV = CHARACTERISTICS VALUE
DOS = DEGREE OF SATURATION FOR BASE (FINAL) LAYER



TYPE "U" TRENCH DETAIL

SCALE: 1:1000

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PERSONS WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

	REVISIONS	DRAWN	DATE
A	CONSTRUCTION CRITERIA CHANGES	J.N.	16-08-07
X	ORIGINAL ISSUE	J.N.	11-05-05

Tech. Officer | Design Office Co-Ordinator | Engineer | Manager(s)

CABOOLTURE SHIRE COUNCIL

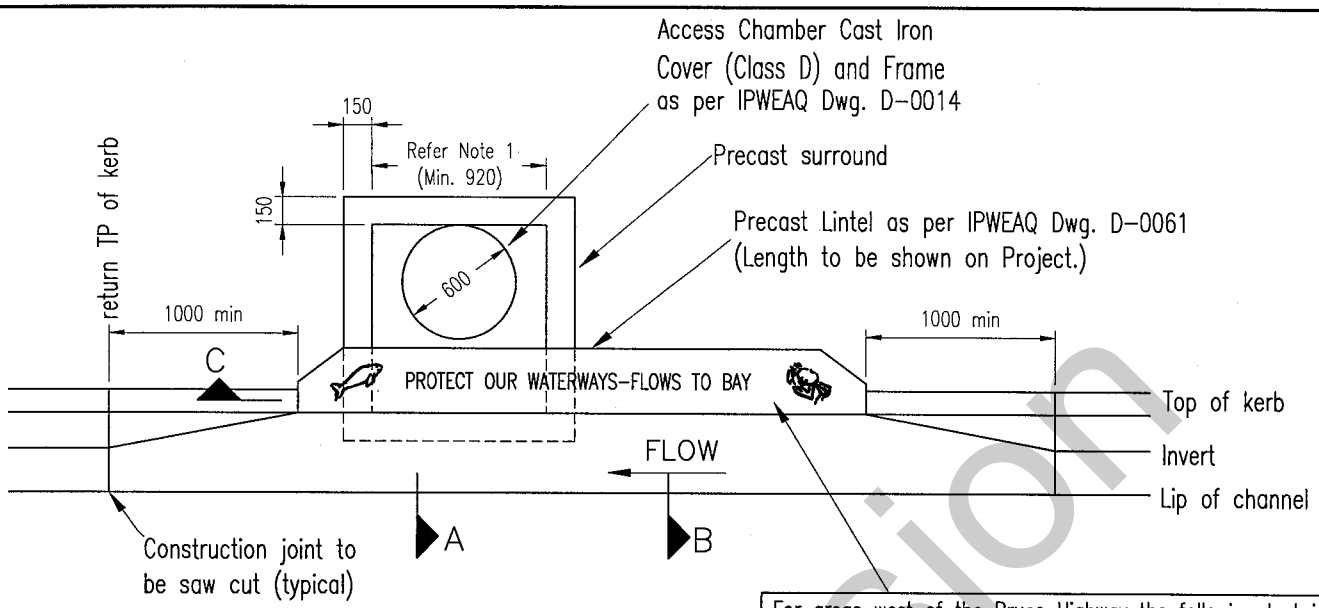
ROAD CONSTRUCTION CRITERIA

TYPICAL CROSS SECTION

DRAWING No. 01-83 | REV. A

ORIGINAL SHEET SIZE A4

16/08/2007 10:59:00 AM



PLAN

For areas west of the Bruce Highway the following text is to be imprinted in the lintel with associated approved artwork.

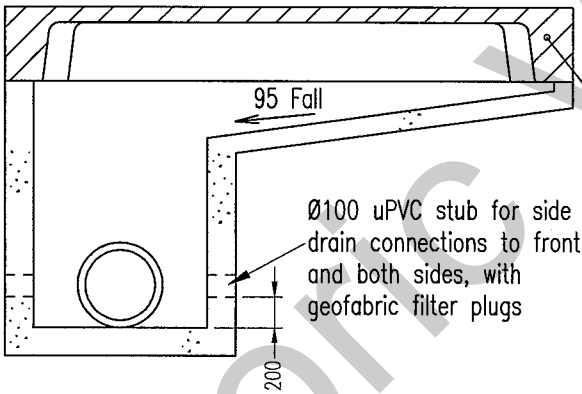
PROTECT OUR WATERWAYS-FLOWS TO CREEK

For areas east of the Bruce Highway the following text is to be imprinted in the lintel with associated approved artwork.

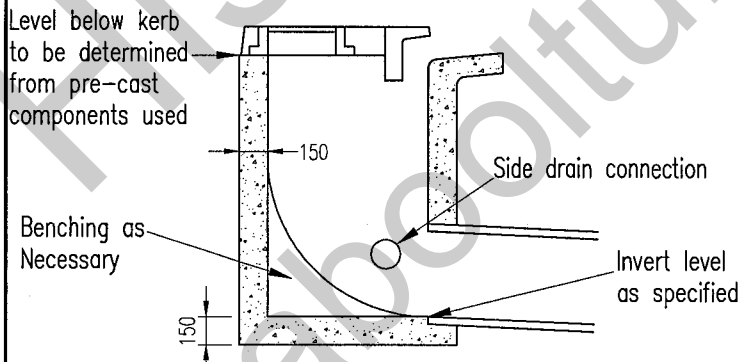
min.200mm

PROTECT OUR WATERWAYS-FLOWS TO BAY

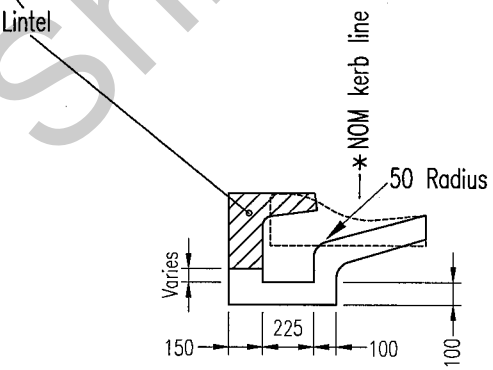
Text to be 40mm high letters imprinted 5mm into concrete. Artwork to be a minimum of 200mm in length and imprinted 5mm into concrete.



SECTION C
ON GRADE CONFIGURATION



SECTION A



SECTION B

NOTES:

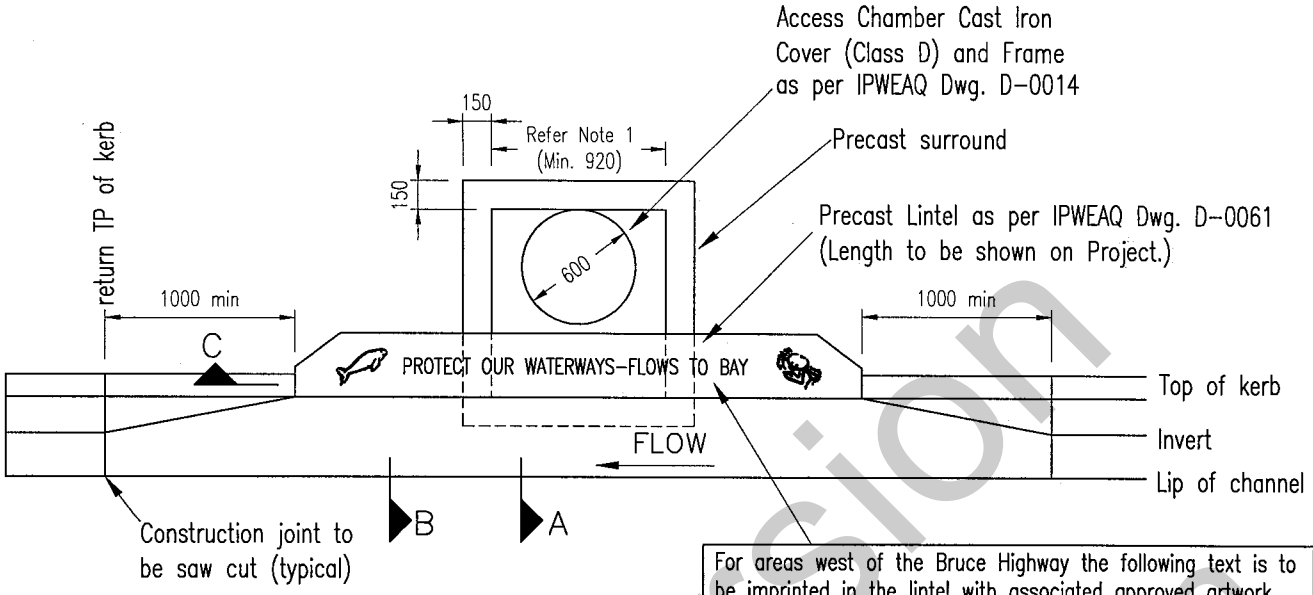
1. Dimensions of pit to suit precast components and may vary to suit manufacturers.
2. For barrier kerb the precast lintel is to be aligned with face of kerb.
3. Concrete N32 in accordance with AS 1379 and AS 3600.

SCALE N.T.S.

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PEOPLE WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

31/8/2004 Manager Transport Planning	Engineer	Design Office Co-Ordinator 8/04	Designed	CABOOLTURE SHIRE COUNCIL	BACK ENTRY CATCH PIT WITH PRECAST EXTENDED KERB INLET (on grade conditions)	STANDARD DRAWING NO. 02-11 C

DATE	REVISION	NO.
08/04	Various Changes	C
12/03	Various Changes	B
08/03	Various Changes	A
09/99	ORIGINAL ISSUE	



PLAN

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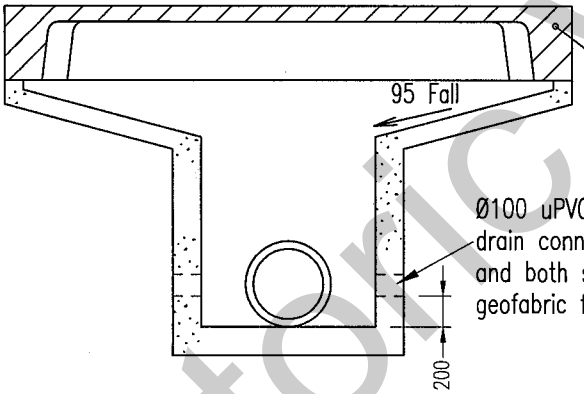
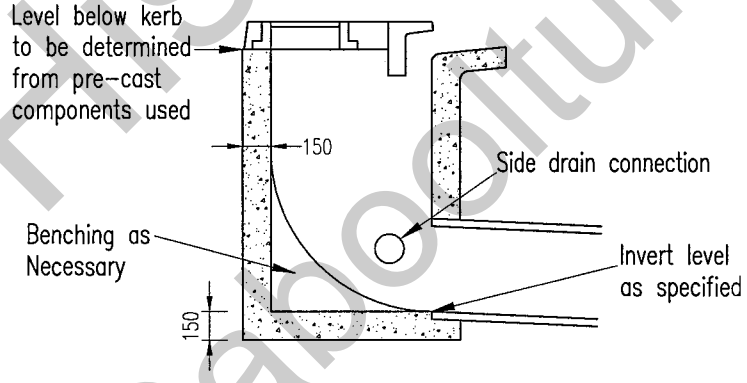
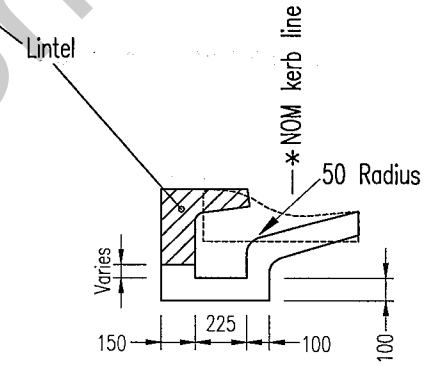


SECTION C

Sag point configuration



SECTION A



SECTION B

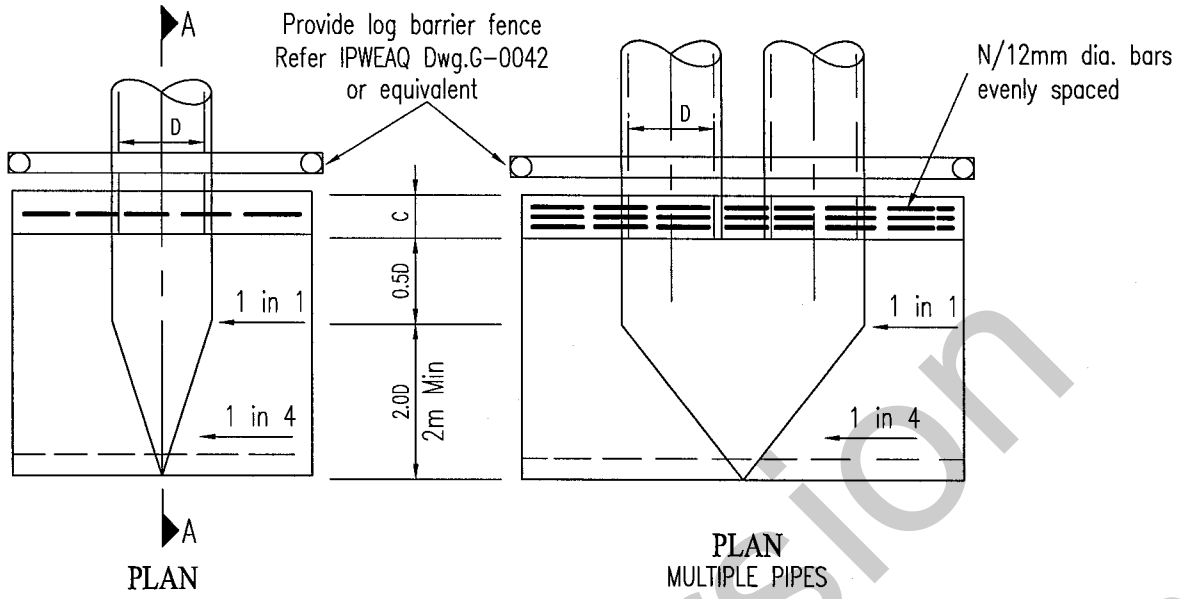
NOTES:

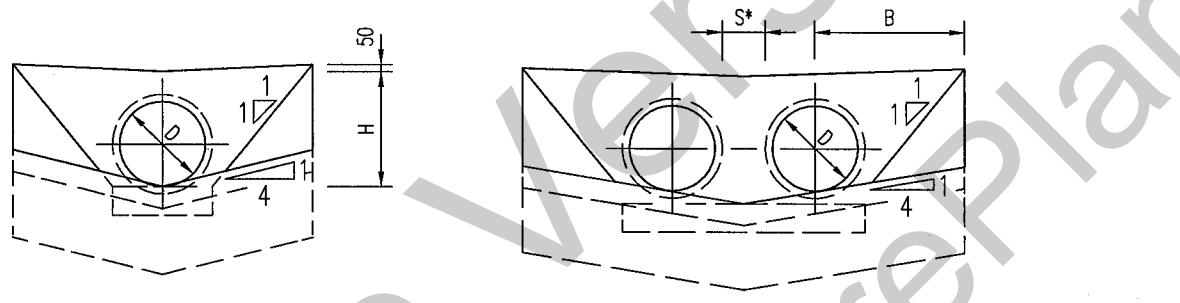
1. Dimensions of pit to suit precast components and may vary to suit manufacturers.
2. For barrier kerb the precast lintel is to be aligned with face of kerb.
3. Concrete N32 in accordance with AS 1379 and AS 3600.

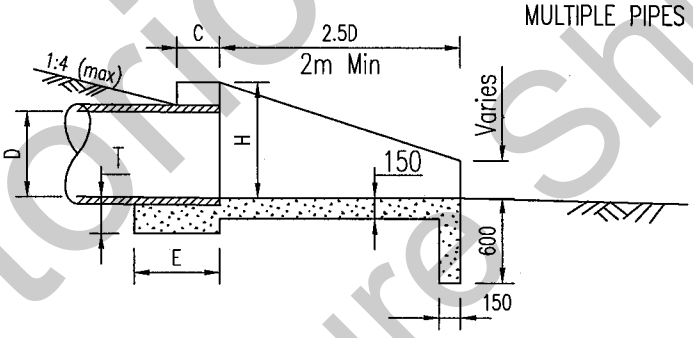
SCALE N.T.S.

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PEOPLE WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

31/8/2004 Manager Transport Planning	8/04 Engineer	Design Office Co-Ordinator; Designed	CABOOLTURE SHIRE COUNCIL	BACK ENTRY CATCH PIT WITH PRECAST EXTENDED KERB INLET (sag condition)	08/04 Various Changes C 12/03 Various Changes B 08/03 Various Changes A 09/99 ORIGINAL ISSUE	DATE / REVISION / NO.
						STANDARD DRAWING NO. 02-18 C







SCALE: N.T.S.

SECTION A-A

DIMENSIONS	PIPE DIAMETER 'D'													
	375	450	525	600	675	750	825	900	1050	1200	1350	1500	1650	1800
B	760	875	995	1115	1240	1380	1520	1660	1890	2130	2365	2600	2840	3075
C	230	230	300	300	300	350	350	350	350	400	400	400	450	450
E	450	450	600	600	600	750	750	750	750	900	900	900	1000	1000
H	570	650	730	810	900	1000	1100	1200	1360	1520	1680	1840	2000	2160
T	180	190	190	200	200	230	240	240	260	260	310	340	380	410
N	1	2	2	2	3	3	3	3	3	4	4	4	4	4

DIMENSIONS

Use 375mm dia. dimensions for 300mm dia.

NOTES:

1. Concrete to be Class N20.
2. Reinforcing to be plain steel reinforcing bars in accordance with AS 1302 for structural grade steel. Clear cover to be 50mm minimum.
3. Weepholes at 1200 crs maximum. No fines concrete block 300x300x150 at each weephole.
4. S* dimension for multiple R.C. Pipes for any method of laying is :
   300 for D = 600 or less
   600 for D greater than 600
5. Taper from downstream end of concrete apron to match concrete lined open drain, where applicable.

CABOOLTURE SHIRE SUPPORTS FACILITIES AND ACCESS FOR PEOPLE WITH A DISABILITY. PLEASE ENSURE PROVISION AND/OR REINSTATEMENT OF FACILITIES.

CABOOLTURE SHIRE COUNCIL

PIPE CULVERT
INLET & OUTLET
PLAN & ELEVATIONS

STANDARD DRAWING No. 02-22B

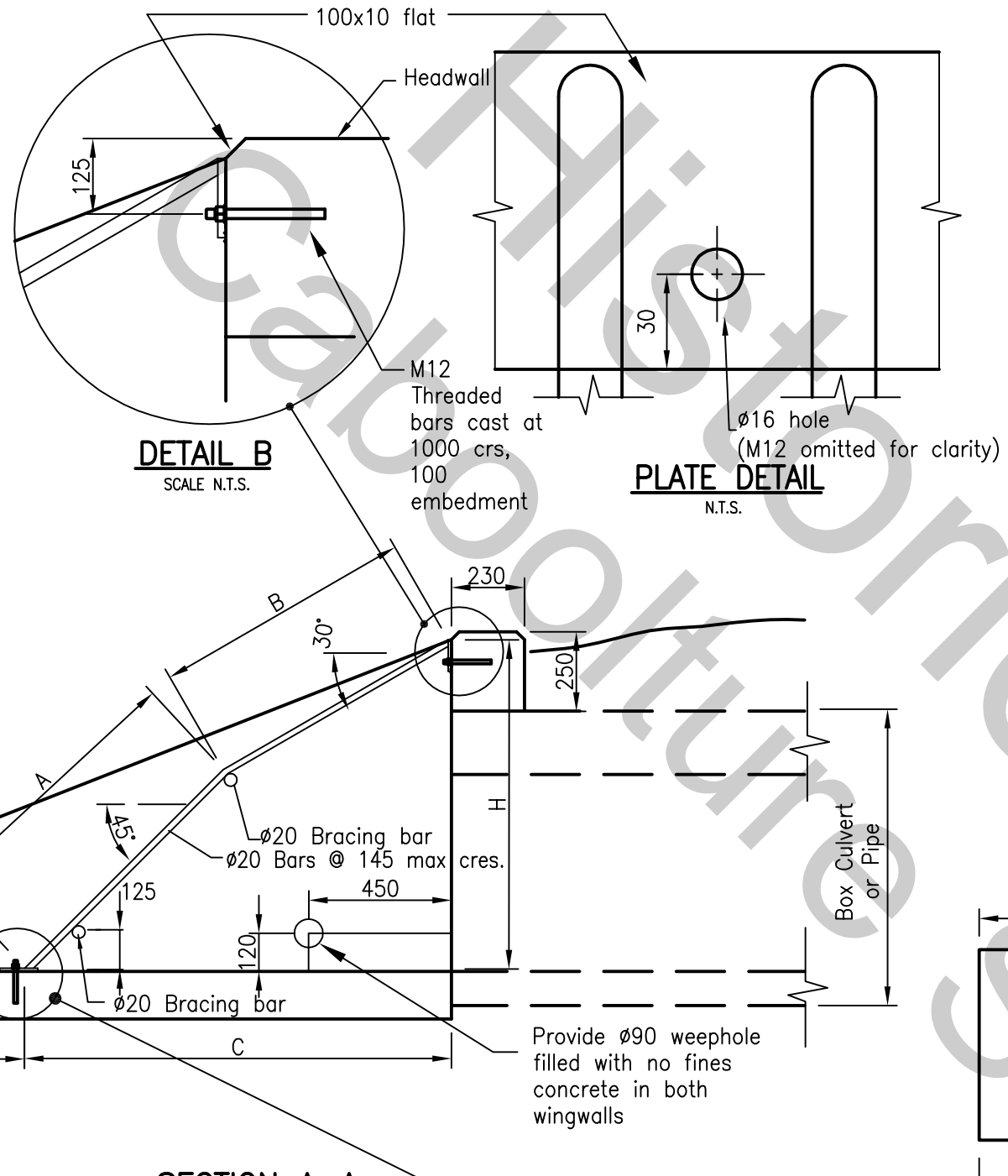
DATE: 09/99

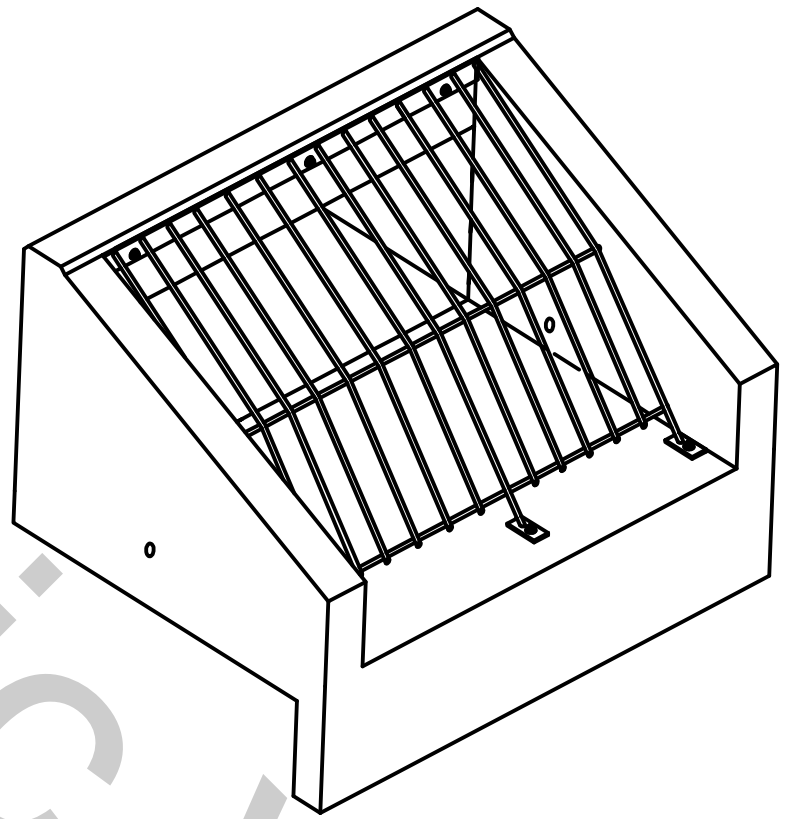
REVISIONS	DRAWN	DATE
B VARIOUS CHANGES		
A VARIOUS CHANGES		
X ORIGINAL ISSUE		

Manager	Engineer	Chief Draftsman	Designed
2.03	11/03	4/07	9/10/03

Field Book	
Level Book	
Job File	
Survey File	
Road No.	

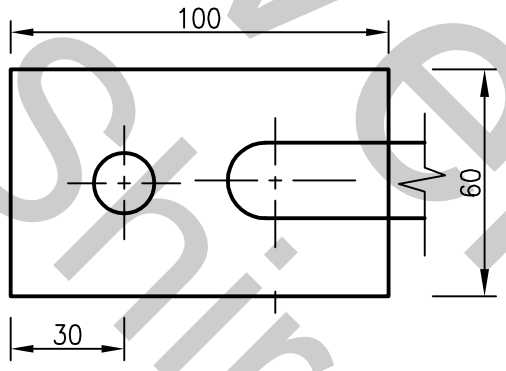
09/10/2003 09:14:08



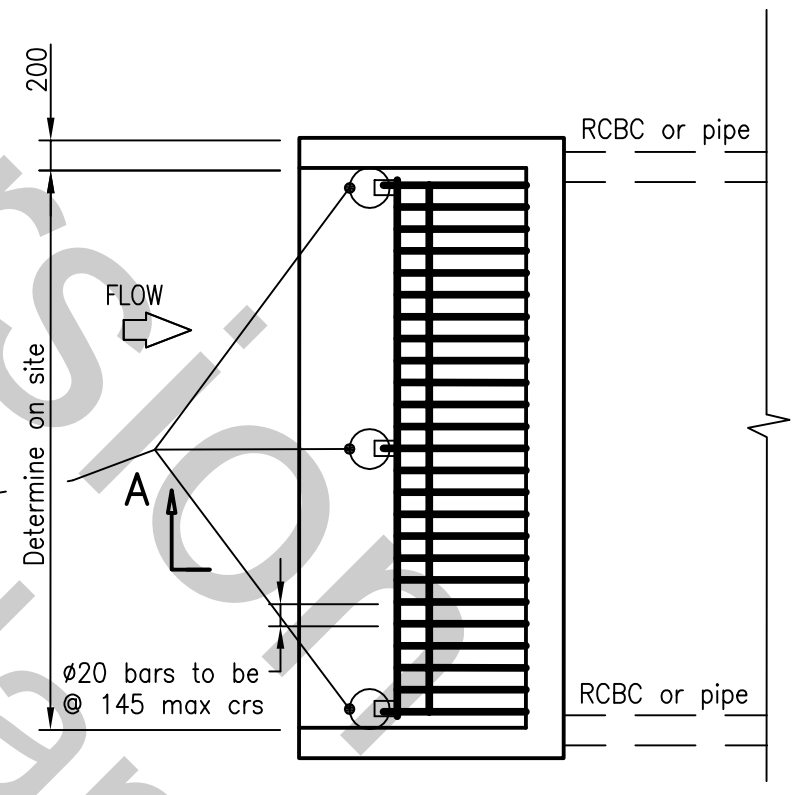


NOTES:

1. For Wingwall and Headwall details and reinforcement, refer MRD Std Drg 1303
2. For Apron details and reinforcement, refer MR Std Drg 1318 (Type 3 Apron)
3. Concrete to be Class N32/20
4. All cover to reinforcement to be 50mm min.
5. Cover in aggressive environments refer MRD Std Drg 1303.
6. All sections to be grade 300 and all bar to be grade 400.
7. All welds to conform to AS1554 and be 6m continuous fillet welds unless otherwise noted.
8. All steelwork to be hot dip galvanised after fabrication to AS1560.
9. All nuts, bolts and washers to be stainless steel grade 316. with isolation washers.
10. Refer to MRD Standards for safe distances to carriageways.



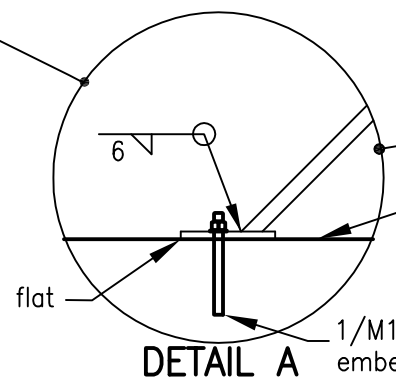
ANCHOR PLATE DETAIL
N.T.S.



PLAN
N.T.S.

TABLE 1

CULVERT HEIGHT	A	B	C	SCREEN HEIGHT H
375	500	613	884	660
450	575	671	988	742
600	675	841	1206	898
750	800	977	1411	1054
900	900	1181	1659	1227
1200	1150	1478	2093	1552



DETAIL A
N.T.S.

These drawings have been developed in consultation between the participating councils.
BEFORE USE, the user shall confirm that the drawing has been adopted by the appropriate council

DO NOT SCALE

Rv.	DATE	REVISIONS

Caloundra City · Caboolture Shire Council · Gold Coast City Council · IPWEAQ · Maroochy Shire Council · Caloundra Shire Council · NOOSA COUNCIL · PINE RIVERS · REDCLIFFE CITY COUNCIL · Ipswich City Council

DRAINAGE
CULVERT INLET SCREEN

DATE 21/08/2007
DRAWING No.
D–082
Rv.