STANDARD DRAWINGS - ROADING
## CRITERIA FOR PUBLIC AND PRIVATE ROADS AND PRIVATEWAYS

<table>
<thead>
<tr>
<th>Type and Description</th>
<th>Road Reserve width (m)</th>
<th>Carriageway width (m)</th>
<th>Kerb/edging</th>
<th>Predicted Traffic VPD &amp; Type</th>
<th>Footpath width (m)</th>
<th>Design</th>
<th>Maximum Grade and Desired Speed (km/h)</th>
<th>Family</th>
<th>Rolling</th>
<th>Hilly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Arterials</td>
<td>Specific Design</td>
<td>Specific Design</td>
<td>Vertical</td>
<td>&gt;10 000 vpd 2 @ 1.4m</td>
<td></td>
<td></td>
<td>5% (60km/h) 6% (55km/h)</td>
<td>Flat</td>
<td></td>
<td></td>
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<tr>
<td>Principal Roads</td>
<td>20.00</td>
<td>13.00</td>
<td>Vertical</td>
<td>&gt;14 000 vpd 2 @ 1.4m</td>
<td></td>
<td></td>
<td>5% (70km/h) 6% (55km/h)</td>
<td>Rolling</td>
<td>4.5km/h</td>
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<tr>
<td>Collector Roads</td>
<td>20.00</td>
<td>13.00</td>
<td>Vertical</td>
<td>&gt;4 400 vpd 2 @ 1.4m</td>
<td></td>
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<td>6% (60km/h) 7% (55km/h)</td>
<td>Hilly</td>
<td>5.0km/h</td>
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<tr>
<td>Local Roads</td>
<td>20.00</td>
<td>11.00/15.00–15.00 lots</td>
<td>Vertical</td>
<td>Not required 1 @ 1.4m</td>
<td></td>
<td></td>
<td>7% (50km/h) 8% (4.5km/h) 10% (4.0km/h)</td>
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<td></td>
<td></td>
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<tr>
<td>E. Rural (Rural)</td>
<td>Specific Design</td>
<td>Specific Design</td>
<td>K &amp; C where Stormwater problems exist</td>
<td>Light, no passenger vehicles 2 @ 1.4m</td>
<td></td>
<td></td>
<td>Specific Design Required</td>
<td></td>
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</tr>
<tr>
<td>Rural A</td>
<td>20.00</td>
<td>4.5 – 6.00</td>
<td>Vertical</td>
<td>Light, no passenger vehicles 2 @ 1.4m</td>
<td></td>
<td></td>
<td>7% (50km/h) 8% (4.5km/h) 10% (4.0km/h)</td>
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<td></td>
</tr>
<tr>
<td>Rural B</td>
<td>20.00</td>
<td>4.5 – 6.00</td>
<td>Vertical</td>
<td>Light, no passenger vehicles 2 @ 1.4m</td>
<td></td>
<td></td>
<td>8% (4.5km/h) 10% (35km/h) 12% (35km/h)</td>
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<td></td>
<td></td>
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<td>Rural D</td>
<td>20.00</td>
<td>4.5 – 6.00</td>
<td>Vertical</td>
<td>Light, no passenger vehicles 2 @ 1.4m</td>
<td></td>
<td></td>
<td>7% (50km/h) 8% (4.5km/h) 10% (4.0km/h)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Rural E</td>
<td>20.00</td>
<td>4.5 – 6.00</td>
<td>Vertical</td>
<td>Light, no passenger vehicles 2 @ 1.4m</td>
<td></td>
<td></td>
<td>8% (4.5km/h) 10% (35km/h) 12% (35km/h)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Cul-de-sac (i)</td>
<td>20.00</td>
<td>8.50</td>
<td>Vertical</td>
<td>Light, no passenger vehicles 2 @ 1.4m</td>
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<td></td>
<td>7% (50km/h) 8% (4.5km/h) 10% (4.0km/h)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(ii) Up to 12 Lots</td>
<td>16.50</td>
<td>7.50</td>
<td>Vertical</td>
<td>Light, no passenger vehicles 2 @ 1.4m</td>
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<td></td>
<td>8% (4.5km/h) 10% (35km/h) 12% (35km/h)</td>
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<tr>
<td>G. Rural Cul-de-sac (i) 13 – 40 lots max</td>
<td>16.50</td>
<td>6.00</td>
<td>Vertical</td>
<td>Light, no passenger vehicles 2 @ 1.4m</td>
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<td></td>
<td>7% (50km/h) 8% (4.5km/h) 10% (4.0km/h)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(ii) Up to 12 Lots</td>
<td>16.50</td>
<td>6.00</td>
<td>Vertical</td>
<td>Light, no passenger vehicles 2 @ 1.4m</td>
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<td></td>
<td>8% (4.5km/h) 10% (35km/h) 12% (35km/h)</td>
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<tr>
<td>H. Private Way (ii)</td>
<td>3.00</td>
<td>2.50</td>
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<td>Light, no passenger vehicles 2 @ 1.4m</td>
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<td>10% (30km/h) 12% (25km/h) 15% (25km/h)</td>
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<td>(iii) 2 Potential Units</td>
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<td>3.00</td>
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<td>Light, no passenger vehicles 2 @ 1.4m</td>
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<td></td>
<td>10% (30km/h) 12% (25km/h) 15% (25km/h)</td>
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<tr>
<td>(iv) 3-4 Potential Units</td>
<td>6.50</td>
<td>4.00</td>
<td>Vertical</td>
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<td>10% (30km/h) 12% (25km/h) 15% (25km/h)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(v) 5-8 Potential Units</td>
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<td>5.00</td>
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<td>Light, no passenger vehicles 2 @ 1.4m</td>
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<td>10% (30km/h) 12% (25km/h) 15% (25km/h)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes:
1. These grades may be increased by 1% for lengths under 150m.
2. Flat, 0-3% cross-slope, Rolling, 3-15% cross-slope, Hilly over 15% cross-slope.
3. 5% maximum if no kerb.
4. Commercial and Industrial RDWs subject to specific design.
5. Deleted.
6. Footpaths will be required in the Rural Residential Zone where it is proven that there are pedestrian traffic generators such as schools, shops or bus stops within close proximity.
7. Where a local road in the Rural Zone meets the lot/traffic generation requirements for those of Arterial and Distributor Roads the design criteria and construction standards for the latter shall apply.
8. Rural road widths less than 6m wide shall be subject to specific site requirements.
THIS CROSS SECTION APPLIES WHERE:

<table>
<thead>
<tr>
<th>road reserve width</th>
<th>carriageway width</th>
<th>berm width</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.0m</td>
<td>11.0m</td>
<td>4.5m</td>
</tr>
<tr>
<td>16.5m</td>
<td>7.5m</td>
<td>4.5m</td>
</tr>
</tbody>
</table>

OTHER CASES

<table>
<thead>
<tr>
<th>road reserve width</th>
<th>carriageway width</th>
<th>berm width</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.0m</td>
<td>13.0m</td>
<td>3.5m</td>
</tr>
<tr>
<td>20.0m</td>
<td>8.5m</td>
<td>5.75m</td>
</tr>
</tbody>
</table>

Where berm width is 3.5m - water may be located under the footpath
Where berm width is 5.75m - spare space is between water & footpath

1. **LANDSCAPING/TREE PLANTING AREAS:**
   To be incorporated into berms and to be free of services.

2. **COMPETITIVE NETWORKS:**
   Locations are for like service networks. Competitive networks will be in respective locations, and at varying depths, or adjacent to each other.
NOTES:
1. Footpaths shall be required in accordance with Table on RD-01.
2. Kerbs shown are standard vertical kerb and channel.
3. Berms: refer to clauses 4.2.8 and 4.3.6.
4. All dimensions in millimetres.

KEY:
- 1400 wide concrete footpath.
- Basecourse & 2 coat seal to design requirements.
  (Refer to clause 4.3.8.1)
- 65mm top soil & standard grassing.

STANDARD DRAWING - ROADING
STANDARD ROAD CROSS SECTIONS

RD 03 - Standard Road Cross-Sections

EFFECTIVE CBRs

Use:
B1 - for over 500 heavy trucks daily
B2 - for 250-500 heavy trucks daily
C - for 100-250 heavy trucks daily
D - for 25-100 heavy trucks daily
E - for 10-25 heavy trucks daily
F - for less than 10 heavy trucks daily
G - for rural seal extensions

RD 04 - Design Graph for Flexible Pavements
NOTES
1. Principal, Arterial and Industrial streets shall be the subject of specific design based on an estimate of their EDA loading.
2. The materials requirements shown are minimum requirements and greater depths of higher quality materials may be used, but the total depth shall not be reduced.
3. The minimum pavement depth for streets shall be 200mm and for priveteways shall be 150mm.

RD 05 - Design Graph for Flexible Pavements for Secondary Streets
NOTE: All dimensions to suit standard cross-sections and minimum turning radii.
PLAN OF CUL-DE-SAC

- Expansion joints at 4.0m spacing maximum.
- Tangent point (end of straight kerb)
- Footpath

SECTION A-A

- Remove top of standard kerb profile
- Construction joint
- Key into channel by deep scabbling while concrete is soft
- 1500
- Slope 1 in 12 max
- 25 Lip

- D10-400 reinforcing bars at 400 centres. 200 lap with mesh.
- HRC 665 mesh reinforcement centrally placed in commercial and industrial areas
- 100mm compacted basecourse in substandard ground conditions.
- 100 in residential areas
- 150 in commercial areas
- 150 in industrial areas

FORMULATION OF EXISTING CUL-DE-SAC HEADS, COMBINED CHANNEL
- VEHICLE CROSSING AND FOOTPATH

RD 07 - Reformation of Existing Cul-de-Sac Head, Combined Channel, Vehicle Crossing, Footpath
PLAN OF CUL-DE-SAC

SECTION A-A

Footpath 75 mm thick in residential areas
150 mm thick reinforced with HRC 665 mesh centrally placed, in commercial and industrial areas

STANDARD DRAWING - ROADING

FORMATION OF CUL-DE-SAC HEADS

ROTORUA CIVIL ENGINEERING INDUSTRY STANDARD

RD 08

NOT TO SCALE

RD 08 - Reformation of Existing Cul-De-Sac Heads, Combined Channel with Mountable Kerb, Vehicle Crossing and Footpath
CORNER DESIGN
Minimum kerb radius 9.00m

TRAFFIC CONTROL
Parking or Bus Stopping should not be permitted along these frontages.

OPEN SPACE
This area should be kept clear of any obstruction which might block sight lines

NOTE
All standards of design illustrated hereon are jointly applicable to all corners of the intersection
- 75m when street is a major route (cl 4.2.13)

STANDARD DRAWING - ROADING
THIS DWG REVISED JULY 2001

TRAFFIC SIGHT LINES AT INTERSECTIONS
URBAN AREAS

ROTORUA DISTRICT COUNCIL
RINZORU CIVIL ENGINEERING INDUSTRY STANDARD
NOT TO SCALE

RD 09 - Traffic Sightlines at Intersections – Urban Areas
<table>
<thead>
<tr>
<th>OPERATING SPEED OF MAIN ROAD km/h</th>
<th>LOCAL/ COLLECTOR MIN. SIGHT DISTANCE (m) “S”</th>
<th>ARTERIAL MIN. SIGHT DISTANCE (m) “S”</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>35</td>
<td>“S”</td>
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<tr>
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<td>160</td>
<td>250</td>
</tr>
<tr>
<td>110</td>
<td>190</td>
<td>290</td>
</tr>
</tbody>
</table>

* Operating speed = 85 percentile free speed

**NOTES**

a. Sightlines are from 1.15m high at A & B to 1.15m high at C & D.

b. Sight distances on State Highways shall comply with Appendix 4 of Transit NZ Planning Policy manual.

c. For entrances with greater than 200 vpd refer to Land Transport Guidelines RTS 6 (Table 1)
RD 11 - Typical Intersection Layout
SECTION AT ‘A’
NOTES

1. The concrete shall be 100 mm thick.
2. The concrete shall have a minimum crushing strength of 17.5 MPa at 28 days and shall comply with NZS 3124:1987.
3. The crossing shall run continuously between the kerb and the property boundary.
4. If there is no existing footpath the Council will provide level pegs to ensure that the work ties in with future footpath development.
5. The work shall be carried out in such a manner as to ensure the safety of road and footpath users.
6. Locate a minimum 0.5m clear of cesspits, hydrants, powerpoles or other similar services.
Notes:

1. The concrete shall be 150 mm thick and reinforced with 1 layer of HRC 665 mesh laid with 50 mm cover from the bottom of the slab.
2. The concrete shall have a minimum crushing strength of 17.5 MPa at 28 days and shall comply with NZS 3124:1987.
3. The crossing shall run continuously between the kerb and the property boundary.
4. If there is no existing footpath the Council will provide level pegs to ensure that the work ties in with future footpath development.
5. The work shall be carried out in such a manner as to ensure the safety of road and footpath users.
6. Locate a minimum of 0.5m clear of cesspits, hydrants, power poles or other similar services.
7. Shrinkage joints through the channel at each side of the crossing shall be 30mm beyond the end of the reinforcing.

<table>
<thead>
<tr>
<th></th>
<th>HEAVY INDUSTRIAL (single lane only)</th>
<th>LIGHT INDUSTRIAL (single lane)</th>
<th>LIGHT INDUSTRIAL (double lane)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>4500</td>
<td>3500</td>
<td>6000</td>
</tr>
<tr>
<td></td>
<td>8000</td>
<td>7000</td>
<td>9500</td>
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</table>
MOUNTABLE KERB AND CHANNEL

DISHED CHANNEL

Reinforce with one layer of HRC 665 Mesh with 50mm cover from the bottom

NIB KERB

Note:
All chamfers 25mm
Concrete to be 17.5 Mpa
All Dimensions are in Millimeters

VERTICAL KERB AND CHANNEL

RD 15 - Kerb and Channel Profiles
VERTICAL KERB AND CHANNEL

NOTE: Existing kerb chamfered down over 300mm length to “let down” section

MOUNTABLE KERB AND CHANNEL

PROCEDURE FOR BREAKING OUT KERBING AT VEHICLE CROSSING
1. Carefully break out or cut kerb to the channel as shown in the above diagrams the full width of the crossing.

2. All concrete shall be 100mm thick and have a strength of 17.5MPa & wood floated to a smooth surface.
NOTE:
Cast iron or other approved pipes may be used in grass berms and from footpath to boundary.

Reinforcing in both sections is 4 R6 bars, one in each corner with 25mm cover.
1. Posts and supports to consist of:-
   a) Timber: 100mm x 75mm, clean building grade or No. 1 framing grade, treated W4, primed and finished with high gloss white paint above ground level.
   b) Metal: (Where Approved) of material of suitable size and construction to support the necessary signage, without failure or deterioration due to electrolytic action or differential expansion. Metal surfaces shall be adequately protected against corrosion, and coloured white. Anchor post in approved manner.
   c) CBD posts to be steel of special design and colour as supplied by RDC.

2. Signage to be in accordance with Transit New Zealand "Manual of Traffic Signs and Markings-Part 1: Traffic Signs". To have WHITE retroreflective symbols and lettering on BLUE background. Signs may be shaped to a point to indicate direction.

3. SIGN BLADE SIZE
<table>
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<tr>
<th>Primary Blade Size</th>
<th>Supplementary Blade Size</th>
<th>Supplementary Letter Height</th>
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<tr>
<td>240mm</td>
<td>200mm</td>
<td>150mm Series D</td>
</tr>
<tr>
<td>200mm</td>
<td>150mm</td>
<td>100mm Series D</td>
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</table>

4. LETTERING DETAILS
<table>
<thead>
<tr>
<th>Blade Size</th>
<th>Letter Height</th>
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</thead>
<tbody>
<tr>
<td>Urban Area</td>
<td>200mm Series D</td>
</tr>
<tr>
<td>Rural Area</td>
<td>240mm Series D</td>
</tr>
</tbody>
</table>

'Typical Section'

'NO EXIT' to be attached when applicable

Post cap if required.

Approved fixing for blade to post.

Refer to table for size. White letters on blue background.

NOTE:-
Street names may be erected on existing poles where approved.

See note 1.

2500 min. to 3000 max clearance to underside of lowest sign.

Timber posts to have 100mm x 75mm x 300mm foot.

Alternative metal post anchor to be approved by RDC.

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RD 19 - Pedestrian Accessways

**Accessway Width Up To 2.7m**

A & B Vary
Path constant at 1350
'L' Varies

**Accessway Width 3.0m & Over**

A & B Vary
Path constant at 1350
'L1' & 'L2' Varies
STANDARD WIRE-MESH FENCE
Minimum Sizes: Timber posts and struts - 100 x 100 or 150\(\Phi\)  
Timber strainer posts - 150 x 150 or 225\(\Phi\)  
Reinforced Concrete Posts: Size and design to be approved

STANDARD WIRE FENCE

RD 20 - Fencing Pedestrian Accessways
NOTES

1. Where the CBR of the existing material with its natural water content is greater than 10% measured in place by use of Clegg Hammer, Scala Penetrometer 2 Blow per 25mm or Nuclear Densometer, that material may be used to backfill the trench up to 300mm from the top surface level of the trench.

2. Bedding and backfilling is to be in accordance with the appropriate N.Z. Standard and the pipe or cable manufacturer’s recommendations, or as directed by the Engineer.

3. In all cases backfilling of the trench with either natural or imported material shall be compacted to achieve a Clegg Hammer value greater than 30, or a Scala Penetrometer reading greater than 6 blows per 25mm.

4. Where the trench is under a footpath, the CBR of the natural material for it to be used as backfill shall be greater than 10% and shall be compacted to achieve a Clegg Hammer value greater than 8, or a Scala Penetrometer reading greater than 1 blow per 25mm.

5. Where the trench is under a grassed berm, natural material is to be used to backfill and shall be compacted to an equivalent density to the surrounding ground. The area is to have 75mm of compacted topsoil and grass sown and established by the service authority.

6. Refer appendix 11 for arterial and collector roads.
Notes:

1. Stormwater control via slot drain and soakage pits, or similar approved stormwater control at the boundary to prevent run-off on to the road.

2. 2-coat or bi-couche seal or 20mm hotmix over 150mm thick basecourse or 125mm thick 17.5MPa reinforced concrete 665 HRC centrally located on a prepared consolidated subgrade. Dimensional details are the same for both sealed or concrete xings. Area to be sealed shall also cover the anticipated or existing swept vehicle area – where road is sealed.

3. 500min hotmix or chipseal strip to edge of concrete crossing. Strips on prepared consolidated subgrade.

4. 300min φ culvert pipe(s) where necessary approved to appropriate loading requirements. Cover over pipes to manufacturers standards.

5. Water table to each side of culvert aligned to prevent erosion.

6. Locate a minimum of 0.5m clear of cesspits, hydrants, power poles or other similar services.

Number of potential lots

<table>
<thead>
<tr>
<th>Number of Potential Lots</th>
<th>Dimension ‘a’ (mm)</th>
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<tbody>
<tr>
<td>1-2</td>
<td>3000</td>
</tr>
<tr>
<td>3-4</td>
<td>4000</td>
</tr>
<tr>
<td>5-8</td>
<td>5000</td>
</tr>
</tbody>
</table>

STANDARD DRAWING - ROADING

RURAL RESIDENTIAL VEHICLE ENTRANCES
(WHERE NO KERB & CHANNEL EXISTS)


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RD 22 - Rural Residential Vehicle Entrances
NOTES:

1. Formation 150mm compacted metal basecourse (min.) 2 coat seal (G3 & G5)
2. Fencing set back allows vehicles to be parked off carriageway while opening and closing gates. (20m min. for Milk Tanker)
3. Crossing to be culverted as necessary, complete with head walls. Culverts and headwalls to be designed and installed to the approval of the Engineer. All culverts shall be 300mm dia. min. installed to manufacturers recommendations.
4. The sealed area is to be shaped so that stormwater does not migrate onto the roadway.
5. Road crossfall to continue for a minimum of 1 metre past road edge line. Maximum gradient shall be 1 in 12 for the first six metres from the road edge line.
6. Area to be sealed shall cover the anticipated or existing swept vehicle area.
7. The crossing is required to be sealed to a length of 10 meters from the road edge.
8. If the road can be shown to have less than 1000 vehicle movements per day the turn-off on the opposite side of the road is not required.
9. All work to be carried out in a manner to ensure the safety of road users.
10. Locate a minimum of 0.5m clear of cesspits, hydrants, powerpoles or other similar services.

Culvert where necessary 300 min dia.

Water table to culvert each side aligned to prevent erosion.

2.5m seal widening

8.0m min for milk tanker

5.0m min for milk tanker

15.0m

Centre line of farm access

Sealed turn off road

Note 8

2.5m seal widening

rd 23 - Rural Commercial Vehicle Entrances

NOTES:

1. MARKING STANDARDS
   Standard Centreline 3m dash, 7m gap.
   Standard Edgeline continuous (100mm)

2. The sealed area is to be shaped such
   that stormwater or loose metal does not
   migrate on to the highway.

3. If existing lanes are less than 3.5m wide
   then widening will be more than 2.5m.
NOTES:
1. MARKING STANDARDS
   Standard Centreline 3m dash, 7m gap.
   Standard Edgeline continuous (100mm)

2. The sealed area is to be shaped such that stormwater or loose metal does not migrate on to the highway.

3. If existing lanes are less than 3.5m wide then widening will be more than 2.5m.

RD 25 - Rural SH 70km/hour, Private Commercial Access or Private Roads
MARKING STANDARDS
Standard Centreline 3m dash-7m gap/
45m dash-12m gap
Standard Edgeline continuous (100mm)
Continuity Line (200mm min.)
1m dash-3m gap

STANDARD DRAWING- ROADING
SIDE ROAD JUNCTION
RD 26 - Side Road Junction
This drawing applies only to the ash or pumice soils. In the case of silts or clays, specific design should apply, and in the case of sound rhyolite, vertical faces are acceptable.

Where the cut exceeds 6.0m, or when the natural ground slope at the top of the batter exceeds 20 degrees to the horizontal towards the cut, specific Engineering appraisal is required.

For rural residential areas, see drawing RD28
RD 28 - Rural Residential Road – Typical Cross Section
CHAPTER 5 -
UTILITY SERVICES
STORMWATER AND LAND DRAINAGE