
PART 3: ROADING**300 SCOPE**

This part of the Standards sets out the engineering requirements for the construction of new roads and associated infrastructure associated with land development projects, including performance criteria, methods for design and construction, and material specifications.

This section is not a comprehensive design guide, however it focuses on issues regarded as significant in the design and construction of new roads, including the upgrading of existing and unformed roads

300.1 Strategic Vision

The strategic vision for Rodney District Council with regard to Roading is:

- Keep Rodney District safe.
- To ensure that there is good road and walkway connectivity through out the District.
- To provide for a safe, efficient and comfortable passage of vehicular and non vehicular traffic.

300.2 Performance Criteria

Meet all relevant standards and the requirements of the District Plan and Council Bylaws.

Provide for a safe, efficient and comfortable passage of vehicular and non vehicular traffic.

Provide for future development.

Designed to cope for future design loads.

Provide for stormwater, landscaping and utility services.

300.4 Documents referred to in this section:

- District Plan. "Development Controls and Performance Standards" section. Rule 21.10.1 (Site Access).
- District Plan ("Defined Road Boundary" in Appendix 21A).
- District Plan. ("On-site Parking" Rule 21.10.2, "Loading Areas" Rule 21.10.3, "General Rules for Parking and Loading" Rule 21.10.4, and "Vehicle Queuing" Rule 21.10.5).
- District Plan Chapter 23, Performance Criteria.
- The Council General Bylaw 1998.
- AUSTROADS – AP-1/89 Rural Road Design "Guide to the Geometric Design of Rural Roads".
- AUSTROADS - Rural Road Design.
- AUSTROADS - Approach Sight Distance and Safe Intersection Sight Distance.
- AUSTROADS – "Intersections at Grade - Part 5".
- AUSTROADS - Guide to the Geometric Design of Rural Roads.
- AUSTROADS – AP – 17/92 Pavement Design - A Guide to the Structural Design of Road Pavements.
- AUSTROADS – Part 13 – Pedestrians, Guide to Traffic Engineering Practice.
- AUSTROADS – Part 14 – Bicycles, Guide to Traffic Engineering Practice.
- NRB Code of Practice Design for Urban Streets [clause 3.5].
- Land Transport NZ - "New Zealand On-Road Tracking Curves" October 1995.

- NZS 4407 : 1991 Test 3.6 The sand equivalent.
- NZS 4407 : 1991 Test 3.10 The crushing resistance of coarse aggregate.
- NZS 4407 : 1991 Test 3.15 The California Bearing Ratio (CBR).
- NZS 3104 Specification for concrete production - High grade and special grade with a 28 day strength of 20 Mpa.
- NZS4121 Design for Access and Mobility: Buildings and Associated Facilities "Design for Access and Mobility".
- AS/NZS 1158:1997 Vehicular traffic (Category V) lighting - Performance and installation design requirement.
- NZS 6701:1983 Code of practice for road lighting.
- AS1254.
- TNZ F3:1998 Pipe Culvert Construction 200.
- TNZ specifications M/1 Roothing Bitumens 1995.
- TNZ specifications M/6 Sealing Chip 200.
- TNZ Specification M/10. Asphaltic Concrete 2002.
- TNZ specifications P/3 First Coat Sealing 1995.
- TNZ P/9. Construction of Asphaltic Concrete Paving 1975.
- TNZ T/1 1997 Benkelman Beam Deflection Measurements 1977.
- TNZ "A Guide to the Design of New Pavements for Light Traffic".
- Transit New Zealand's Manual of Traffic Signs and Markings (Parts I and II).
- Transit New Zealand State Highway requirements.
- TNZ Bridge Manual.
- Building Act 2004.
- A Management Plan for the Auckland Highway System (April 1998).
- Roothing Consultants Guidelines (May 1999).
- <http://www.rodney.govt.nz/DistrictTownPlanning/infrastructure/Pages/Appendices.aspx> (refer Appendix L - RAMM Data Collection Electronic Version).

301 GENERAL DESIGN CONSIDERATIONS

301.1 Unless stated otherwise sections 301 - 347 apply to all roads in the district area. Sections 348 - 362 are the variations that apply to district rural roads.

302 THE ROAD PATTERN

302.1 The road design layout shall take into consideration the following:

- be safe and efficient;
- provide connected roads that encourage walking and cycling.

302.2 Tracking Curves of vehicle movements may be used to verify the suitability of proposed layout geometry. The vehicles chosen shall be appropriate to the type of vehicle that will use the road.

For on road usage and site manoeuvring or parking refer to;

- RTS18 – New Zealand On-Road Tracking Curves for Heavy Vehicles 2007
- AS/NZS 2890. Part 1:Off street car parking

- A design vehicle of suitable dimensions and turning characteristics representative of the 90-percentile vehicle shall be used [i.e. the vehicle for which only 10% of vehicles in its category have more critical dimensions].

303 CARRIAGEWAY, ROAD AND FORMATION WIDTHS

303.1 Road widths shall be generally designed in accordance with Table 3.1 Residential Road Layout.

TABLE 3.1 RESIDENTIAL ROAD LAYOUTS
(REFER TO COUNCIL DRAWING NUMBER 18000 SHEET 3.3 and 3.30)

Layout and Minimum Width Requirements (metres)													
Traffic generated	services berm	footpath	landscaping	marked parking	lane	Centre-line	lane	marked parking	landscaping	footpath	grass berm	services berm	Minimum legal width
<300 vpd*	1.7	1.5	2.5	-	3		3	-	-	-	3	-	15
<1000 vpd	1.7	1.5	2.5	-	4.25		4.25	-	-	-	1.0	1.7	17
<3000 vpd	1.7	1.5	3.0	-	4.25		4.25	-	3.0	1.5	-	1.7	21
>3000 vpd	Specific design is required - subject to the approval of the Roading Asset Manager												26+

* 'vpd' = vehicles per day

- Notes
1. Specific design is required for all roads in Commercial, Industrial and Business and Residential Medium and High Intensity Zones.
 2. A reduced cross-section may be approved by the **Engineer** on Limited Access Roads where parking may not be required.
 3. Local Area Traffic Management (traffic calming) may be approved on roads with traffic volumes less than 1000 vpd.
 4. Traffic generation is based on trips per dwelling per day calculated on the number of potential dwellings provided for in the zone.
 5. Parking provision requirements shall assume that parking is only permitted on one side of the road where volumes are less than 3000 vpd.
 6. All road designs shall consider anticipated traffic volumes.
 7. For 'Low Intensity Residential' and 'Landscape Protection' Zones refer to Table 3.6 "Rural Roads Geometric Standards" for carriageway width, kerb and channel and footpath requirements. For all other requirements see the above Table 3.1.
 8. For the <1000 vpd profile and subject to the approval of the **Engineer**, the width of each lane may be reduced to 3.5m where the berm area has been increased in width and designed to provide recessed parking. The minimum legal width shall not be reduced.
 9. Where on-road devices (i.e swales) of the type described under section 322 below are to be provided, the minimum legal road width shall be increased by not less than 3.0m for each device. Where the device is likely to require a larger footprint necessitating further widening of the road reserve this additional width and length shall be determined by the **Engineer** and included in the scheme plan for the development.

304 PEDESTRIAN AND CYCLE TRAFFIC

304.1 Footpaths shall be provided for pedestrians in accordance to Table 3.1 "Residential Road Layouts". Cycle tracks or lanes will require specific design and shall be designed in accordance with Austroads Part 14.

305 ENGINEERING DESIGN – ROAD GEOMETRY

306 GRADIENTS

306.1 The volume and extent of earthworks in developments is influenced by the maximum and minimum gradients adopted. Although the minimum acceptable gradient will normally be 0.5%, a flatter minimum gradient may be accepted by the **Engineer**. Road gradients should not be steeper than 12.5% except for residential access places, cul de sacs, local streets, and rural streets carrying less than 250 vehicles per day which may have a gradient of up to 16.5%. On all roads fronting Industrial

or Commercial Zones and roads classified as Arterial Routes or higher, the maximum gradient should not be above 8%. Changes to the maximum gradients may be approved by the **Engineer**.

- 306.2** Where curves on rural roads less than 100m radius are necessary for topographical or other reasons, extra widening shall be applied according to the width of carriageway normally available to moving traffic, and the curve widening shall comply with recommended values set out in the AUSTRROADS - "Guide to the Geometric Design of Rural Roads". Should it be necessary to preserve the minimum berm width extra widening shall also be applied to the land set aside for the road.

307 HORIZONTAL CURVES

- 307.1** Horizontal curves in 50 km/hr zones may be circular, with a minimum centreline radius of 80m for all industrial and collector roads. For local roads of less than 2,000 vehicles per day the radius may be reduced progressively to a minimum of 15m on roads with less than 300 vehicles per day [vpd].
- 307.2** On roads which may have a higher speed limit in the future, the **Engineer** will require transition curves with a specified speed value. Transition curves shall be calculated in accordance with Austroads Urban Road Design Guide 2002. Transition curves will not normally be required in local roads apart from the aforementioned situation.

308 VERTICAL CURVES

- 308.1** Vertical curves shall generally comply with the minimum requirements of Austroads Urban Road Design Guide 2002 except that shortening of undervertical (sag) curves may be necessary to ensure that the gradient in the channel is not less than 1:300. Shortening of the vertical curve on a road adjacent to intersections may be required where the gradient of the road is more than 5%. Change of grade in flat land should have vertical curves of 60m minimum length where drainage permits.

309 SIGHT DISTANCE

- 309.1** The safe stopping sight distance (SSSD) are shown in Table 6.3 of the Austroads – Guide to Traffic Engineering Practice – Part 5: Intersections at Grade; and shall apply to all roads unless specifically advised otherwise by the **Engineer**.
- 309.2** The safe stopping sight distance is the minimum line of sight distance measured from the driver's eye 1.05m above the road, to an object on the road situated in the centre of the same traffic lane.

Notes:

Operating Speed = 85th percentile speed on frontage road. This may be taken as the speed limit plus 15% if survey data is not available.

Distances are based on the Approach Sight Distance and Safe Intersection Sight Distance tables in AUSTRROADS - Intersections at Grade (Part 5) assuming reaction times of 2.5 seconds for speeds on all roads.

310 CROSSFALL AND SUPERELEVATION

- 310.1** The normal crossfall on sealed pavements shall be 4% in both directions at right angles to the carriageway centreline.
- 310.2** The normal crossfall on unsealed pavements shall be 6% in both directions at right angles to the centreline of the road.
- 310.3** Normal crossfall shall be used in 50 km/hr zones, or in areas that, in the opinion of the **Engineer**, are likely to become 50 km/hr zones, except where superelevation is required by the **Engineer**. If there is a possibility that a certain road may have an increased speed limit in the future, the **Engineer** may require the superelevation of the road to be constructed to a speed value nominated at the time of the request. Any superelevation shall comply with AUSTRROADS - Rural Road Design.
- 310.4** Superelevation requirements may require adjustment to ensure flowing kerb profiles.
- 310.5** The ruling profile gradient (i.e longitudinal) is to be developed along the shortest or inside seal edge of the carriageway.
- 310.6** Reverse curves are to be separated by sufficient length of straight to allow for a satisfactory rate of superelevation reversal, consistent with the design standards.

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- 310.7** Superelevation appropriate to the design speed shall be applied on all horizontal curves.
- 311 INTERSECTION DESIGN**
- 311.1** All major intersections shall be designed to accommodate heavy vehicle usage. The general minimum design radius of 15.0m for a semi-trailer may be used for design purposes. Design shall comply with the RTS 18 - "New Zealand On-Road Tracking Curves for Heavy Vehicles August 2007". The **Engineer** shall decide if each intersection falls within the category of a major intersection.
- 311.2** "Austroads - Intersections at Grade - Part 5" is to be used in the selection and design of intersection layouts. Particular attention is to be given to complying with sight distance requirements of this document (see also section 309).
- 311.3** Intersections shall be designed such that the side road adjoins the through road at a preferred angle of 90°, and in no case less than 80°, at a location with adequate sight distance in both directions on the through road.
- 311.4** Crossroad intersections will not be approved. All intersections shall be designed to accommodate the anticipated traffic movements.
- 311.5** The edge of seal radius at an intersection shall be not less than 15m in rural areas and 6m in residential areas.
- 311.6** Wherever practicable the gradient within 30m of intersections should be less than 5% and preferably less than 2%.
- 311.7** Where traffic islands are deemed necessary at intersections these shall be specifically designed and shall be lit during the hours of darkness. Appropriate lighting shall also be specifically designed. See also section 336 and 362 Road Lighting
- 311.8** Intersections on curves, particularly on the inside of curves, should be avoided.
- 312 CUL-DE-SAC HEADS**
- 312.1** The cul-de-sac head shall incorporate a minimum 10m outside radius turning circle. If the footpath is constructed as for a commercial vehicular crossing the footpath can be included as part of the 10m requirement, subject to **Engineer's** approval. In industrial and rural areas a minimum radius of 12.5m is required.
- 312.2** 'Y' shaped cul-de-sac heads (where manoeuvring is necessary) may be appropriate, subject to **Engineer's** approval, for cul-de-sacs servicing a maximum of 20 dwellings, but not in industrial, commercial or business areas.
- 312.3** The cul-de-sac shall have sufficient grade to ensure that ponding of water does not occur.
- 313 ROAD PAVEMENT DESIGN**
- 313.1** Pavement designs shall comply with AUSTRROADS Pavement Design - A Guide to the Structural Design of Road Pavement (and supplements including the Transit NZ "A Guide to the Design of New Pavements for Light Traffic"). The pavement shall have a design life of no less than 20 years.

314 AGGREGATE SPECIFICATIONS

314.1 Sub-base

314.2 The following sub-base qualities are recognised in Table 3.3:

Table 3.3 Sub Base

<u>Quality</u>	<u>Size</u>	<u>Code</u>
General Quality	All passing 40mm	GAP 40
General Quality	All passing 65mm	GAP 65

314.3 Sub-base aggregate shall consist of broken hard durable rock, free of organic matter, clay and any other deleterious material.

314.4 The sand equivalent shall not be less than 25 when tested in accordance with NZS 4407: 1991 Test 3.6.

314.5 The aggregate shall have a crushing resistance greater than 100 KN when tested in accordance with NZS 4407: 1991 Test 3.10.

314.6 Aggregate shall produce a CBR greater than 40 when tested in accordance with NZS 4407: 1991 Test 3.15.

314.7 Base course

314.8 The following base course quality is recognised in Table 3.4:

Table 3.4 Base course

<u>Quality</u>	<u>Size</u>	<u>Code</u>
Transit New Zealand M4	All passing 40mm	TNZ AP40

For modified aggregates refer to section 315.

315 MODIFIED AGGREGATES

315.1 Modified sub-base aggregates may be utilised as base course provided adequate material and performance information is provided to the satisfaction of the **Engineer**.

316 PAVEMENT LAYER CONSTRUCTION

Sub-base

316.1 Prior to placing the granular pavement layers the subgrade shall be inspected jointly by the **Developer’s Representative** and the **Engineer**, who will certify the completed works,. The **Engineer** shall require the subgrade to be proof rolled or to be tested with the Benkleman Beam to verify its uniformity.

316.2 Should the constructed subgrade capacity not meet the minimum design strength assumptions, the subgrade shall be modified to increase its strength to the required capacity. Alternatively the granular layers may be increased in thickness to compensate for the strength deficit in the subgrade.

316.3 All design alterations by the **Developer’s Representative** shall be submitted to the **Engineer** for approval prior to the remedial works commencing.

- 316.4** The sub-base shall be spread, graded and rolled to the correct formation level. The completed sub-base shall be inspected jointly by the **Developer's Representative**, who will certify the completed works and by the **Engineer** prior to placement of the base course.

Base course

- 316.5** The base course layer shall be placed to full depth, compacted and graded to shape at the optimum moisture content.

317 TESTING

- 317.1** Unless approved otherwise by the **Engineer**, Benkleman Beam tests shall be carried out on the base course layer prior to sealing.

- 317.2** The Benkleman Beam tests shall be completed in accordance with the TNZ T/1 1997.

- 317.3** The D95 percentile deflection limit shall not exceed the limits shown below. If an individual reading exceeds the D95 limit by more than 1.5 times, the pavement shall be reconstructed.

Table 3.5 Benkleman Beams

BENKLEMAN BEAM LIMITS	
Traffic generated (vpd)	D₉₅
<300 (residential only)	1.5
<3000	1.25
>3000	1.0

- 317.4** All material and performance specifications may require testing by a TELARC Registered Laboratory. This shall be at the discretion of the **Engineer**.

- 317.5** All testing required shall be at the cost of the **Developer**.

318 CARRIAGEWAY SEALING

- 318.1** Unless otherwise approved by the **Engineer**, all Service lanes, Residential, Commercial Business and Industrial zones shall be finished with hot laid asphaltic concrete over a first coat chip seal. The **Developer** is to complete both of the following seal layers at the time of construction:

First Coat Chip Seal

- 318.2** First coat sealing with asphaltic cutback shall be to TNZ specifications P/3 and M/1. Sealing chips used must comply with the TNZ specifications M/6. Local stone may be used where the loss by the Los Angeles abrasion test does not exceed 40%.

- 318.3** The first coat chip seal shall be applied to the prepared base course surface at least one week before the asphaltic concrete surfacing is laid.

318.4 Hot Laid Asphaltic Concrete Surfacing

- 318.5** Hot laid surfacing shall be laid at a minimum compacted thickness of 30mm with a Mix 14 asphaltic concrete complying with TNZ Specification M/10. The method of laying is specified in TNZ P/9.

- 318.6** Paved surfacing shall be laid to the requirements of the relevant TNZ and/or AS/NZS Standards.

All other roads require a two coat chip seal to TNZ P/3, M1 and M6 specifications.

319 SUBGRADE DRAINAGE**320 SUBSOIL DRAINAGE**

320.1 Where subsoils are not free draining, subsoil drains are required under road channels. Refer to Council Drawing Number 18000 Sheet 3.13..

321 ADDITIONAL SUBGRADE DRAINAGE

321.1 Any wet spot in the sub grade shall be drained to the under channel drainage system. Where the wet area is below the level of the under channel drain, it shall be drained using approved filter drain pipes connected to the nearest stormwater system.

322 STORMWATER SYSTEMS

322.1 A piped stormwater system shall be installed to cope with the 10% AEP storm in all areas. The system shall be designed for the road area and all contributory catchment. As a general rule a local road may act as a secondary flow path and as a flood retention area for storms in excess of the 10 % AEP storm.

322.2 In some areas it may be necessary to provide quantity detention and quality treatment of carriageway run-off. This may be by way of a number of devices (i.e swales, rain gardens etc). The location within the road reserve is subject to specific approval from the Roading Assets Manager and/or Stormwater.

323 KERBING AND CHANNELLING

323.1 Where kerbs and channels, or equivalent approved concrete, ceramic or stone edging, are to be provided on carriageways, they are to comply with the Council Drawing Number 18000 Sheet 3.13. Cast in situ concrete shall be to NZS 3104 with a 28 day strength of 20 MPa.

323.2 String lines set up for kerbing may be inspected and approved by the **Engineer** prior to construction.

323.3 Where cross fall is such that stormwater control is required on one side only of the carriageway, kerb and nib only may be installed on the higher side. Special provision for roof water drainage may be required.

323.4 Where the gradient of the carriageway exceeds 5 % the **Engineer** may require the use of vertical kerbs to ensure adequate stormwater control on the carriageway. This may also apply in instances where private properties are situated below kerb level and there is a probability that surface runoff may enter properties via kerb crossings. Refer to section 332 below.

323.5 Mountable (low profile) kerbs may be permitted on roads proposed to carry less than 1,000 vehicles per day but must be approved by the **Engineer**. Mountable kerbs maybe permitted additionally to the aforementioned circumstance at the discretion of the **Engineer**.

324 CATCHPITS

324.1 For specification on catchpits refer to Stormwater Part 4 – 424.

325 DISHED CHANNELS IN CARRIAGEWAYS AND PARKING BAYS

325.1 To provide setback parking a 600mm wide dished channel shall be constructed to the standard detail shown in Council Drawing Number 18000 Sheet 3.13.

326 DISHED CHANNELS WITH FOOTPATHS OR ACCESSWAYS

326.1 Low level footpaths and footpaths in pedestrian access ways shall have a dished channel formed along the path edge. This channel shall be designed and constructed to contain the runoff from the contributory catchment during the 10 % AEP event.

326.2 The construction of dished channels shall be as shown in Council Drawing Number 18000 Sheet 3.13.1.

327 FOOTPATHS/ACCESSWAYS

327.1 Concrete footpaths shall be constructed to NZS3104 with a 28 day strength of 20 Mpa with a non-slip wood float or light broom finish. The minimum depth of concrete shall be 125mm. A minimum 30mm compacted depth of fine granular material shall be placed under the concrete. The width shall be not

less than 1.5m except in commercial areas where the minimum shall be not less than 3.0m. Cross fall shall be 3 percent. Solid masonry paving units may be used providing permanent concrete edgings are used.

327.2 Footpaths in Commercial and Retail Service zones shall be specifically designed for the particular circumstances which apply, but shall not be less than 3m wide.

327.3 In general footpaths are to be located away from the kerb. (Refer Table 3.1).

327.4 Footpaths in cul-de-sac that form part of the required cul-de-sac turning area shall be 200mm thick. Turning area shall conform to section 312.1.

327.5 Footpath construction joints or saw cuts to a minimum depth of 30mm shall be formed at 4m centres.

328 PEDESTRIAN ACCESSWAYS

328.1 Steep grades (>1 in 5) and steps shall be avoided as far as practicable.

328.2 The minimum width of pedestrian access ways is 2.5m.

328.3 Pedestrian access ways shall be paved to a minimum width of 1.5m.

328.4 Provision shall be made for the control, collection and disposal of stormwater along pedestrian access ways.

328.5 Bollards as per Council Drawing Number 18000 Sheet 3.16 are to be installed at each end of pedestrian access ways.

329 CYCLE PATHS

329.1 Paths for bicycle use shall be constructed to standards specified for footpaths. Cycle paths shall be 2.0m wide within the berm on one side of the road or 1.50m wide if on both sides of the road, and shall be additional to any footpath requirement. The cycle path shall have a minimum lateral clearance of 0.70m. Stormwater disposal, handrails, lighting shall be provided as appropriate to the specific situation. Refer to Council Drawing Number 18000 Sheet 3.16 for access way cycle barrier details.

329.2 Shared Cycleway / Footway

Paths for a shared cycleway/footway are to follow the requirements of Austroads "Part 13 – Pedestrians, Guide to Traffic Engineering Practice" and "Part 14 – Bicycles, Guide to Traffic Engineering Practice".

330 CROSSINGS

331 PRAM AND WHEELCHAIR CROSSINGS

331.1 Wheelchair ramps shall be constructed as shown on Council Drawing Number 18000 Sheet 3.17. Maximum gradient shall be 1 in 12. Where required by the **Engineer** a contrasting surface shall be constructed on the ramp in accordance with NZS4121 "Design for Access and Mobility".

331.2 The crossings shall be sited to facilitate normal pedestrian movements in the road. Where possible, catchpit shall be sited so as to reduce the flow of stormwater in the channel at the crossing entrance.

332 VEHICLE CROSSINGS

332.1 General Bylaw 1998, Chapter 9-Road and Traffic Control and Numbering of Premises, requires Council consent for all crossings in public places

332.2 Refer to the District Plan. ("Development Controls and Performance Standards" Section. Rule 21.10.1 (Site Access). Copy provided as Appendix ("H").

332.3 Details of acceptable forms of crossings are indicated in Council Drawing Number 18000 Sheets 3.4, 3.5, 3.6, 3.7, 3.8 & 3.9.

332.4 Crossing within the "Defined Road Boundary" as shown in the Council Drawing Number 18000 Sheet 3.10, and the District Plan ("Defined Road Boundary" in Appendix "H") requires a (Restricted Discretionary Activity) Resource Consent.

- 332.5** Where crossings may be expected to carry heavy traffic, these shall be specifically designed and the depth increased or reinforcing provided, or both, to the **Engineer's** satisfaction.
- 332.6** All concrete in vehicle crossings shall be brushed finish 20MPa concrete minimum 150mm thick.
- 333** **BERMS**
- 333.1** The minimum width of berm are given in Table 3.1. The minimum width of berm in High Intensity Residential (ResH) is 5500 mm to accommodate the provision of stormwater reticulation in the berm area, except with the approval of the Rooding Asset Manager.
- 333.2** On completion of all other works, the berms shall be spread with a minimum consolidated depth of 100mm. The topsoil shall be graded to kerb top and footpath edges, and may be finished 15mm high to allow for settlement except on the low side of the footpath where the topsoil shall be finished flush to prevent water ponding.
- 333.3** After topsoiling the berms shall be sown with amenity type rye grass seed and fertilised.
- 333.4** Mowing of berms shall be the responsibility of the **Developer** until the developed berm is vested in Council.
- 334** **CROSSFALL ON GRASS BERMS**
- 334.1** The shape, slope and vegetation of berms shall be such as to provide satisfactorily stormwater runoff, maintenance, location of services and vehicle crossings to properties (unless acceptable alternative parking is provided). To achieve satisfactory drainage the crossfall should be at least 3%.
- 334.2** Grassed areas for tree planting which are additional to the minimum berm width shall be specifically designed. In these areas steeper gradients may be permitted to a maximum of 20% providing the area can be mown and maintained.
- 334.3** All planting within the berm area must be approved prior to its installation.
- 335** **LANDSCAPING**
- 335.1** Berms may be planted provided the placement of the trees complies with the requirements of Council Drawing Number 18000 Sheets 3.25, 3.26, 3.27 and Table 3.1.
- 335.2** Similar types of trees should be planted to give a uniform street appearance and shall be subject to prior approval of the **Engineer**.
- 336** **ROAD LIGHTING**
- 336.1** Road lighting in residential areas is to provide for road traffic safety, and pedestrian safety, security and convenience. Access ways in public areas or other locations away from roads are to be illuminated in conjunction with the roading area plan or layout, enabling visual surveillance of the access way from the road. The style of lighting standard and fitting to be used shall be approved by the Engineer.
- 336.2** Pedestrian access ways shall have pedestrian safety lighting located and designed to minimise the effects of the intrusion of light into neighbouring dwellings.
- 336.3** Road lighting pole requirements are detailed in Council Drawing No. 18000 Sheet 3.28 & 3.29. Frangible bases will be required where the legal speed limit set is greater than 50 km/h. Frangible bases may be required at the **Engineer's** discretion where the road being constructed intersects with a main road.
- 336.4** All required road lighting is to be installed by the **Developer** and be in operation at the time Council certifies completion.
- 336.5** Lighting of roads, service lanes and pedestrian access ways shall be in accordance with AS/NZS 1158:1997 and related documents.
- 336.6** Provide Street lighting Schematic drawing of asbuilts upon completion.
- 336.7** A code compliance (CCC) for road lighting complete with illumination certificate will be attached to the required for 224.c inspection request.

Note: For any wiring/electrical requirements, refer to Vector standards for current specifications.

337 STREET FURNITURE

337.1 All street furniture including seating and public litter bins shall meet the uniform specifications available from the **Engineer**.

338 TRAFFIC SERVICES

338.1 The **Engineer** shall require the installation of all road marking, traffic signage and other delineation to be included in all road construction. All traffic service installations shall be in accordance with Council's Policies and Standards and Transit New Zealand's Manual of Traffic Signs and Markings (Parts I and II).

338.2 Painted road markings shall be reinstated following the application of the hot laid asphalt and the cost shall be included in the Bond (if any).

338.3 Refer to Section 103.13 and Council Drawing Number 18000 Sheet 3.1 for Road Name sign requirements and positioning.

339 BRIDGES & CULVERTS

339.1 Where the carriageway construction crosses a stream, discussion with the **Engineer** prior to submission of the Scheme Plan is essential. This particularly applies to the scenario set out in section 339.9 and 339.10 below.

339.2 Where a culvert or bridge crosses a stream(s) it must be constructed in strict accordance with any flood management plan contained in a catchment management plan for the area. Where a catchment management plan has not been prepared for an area the **Engineer** will request the Stormwater Asset Manager to specify the type of crossing, bridge or culvert, and the configuration of the structure to ensure compliance with hydraulic and hydrological requirements for the site and the catchment.

339.3 Bridge design shall conform to the technical requirements of TNZ 'Bridge Design Manual. All bridges shall have a minimum 500mm clearance above the 1% AEP flood level.

339.4 The width between kerbs or wheel guards shall be as set out in Table 3.6.

339.5 The full formation width of the road shall be carried over all culverts.

339.6 All bridges and cast-in-situ box culverts will require a Building Consent under the Building Act 2004. Precast box culverts and other culverts over 1m diameter may be subject to a Building Consent under the Building Act 2004.

339.7 Traffic guard rails of an approved type and layout shall be installed over the culvert embankment.

339.8 Culverts shall be designed to cater for the 1 % AEP event. The design shall consider the following:-

- (a) Shall pass the 1% AEP event without heading up to levels determined in the relevant catchment management plan or in the absence of such a plan at a level approved by the Stormwater Asset Manager. Pass the 10% AEP event without heading up and not exceeding any level set by the catchment management plan or by the Stormwater Asset Manager.
- (b) Meet all requirements for inlet and outlet conditions set out in Section 4 Stormwater of these Standards.
- (c) May not head up in the 1% AEP event to the point where the minimum freeboard is less than 500 mm below the edge of the carriageway.

339.9 Where a road is intended to cross a defined flood plain the effects of the proposed road may be required to be modelled by the **Engineer**. The impacts indicated by the model and consequent assessment of effects will be used to determine the vertical alignment of the road. Consideration shall be given to:

- (a) Effects of heading up
- (b) Embankment stability
- (c) Overtopping

(d) Scour of both embankment and stream

339.10 Work in a watercourse or flood plain is likely to require resource consent from the Auckland Regional Council. The type and likely conditions attached to such consents should be dealt with prior to submission for engineering plan approval. Any consent conditions applied by the ARC will form part of the engineering approval issued by the **Engineer**.

340 PARKING

340.1 For matters pertaining to parking refer to Table 3.1, and the District Plan, (“On-site Parking” section. Rule 21.10.2 and Table 1, refer to Appendix “H” of the Standard. Note that where roads are proposed to be created as part of any subdivision of land in a Residential, Commercial, Industrial or Business Zone a minimum of one carparking space shall be provided within the legal road for every two sites.

341 PARKING AND LOADING AREAS

341.1 Refer to the District Plan (“On-site Parking” Rule 21.10.2, “Loading Areas” Rule 21.10.3, “General Rules for Parking and Loading” Rule 21.10.4, and “Vehicle Queuing” Rule 21.10.5. Copy provided in Appendix “H”).

341.2 Parking areas within legal road land shall be constructed to the same design standards as the roads of which they are a part.

341.3 Parking and loading areas within private developments, where required by the District Plan, or conditions of a Resource Consent, shall be constructed to a permanent dust free pavement. Pavement design shall conform to the requirements of Section 313 -324 and shall make appropriate allowance for the frequency of heavy vehicles. Where a parking or manoeuvring area abuts a site boundary, a kerb or similar non-mountable barrier not less than 150mm high shall be provided to prevent vehicles overhanging the boundary, except at the vehicle crossing(s). Appropriate crossfalls, kerbing and channelling, dished channels and catchpits shall be provided for the drainage of the parking area. Unless approved otherwise by the consent conditions all run-off from parking areas shall be treated to the requirements of ARC TP 10 “Design Guidelines for Stormwater Treatment Devices”.

342 BUS BAYS

342.1 On roads that are likely to become future bus routes, bus bays shall be installed. These shall be as detailed on Council Drawing Number 18000 Sheet 3.22. The recommendations of the **Engineer** shall be sought on the need for bus bays.

343 SERVICE LANES

343.1 Service lanes shall have a kerb and channel on at least one side, a concrete edging strip flush with the surface may be used on the other side. Provision shall be made for the disposal of stormwater. The pavement construction and surfacing shall be in accordance with Section 313 – 318.

344 SERVICE LANES IN BUSINESS ZONES

344.1 Industrial, Commercial and Business Zone service lanes and private ways shall be subject to specific design. Where the service lane serves properties on one side only, the surface may have a single crossfall with kerb and channel on the lower side and a concrete edging strip flush with the surface on the high side.

345 URBAN PRIVATE WAYS AND COMMON AREAS

345.1 The minimum widths between boundaries shall comply with the District Plan and shall include a grassed strip on either side to provide for the construction of underground services.

345.2 Private ways are to be constructed in accordance with the details set out in Council Drawing Number 18000 Sheet 3.21. Alternative construction details will be permitted at the discretion of the **Engineer**.

345.3 The carriageway width will be set by consent conditions. As a general rule the width shall not be less than 2.7 metres exclusive of channels, serving up to 5 dwellings, and 5.5 metres exclusive of channels, serving more than 5 dwellings. The pavement shall be constructed of 150mm thick, 20 MPa concrete.

The width of private-ways serving any activity other than residential dwellings shall be a minimum of 6 metres exclusive of channels or separate entry/exit, each not less than 3 metres exclusive of channels.

- 345.4** Adequate provision shall be made for the collection and disposal of stormwater to a piped system. The method selected on the particular site must be demonstrated to contain the 10 % AEP storm run-off from the contributory catchment. This may mean the use of a kerb rather than a dish channel particularly on steeper gradients.
- 345.5** Adequate turning area shall be provided on all private ways. Gradients shall not exceed 1 in 5. Transverse slopes shall be 3% and the minimum inside radius of curves shall be 9m.
- 345.6** Passing bays shall be 8 metres by 5.5 metres (exclusive of tapers which shall not be less than 5 metres long) and be located to ensure that the line of sight is maintained between adjacent passing bays. Passing bays shall be constructed to the same standards as the carriageway.
- 345.7** In situations where the grade is excessive and/or the surface will be shaded for extended periods, a high friction surfacing such as exposed crushed (not round) aggregate, carborundum dust surface treatment, impressed close space chevrons, etc shall be utilised to provide a high skid resistance.
- 345.8** Any stream crossing associated with a private way involving a culvert and associated head walls will remain a private asset and not be included in Council's Asset Register.

346 ROADSIDE HAZARDS

- 346.1** Assessment of potential roadside hazards shall be undertaken for all designs to the satisfaction of the **Engineer**. All identified hazards shall be eliminated, isolated or minimised as appropriate.

347 UTILITY SERVICES WITHIN ROAD LAND (ROW, PRIVATE WAYS OR PRIVATE ROAD)

- 347.1** Services installed within the road land shall be confined to the locations indicated on Council Drawing Number 18000 Sheet 3.31.2 & 6.1 and Table 3.1.

RURAL ROADS

348 DEFINITION OF RURAL ROADS

- 348.1** For the purposes of this Part of the Standard, rural roads are defined as all roads not adjoining a Residential, Commercial, Business or Industrial Zone as defined in the District Plan.
- 348.2** Kerbing and channel and footpath requirements in Landscape Protection and Low Intensity Residential Zones, Rural Settlement 1 Zones and in Countryside Living Zones shall comply with the requirements of Table 3.6.
- 348.3** Where the Council considers that a development will significantly increase the traffic volume on an existing road, it will require works and/or a contribution towards improvements on the road serving the development to the requirements of this Standard.

349 SCOPE

- 349.1** This section sets out the variations to Sections 301 to 347 that apply to rural roading developments. They shall apply to all new formations whether on new or existing unformed legal roads and in cases where the Council requires the **Developer** to upgrade an existing formed rural road.

350 TRAFFIC VOLUMES

- 350.1** For convenience in using Table 3.6, roads are grouped according to the volume of traffic using them. For traffic volumes exceeding 2,500 vehicles per day current New Zealand Transport Agency (NZTA) requirements shall apply.
- 350.2** The **Engineer** will nominate the traffic volume to be considered with regard to the proposed uses of the land, possible future extensions of the road and the developments anticipated during the design life of the pavement.

351 TOPOGRAPHY

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- 351.1** Attention is drawn to the particular difficulties in meeting the requirements of the Air Land Water Plan in respect of water quantity and quality.
- Council will not permit the adoption of engineered structures such as tanks on the road reserve as public assets. Attenuation and quality treatment must generally be undertaken within private property as private assets unless otherwise approved by the Roads Asset Manager
- 351.2** Types of topography are defined in Table 3.6.
- 351.3** Where the topography is considered to fall within the mountainous category, early consultation with the **Engineer** prior to scheme plan submission is recommended.
- 352** **DESIGN SPEED**
- 352.1** The design speed of the alignment shall be derived using the speed environment approach and shall not be less than the design speeds indicated in Table 3.6. Design speed changes greater than 10km/hr on adjacent curves will not be permitted unless specific signage or other mitigation measures are included in the design and approved by the Manager: Transport Operations and Safety.
- 353** **ROAD RESERVE LAND**
- 353.1** It is important that adequate road reserve land width is provided. Generally a minimum road reserve land width of 20m will be required, although a reduction to 15m may be permitted by the **Engineer** on a no exit road with no possibility of extension in the future. This reduction does not apply to the cul-de-sac head area which may require additional widening. The effects of the Air Land Water plan mentioned in section 351 above must be considered in the consideration of the road reserve width. Where devices such as swales are to be provided on road reserves then the width of the road reserve must be increased accordingly. For swales a minimum of 3 metres of additional width for a swale on one side must be added and a minimum of 5 metres where swales are to be provided on both sides of the carriageway. The actual width may vary according to the swale design.
- 353.2** For all roads where drainage swales are provided, the minimum legal width shall be widened by not less than 3 metres for each swale to ensure that adequate berm width is maintained for all services clear of the swale(s).
- 353.3** A minimum clearance of 3m shall be provided between the road boundary and the tops of cuttings or the toes of batters. Variations may be approved at the **Engineer's** discretion.
- 353.4** All rural road boundaries shall be fenced within each Lot and survey pegs identified before the Completion Certificate is issued.

354 RURAL ROAD PAVEMENTS

354.1 Rural Roads shall comply with the geometric and construction standards set out in Table 3.6.

Table 3.6 Rural Roads – Geometric Standards

Indicative Volume (v.p.d.) ¹	Topography ²	Design Speed (kh/h)	Carriageway Width ³ (m)	Kerb & Channel		Footpath		Surfacing ⁴	Bridge Width ⁵ (m) length		
				CSL (R)	CSL (T)	CSL (R)	CSL (T)		<6m	6m-30m	>30m
<30	Level rolling mountainous	. . . . .	6	. . . . .	.	. . . . .	. . . . .	seal/metal	3.7	3.7	3.7
30 - 100	Level rolling mountainous	. . . . .	6	. . . . .	1 side	. . . . .	. . . . .	seal/metal	7	3.7	3.7
100 - 250	Level rolling mountainous	80 70 50	7 7 6	. . . . .	2 sides	. . . . .	1 side	seal	7	7	3.7
250 - 500	Level rolling mountainous	80 70 50	7 7 6	. . . . .	2 sides	. . . . .	1 side	seal	7	7	7
500 - 2500	Level rolling mountainous	80-100 80 50	8 8 7	. . . . .	2 sides	. . . . .	1 side	seal	8	8	8

- Notes:
1. Assessed at 10 v.p.d. per title served, including future potential development and extensions.
 2. Level topography includes level to gently rolling country which offers few obstacles to the construction of a road having continuously unrestricted horizontal and vertical alignment. Rolling topography includes rolling, hilly or foothill country, where the slope generally rises or falls gently to moderately and where occasional steep slopes may be encountered. It will offer some restrictions in horizontal and vertical alignment. Mountainous topography includes rugged hilly and mountainous country and river gorges. This class of country involves definite restrictions on the standard of alignment attainable and often involves long steep grades and limited sight distances.
 3. Refer to Council Drawing 18000 Sheet 3.24 for definition of carriageway width.
 4. Metalled surfacing shall not be used in Countryside Living (Rural), Countryside Living (Town), Rural Settlement 1 Zones or on gradients > 12.5%.
 5. Bridge width is the minimum between kerbs.
 6. For AADT > 2500 vpd. refer to Austroads Rural Road Design Guide.
 7. CSL(R) = Countryside Living (Rural); CSL(T) = Countryside Living (Town).
 8. For 'Low Intensity Residential' and 'Landscape Protection' Zones use this Table for carriageway width, kerb and channel and footpath requirements. For all other requirements refer Table 3.1.

355 RURAL CUL-DE-SAC HEADS

355.1 Rural cul-de-sac roads shall terminate in a simple circular turning circle of 12.5m minimum outside seal edge radius.

355.2 Additional width shall be provided to the legal road width at the cul-de-sac head.

- 355.3** Off-centre cul-de-sac heads shall be designed by off-setting the road carriageway crown to create symmetrical conditions with the channel designed accordingly.
- 356 RURAL PRIVATE ACCESSES TYPE 1**
- 356.1** In all Rural Zones (except as provided by Section 357), as defined in the District Plan, rural private ways, rights of way and common access lots shall be constructed of 150mm of 20 MPa concrete as shown on Council Drawing Number 18000 Sheet 3.21.1.
- 356.2** The carriageway width will be set by consent conditions. As a general rule, the width shall be not less than 3 metres exclusive of channels, serving up to five 5 titles, and 5.5 metres exclusive of channels, serving 6 or more titles.
- 356.3** Passing bays shall be 12 metres by 5.5 metres (exclusive of tapers which shall be not less than 5 metres long) and be located at not more than 100 metres centre to centre and an over vertical where the line of sight is maintained between adjacent passing bays. Passing bays shall be constructed to the same standard as the carriageway.
- 356.4** Where the road fronting the private access carries more than 250 vpd, or where the access serves 5 or more Titles, the vehicle crossing and the first 12 metres within the private access shall be formed and sealed to not less than 5.5 metres wide exclusive of channels.
- 357 RURAL PRIVATE ACCESSES TYPE 2**
- 357.1** In Rural Zones, other than Countryside Living Zones and Rural Settlement 1 Zones, metalled rural private ways may be constructed where the following criteria are met:
- the private way serves 4 or less Titles or dwellings, and
 - the private way does not serve, adjoin or cross land presently developed for horticultural purposes; and
 - is accessed by a metalled public road which is unlikely to be sealed within 10 years; and
 - does not exceed a maximum grade of 1 in 8 (12.5%)
- 357.2** Metalled rural private ways may be constructed to a minimum width exclusive of featheredge of 3m and a minimum compacted depth of 200mm.
- 357.3** In the case of a private way meeting the above criteria except for a short section where the grade exceeds 1 in 8, then only the section with excessive grade need be constructed in concrete.
- 357.4** In the case of a private way meeting the above criteria except that it is accessed by a sealed road, then only the vehicle crossing and the first 20m within the boundary need be constructed in concrete.
- 357.5** Section 345.7, 345.8, 356.3 and 356.4 shall apply.
- 358 RURAL VEHICLE CROSSINGS**
- 358.1** Vehicle crossings shall be provided at the entrances to all private ways, rights of way and common access lots, and at all gateways in the road boundary fence. Crossing pipes shall be a minimum of 300mm diameter Class 4 RCRRJ or Class SN16 mPVC or better, except where otherwise approved by the **Engineer** and the crossing shall be an adequate width for the intended use (Refer Council Drawing Number 18000 Sheet 3.9.2).
- 358.2** Crossings adjacent to sealed roads shall be formed/sealed according to Council Drawing 3.9.2 in concrete or a two coat chip seal or asphaltic concrete. The first 600mm of a concrete crossing shall be either two coat chip seal or asphaltic concrete.
- 358.3** For unsealed roads, crossings shall be formed by using similar materials to that of the existing road surface or better.
- 358.4** Refer to the District Plan. (“Development Controls and Performance Standards” section. Rule 21.10.1.6 Access in Rural Zones. Copy provided as Appendix “H” herein.)

359 STORMWATER

- 359.1** Adequate drainage channels shall be formed below subgrade level (refer Council Drawing 18000 Sheet 3.24). Steep sided ditches, or excessively deep channels will not be accepted. The **Engineer** may require the formation of drainage channels along the top of fill batters to control erosion.
- 359.2** The road drainage channel shall be designed to consider the whole of the contributory catchment. Where appropriate the **Engineer** may require that the road drainage channel be enlarged to deal with the run-off from the 10 % AEP event. The consequent sizing of vehicle crossing culverts will be required to reflect this volume and particular provision may need to be made to reduce velocities and thereby minimise erosion within the channel and at cut-offs.
- 359.3** Adequate cut off shall be provided such that the maximum length of flow path in the road drainage channel does not exceed 200m. Where directed by the **Engineer** as a result of section 351 and 359.2 above, the frequency and method of construction of the cut-off may be subject to specific design.
- 359.4** The cut-off shall discharge to a natural watercourse, by way of an open drain along a lot boundary. Open drains through the body of the lot will generally not be acceptable. All such cut-off drains through private property shall be protected by way of a drainage easement registered on the title of the property or properties affected. Where the easement is a specific one, i.e. not an easement in gross, it shall be a minimum width of 3 metres to allow for easy maintenance access
- 359.5** Relevant consent approvals from the Auckland Regional Council will need to clearly demonstrate how erosion and silt control will be managed.
- 359.6** All road discharges should be fitted with erosion protection structures/measures. In mountainous terrain the construction of stormwater fluming may be necessary.

360 UNDER ROAD CULVERTS

- 360.1** Culverts beneath the carriageway shall be adequately sized for the flow, and in no case less than 300mm diameter, and unless approved by the **Engineer** in writing shall be made of Class 4 , RCRRJ.
- 360.2** Culverts should cross the road as directly as practicable and in no case at less than 60 degrees to the road centreline. The inlet and outlet of the culvert should be at least 1.5m beyond the feather edge and preferably further, to reduce the traffic hazard and provide adequate support to the road shoulder. (Refer also to Section 324).

361 COUNTRYSIDE LIVING (TOWN) ZONES

- 361.1** All drainage channels located within the road reserve shall be subject to specific design from the Engineer.

362 RURAL ROAD LIGHTING

- 362.1** In Countryside Living Zones and the Rural Settlement 1 Zones flag lighting shall be provided at all intersections.
- 362.2** In rural areas flag lighting shall be provided at all intersections where any leg of the intersection has more than 1,000 vpd or where deemed necessary by the **Engineer** because of restricted sight distances or geometry.

Note: For any wiring/electrical requirements, refer to Vector standards for current specifications.