PART 8: ROADS AND TRANSPORT

CONTENTS

FIGURES

TABLES

8.1 REFERENCED DOCUMENTS

Planning and Policy

- *Selwyn District Plan (District Plan)*
- www.selwyn.govt.nz/services/planning
- Land Transport Act (1998)
- Traffic Regulations (1976)
- Selwyn District Council Speed Limits Bylaw (2006)
- www.selwyn.govt.nz/council-info/key-documents/bylaws
- Selwyn District Council *Traffic and Parking Bylaw (2009)*
- www.selwyn.govt.nz/council-info/key-documents/bylaws/current-bylaws
- Selwyn District Council - Walking and Cycling Strategy Action Plan 2009 www.selwyn.govt.nz/services/roading/walking-and-cycling-strategy
- Christchurch, Rolleston and Environs *Transportation Study (September 2006)*
- www.selwyn.govt.nz/services/roading/crets
- Canterbury Regional Council Regional *Land Transport Strategy*
- http://ecan.govt.nz/our-responsibilities/Regional-Land-Transport/Pages/regional-land-transport-strategy.aspx
- Greater Urban Development Strategy and Action Plan (2008)
- http://www.greaterchristchurch.org.nz
- Ministry of Transport New Zealand *Transport Strategy*
- www.beehive.govt.nz/nzts/docs/nzts_v13_23nov02.pdf
- Land Transport New Zealand Cycle Network and Route Planning Guide
- www.landtransport.govt.nz/road-user-safety/walking-and-cycling/cycle-network/docs/cycle-network.pdf
- Ministry of Transport Getting there – on foot, by cycle
- www.transport.govt.nz/assets/NewPDFs/GettingThereA4.pdf
- Land Transport NZ Traffic Control Devices 2004 Rule
- www.ltsa.govt.nz/rules/traffic-control-devices-2004.html
- Land Transport NZ Setting of Speed Limits 2003 Rule
- www.landtransport.govt.nz/rules/setting-of-speed-limits-2003.html
- NZTA (Transit New Zealand) Planning Policy Manual (state highways)
- NZUAG New Zealand Infrastructure Asset Valuation and Depreciation Guidelines
- Public Transport in new subdivisions (Canterbury Regional Council/SDC)

- www.selwyn.govt.nz/transport/public transport provision.pdf
- Greater Christchurch Metro Strategy Review 2006-20012
- www.metroinfo.org.nz/strategy2007

Design

- Selwyn District Council Subdivision Design Guide – Design Guide for residential subdivision in the urban living zones
  www.selwyn.govt.nz/__data/assets/pdf_file/0016/15163/ADOPTED-SDC-Subdivision-Design-Guide.pdf
- Selwyn District Council Medium Density Housing Guide
- Draft Selwyn District Council Design Guide for Commercial Development in urban areas
- www.selwyn.govt.nz/services/planning
- Selwyn District Council Trees and Vegetation in Selwyn District Management Policy Manual
  www.selwyn.govt.nz/services/facilities/draft-trees-and-vegetation-policy
- Christchurch City Council Design Guide Crime Prevention Through Environmental Design
- www.ccc.govt.nz/cityleisure/projectstoimprovechristchurch/urbandesign/urbandesignguides.aspx
- Christchurch City Council Waterways, Wetlands and Drainage Guide, Ko Te Anga Whakaora mö Ngä Arawai Rëpo (WWDG) (2003)
- NZTA - All Land Transport New Zealand (LTSA) Guidelines (including RTS series) and manuals
- NZTA (Land Transport Safety Association New Zealand) On Road Tracking Curves
- NZTA - All Transit New Zealand (TNZ) manuals and standards including the Bridge Manual, Criteria and Guidelines
- NZTA Pedestrian Planning and Design Guide 2008
- Austroads Guides to Road Design, Road Safety, Traffic Management Sets (2009)
- NZS 4121:2001 Design for Access and Mobility: Buildings and Associated Facilities
- NZS 4404:2010 Land development and subdivision infrastructure
- AS/NZS 1158 Set Lighting for roads and public spaces - series
- AS/NZS 2890.1:2004 Parking facilities Part 1: Off-street car parking
- NZUAG National Code of Practice for Utilities' Access to the Transport Corridors draft April 2011
- www.nzuag.org.nz/national-code/
- NZTA (Transfund) Road Safety Audit Procedures for Projects (2004).

Construction

- Christchurch City Council Civil Engineering Construction Standard Specifications Parts 1-7 (CSS)
- https://ccc.govt.nz/consents-and-licences/construction-requirements/construction-standard-specifications
- NZTA (Transit New Zealand) T/10 Skid Resistance Investigation and Treatment Selection
- NZTA (Transit New Zealand & Land Transport Safety Association) *Manual of Traffic Signs and Markings, Parts 1 & 2*
- NZTA Traffic Control Devices Manual (2008)
- Road Safety Manufacturers Association Compliance Standard for Traffic Signs(2008)
- NZS 8603:2005 Design and application of outdoor recreation symbols
- SNZ HB 2002:2003 Code of Practice for Working in the Road

Where a conflict exists between any Standard and the specific requirements outlined in the Engineering Code of Practice (COP), the COP takes preference (at the discretion of the Council).

8.2 INTRODUCTION

This Part of the Engineering Code of Practice is based on Part 8 of the CCC Infrastructure Design Standard, by agreement, and with the consent of Christchurch City Council.

This Part sets out Council's requirements for designing streets, and other access linkages, that not only function well but are also appropriate and safe environments.

This Part is **not** intended to be a detailed design guide or to replace the need for traffic and pavement engineering expertise in some areas of the design process.

8.2.1 Legal requirements

All traffic control devices, as defined in the Land Transport Act, on roads and rights of way, must comply with the:

- Land Transport Act;
- Traffic Regulations;
- Traffic Control Devices 2004 Rule;
- Traffic and Parking Bylaw;
- Speed Limits Bylaw.

8.3 PHILOSOPHY

Access to, and within, areas to be developed includes more than the road network constructed to provide formal access to properties. It also includes public transport access and purpose-built green linkages that provide for pedestrians and cyclists to use areas such as reserves and waterways.

These linkages need to reflect desire lines, within and outside the area, and make the area attractive and accessible so that people are encouraged to walk or cycle rather than use their car where practicable, particularly for shorter local trips. When this can be achieved, it results in energy savings and creates a safer and more pleasant neighbourhood.

Streets can serve a wide range of functions, whilst providing valuable and unique areas of community space (see Figure 1). Use the design process to challenge the assumption that motor vehicles have "automatic" priority (particularly on local roads) and consider all the demands and functions of the street space, in order to achieve a better balance for all those who use it.

Information about creating Living Streets is available at www.ccc.govt.nz/thecouncil/policiesreportsstrategies/policies/groups/streetsroads/livingstreetscharter.aspx

Figure 1 Street functions

The Council encourages innovative design, for access and roads, which satisfies the following objectives:

- safe – the layout must be safe for pedestrians, residents, cyclists, public transport and motorists;
- secure – the design of the roads and other linkages must not compromise the personal security of the users;
- energy efficient – the layout should minimise the number and length of vehicle trips and promote alternatives to motor vehicle use;
- linked – the layout of a development should be extended on a hierarchical network basis for all modes. It should promote walking and cycling, particularly for short trips to local facilities, and should provide direct access to public transport routes. Linkages to existing areas of development must also be provided;
- suitable traffic speeds – the road design must encourage traffic speeds that are appropriate for the road classification and context;
- permeable and connective – the road layout must be easy to read and follow, for both residents and visitors;
- accessible - the road design should incorporate footpaths and kerb cutdowns that provide easy access for all;

- enhances environment – the road design should incorporate carriageway and residential stormwater quality improvements or design features as part of the grass berm design e.g. encouraging sheet flow over grass berms, swales protected from traffic use;
- attractive – the design of the street landscaping and other features can add significantly to the amenity, environment and character of the area.

Where the above objectives may be achieved through other mechanisms, the Council may reconsider applying the requirements of this Part of the COP to a development.

Be familiar with the following documents when considering the design of the development:

- Regional Land Transport Strategy
- SDC Subdivision Design Guide, Medium Density Design Guide, draft Design Guide for Commercial Development in urban areas
- *District Plan*
- SDC Walking and Cycling Strategy Action Plan (2009)
- Christchurch, Rolleston and *Environs Transportation Study* (CRETS)
- Providing for Public Transport within your subdivision (ECAN/SDC document)
- NZS 4121 Design for Access and Mobility: Buildings and Associated Facilities
- AS/NZS 1158 Set Lighting for roads and public spaces - series

8.4 QUALITY ASSURANCE REQUIREMENTS AND RECORDS

Provide quality assurance records that comply with the requirements in Part 3: Quality Assurance, during design and throughout construction.

8.4.1 Design records

Provide the following information, to support the Design Report:

- a clear description of the purpose of the work;
- transport infrastructure and services issues (e.g. vehicle, cycle, public transport, pedestrian);
- traffic-loading, traffic modelling and volume data and projections used and calculations;
- geometric data;
- geotechnical data, including subgrade information and CBR’s;
- pavement design methodologies used and corresponding metalcourse calculations;
- surface treatments;
- road drainage control and edge treatment;
- hydraulic data (e.g. road level, flood level);

- slope retention;
- utility service conflicts and programmed work issues;
- road traffic safety audits;
- streetscape and amenity features.

The amount of detail required will depend on the scale of the subdivision or project. The design report will be checked against the resource consent or project brief or outline development plan by Council and the consultant designer will be advised if further information is required.

8.4.2 Safety audit

A safety audit of the design for all roading, pedestrian and cycle facilities **must** be undertaken and submitted as part of the design where required as a condition of a resource or project brief or as provided for in the acceptance of the contract quality plan by Council. The safety audit provides a check that the proposed design is safe and complies with all of the legal and design requirements for road marking, lighting and signage.

A safety audit of the constructed asset must also be undertaken and submitted as part of the As-Built record where required as a condition of a resource consent or project brief.

Carry out safety audits in accordance with NZTA (Transfund) *Road Safety Audit Procedures for Projects*. Use the Austroads *Guide to Road Safety - Part 8: Treatment of Crash Locations*, for safe design practices.

8.4.3 Construction records

Provide the information detailed in Part 3: Quality Assurance and the *Construction Standard Specifications (CSS)* where required as a condition of a resource consent, project brief or as provided for in the acceptance of the contract quality plan by Council, including:

- material specification compliance test results;
- subgrade test results and corresponding recalculations of metalcourse depths;
- compaction test results;
- Benkelman Beam test results;
- as-built levels of the top of kerb, manhole covers and the road centreline;
- surface profile test results for roads and rights of way greater than 100m in length i.e. NAASRA/International Roughness Index;
- surface texture test results;
- concrete or asphalt core test results;
- post-construction safety audit.

Provide details in a form complying with the requirements of Part 12: As-Builts.

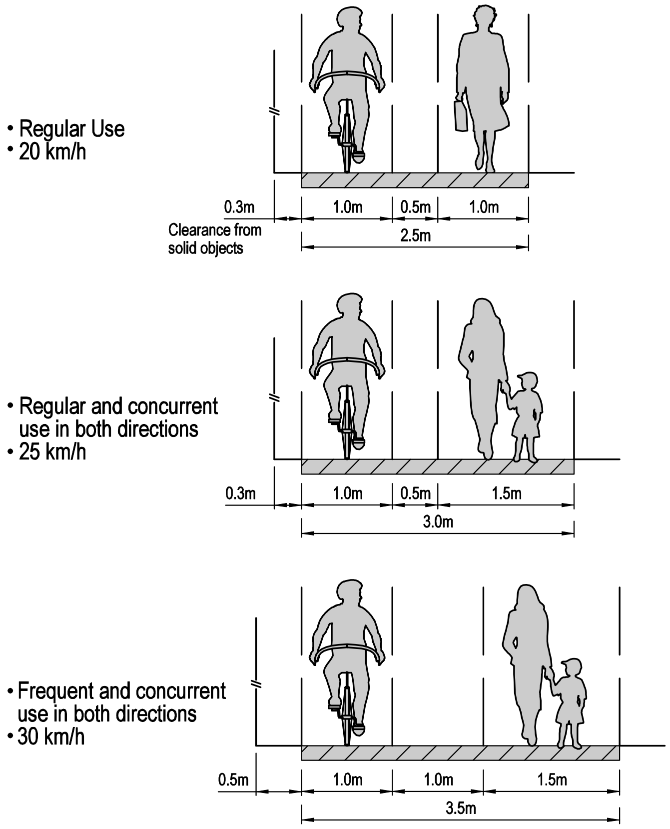
8.5 OFF ROAD LINKAGES

Linkages for pedestrians and cyclists (pedestrian-cyclist links) must create an attractive, friendly, connected, safe and accessible environment. These linkages must ensure that people can move about the community freely in areas where there are no road linkages (e.g. at the end of culs-de-sac) and provide direct pedestrian access to bus stops. Use green linkages between culs-de-sac, through public reserves or adjacent to waterways, or other natural features.

Design the paths so that they are suitable for pedestrians, cyclists, skate-boarders, skaters, prams and people with mobility issues. Motorised wheelchairs require 1.2m clear width.
The overall width of the linkage needs to be adequate for the expected path volumes and appropriate landscaping. Minimal width linkages of 2.5 to 3.0m with little or no landscaping are unattractive to use and may have perceived security problems associated with them. Therefore, providing wide, open and well-lit areas is extremely important to create a secure and useable linkage.

The minimum clear width of formed paths in legal road is 1.5m for pedestrian-only paths and 2.5m for paths shared by pedestrians and cyclists. The formed width should be widened wherever a lot of people are expected to use the facility, as illustrated in Figure 2. Clause 10.7.2 – Pedestrian and cycle paths (Reserves, Streetscape and Open Spaces) details requirements for paths in reserves. The Council may require a safety audit to be undertaken for shared paths before approval of these.

Figure 2 Pedestrian/shared path widths



Seal or, if approved by Council, shingle the path and landscape the remaining land in a manner that does not compromise the security of people using the facility. Part 10: Reserves, Streetscape and Open Spaces provides landscaping guidelines.

Use the following guidelines for the detailed design of off-road paths:

- Crime Prevention Through Environmental Design

- Austroads Guide to Road Design, Part 6A Pedestrian and Cycle Paths
- AS/NZS 1158 Set Lighting for roads and public spaces - series

Discourage vehicle access to berms, footpaths and swales by using landscape elements (e.g. kerbing, bollards, plantings or fences).

8.6 CYCLE FACILITIES

Make provision for on-street and off-street cycle facilities, where required by the *District Plan* or indicated on the Cycle Network Map Plan in the *Walking and Cycling Strategy Action Plan*, to facilitate an alternative to the car for short to medium length trips. Consider installing cycle parking facilities near bus stops, to ease the transfer between transport modes. Discuss with Council proposed Outline Development Plans or proposed plan variations that effect subdivision proposals.

Provide on road or off road cycle lanes on all collector and arterial roads as agreed with Council. Separate off carriageway cycle/walkway pathways on arterial and collector roads may be provided as an alternative as agreed with Council. For local urban roads, cycle facilities may be provided through wide kerbside lanes.

Wherever off-road pedestrian and cycle paths are required, design them to the widths specified in Figure 2. Part 10: Reserves, Streetscape and Open Spaces and Part 11: Lighting provide further information on off-road facilities.

Design the cycle facilities and widths in general compliance with the New Zealand Supplement to *Guide to Traffic Engineering Practice, Part 14: Bicycles.* Use the *Guidelines for the Marking of Cycle Lanes on Urban Roads* to design the roadmarking and mark in accordance with *CSS: Part 6* as approved by Council.

8.7 CYCLE STANDS

The design and location of cycle stands is important to people who cycle and supports the promotion of active travel.

In the past cycle stands have been poorly designed and often ineffective. For example cycle stands that are too low and may damage bike wheels. The staple design, as shown below in Figure 3, is a simple and effective system preferred by cyclists if the height is no less than 750mm (such that it can support the bike frame rather than just "hold" the wheel) and no greater than 1000mm. However other cycle parking systems are available and will be considered if they meet the same outcomes as 'staples' in terms of height and the specifications for space illustrated in Figure 3.

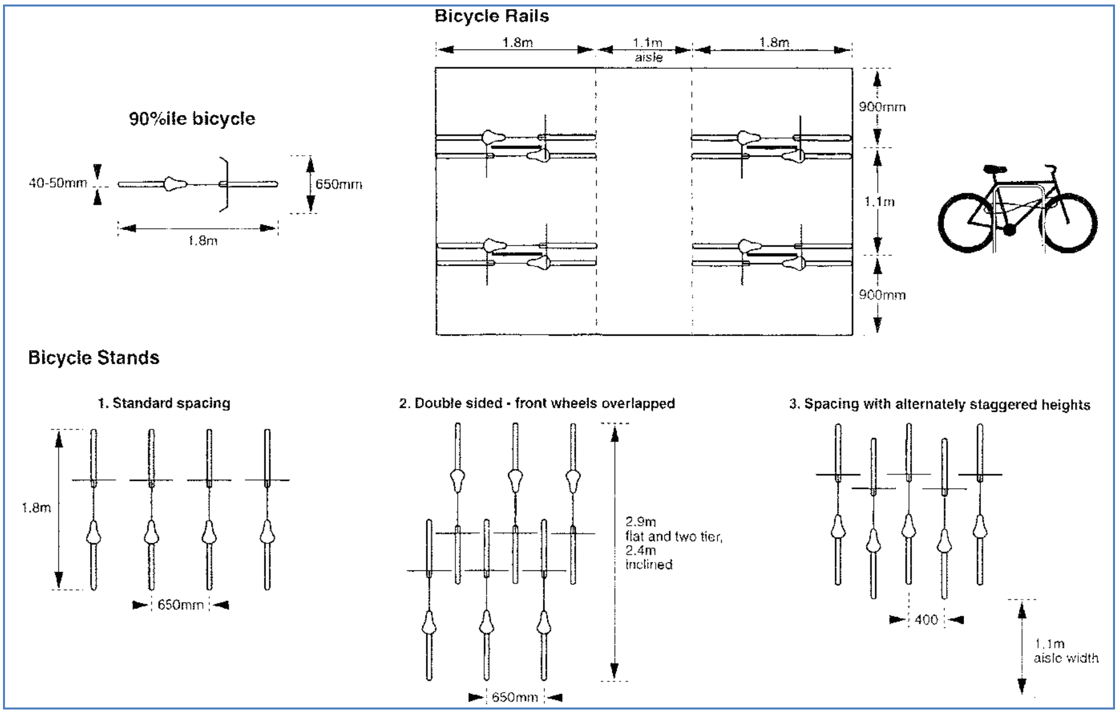


Figure 3 Cycle stand parking specifications [Source: Christchurch City Plan]

The location of cycle parking is also important, the District Plan requires that cycle parking be provided on the same site as the activity and located as close as practicable to the building main entrance, and be clearly visible to cyclists entering the site, be well lit and secure.

The District Plan also outlines the quantity of cycle parking required for certain activities.

Further information on best practice cycle parking can found in the Cambridge (UK) Cycle Parking Guide.
http://www.cambridge.gov.uk/public/docs/CycleParkingGuide_std.pdf

8.8 PUBLIC TRANSPORT

8.8.1 Bus routes

Consider the specific needs for public transport at an early stage of the design process to ensure that:

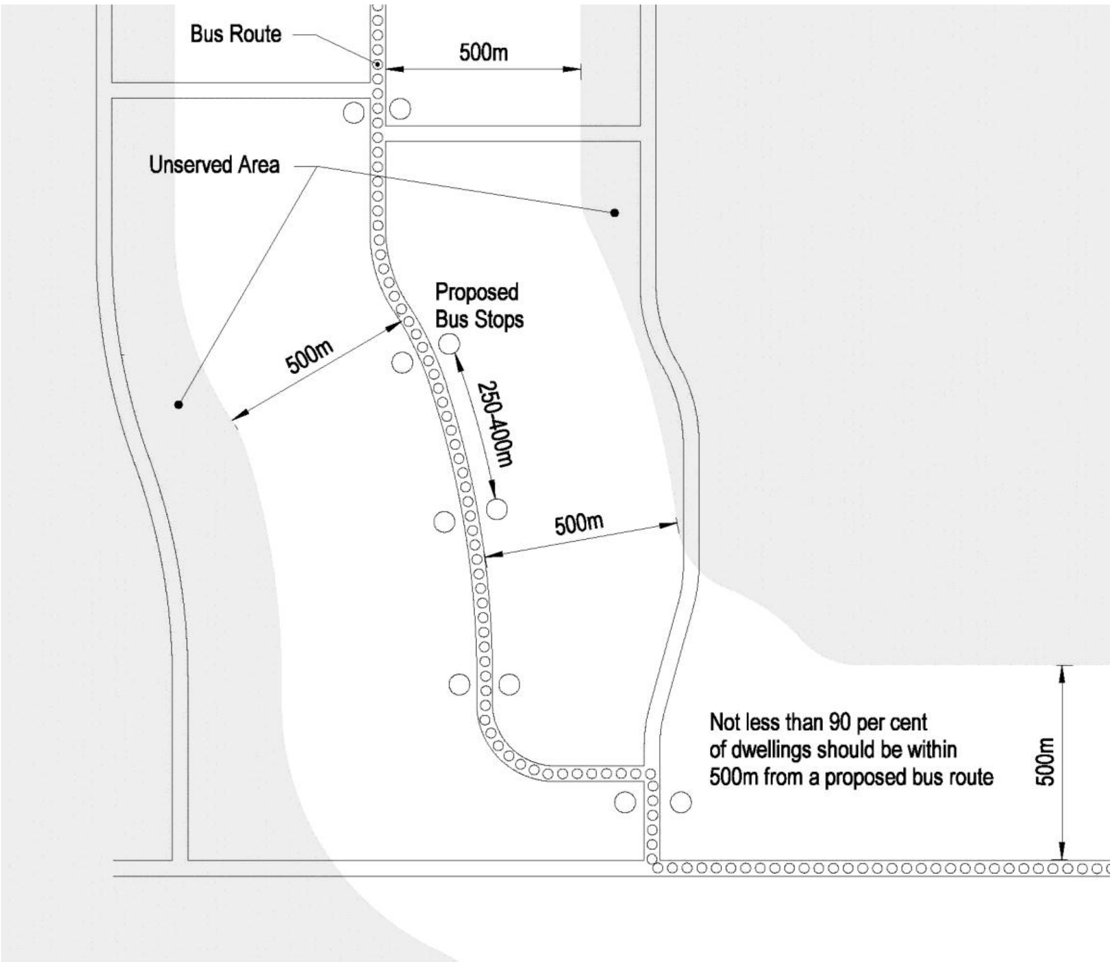
- roads can cater for the manoeuvring requirements of public transport vehicles (including turning around at a terminus);
- termini of routes are identified;
- routes are efficient and easily accessible by public transport vehicles;
- proposed routes form a coherent new bus route or an extension to an existing route.

The provision of bus routes in new development areas must be discussed with Canterbury Regional Council (Environment Canterbury) staff. New bus routes may be provided by the Regional Council where it is economic and practical to do so.

Infrastructure may need to be provided by the developer as a condition of a resource consent.

In townships with a public bus service a serviced subdivision shall have, not less than 80 % of households within 500m of the shortest direct route distance from a bus route. Wherever there is an existing bus route which can service the area (as defined in the previous sentence), there should be easy and direct access to it for pedestrians. Wherever culs-de-sac are used to provide access to properties, these should be extended where appropriate to provide direct pedestrian linkages to bus routes. Higher density housing and community facilities, such as schools, parks, shops or retirement villages, should be located close to existing or potential future bus routes to enhance access to the services and encourage use of sustainable transport.

Figure 4 Example of bus routing



Wherever the bus route travels through a development, now or is likely to in the future, design the relevant roads to ensure that the bus can travel and manoeuvre along the proposed route easily, without obstructions and, ideally, without delaying other traffic.

Bus routes are generally along collector or arterial roads. Routes need to be as direct as possible to reduce travel times and should avoid or minimise complicated turning manoeuvres at intersections. In particular, avoid right turns when accessing arterial roads. As explained above, Environment Canterbury plan and manage the public transport services, so discuss potential routes with their staff.

Consult with Selwyn District Council before submitting engineering drawings to ensure that intersections conform to the Council's requirements.

8.8.2 Bus stops

Plan and co-ordinate the bus stop locations and associated infrastructure on the street with Selwyn District Council and Environment Canterbury at the consent stage. Extra space may be required for siting bus shelters or other required infrastructure, which can be incorporated into the engineering drawings. Council may need to ensure subdivisions provide for possible future changes to bus routes.

Bus stops shall ideally be spaced no more than 400 metres apart with inbound and outbound pairs of stops opposite each other, but offset, wherever the service travels in both directions along a road. Bus stops should be located close to key facilities to enhance accessibility for the community. Provide footpaths to give pedestrians good, safe access to the service.

If the width of the roadway does not provide for roadside parking, allow for the construction of inset bus bays. Construction details for bus stops may be found in *CSS: Part 6*.

8.9 ROAD CLASSIFICATION

The road network is the system of interconnected road links that provides for the movement needs of people and goods, property access and servicing needs and as a public space. It is usually arranged and operated in a manner to recognise and best serve the varying demands expected of different elements (usually using a hierarchical classification system). Developments must provide road networks internally to achieve these purposes, and connect appropriately to the existing network.

The length and arrangement of these roads within the development and connections to the existing network determine the amount of traffic each element is likely to carry and the role it plays in providing for property access or longer journeys.

New road classifications will be determined considering the function of each link, surrounding land uses, preferred speed regime and geometric characteristics.

The classification of existing roads in Selwyn District is listed in the *District Plan Rural Volume, Appendix 9 and Townships Volume, Appendix 7.*

Be aware of any local area traffic management schemes, outline development plans or structure plans which may incorporate street requirements for the area.

8.9.1 Local roads

The primary purpose of local roads is to provide access to properties. These are not intended as a through road for vehicles to other streets.

New local township roads are further classified into the following categories:

- **Local Business Road** (includes cul de sacs) – serves a commercial or industrial area within a business zone in the district. These roads are of a higher standard than a residential local road as they need to cater for larger and heavier vehicles with higher demands on vehicle manoeuvring, parking and property access.
- **Local Major Road** – is a local road that ideally connects to a collector or possibly to an arterial road and other local roads. They are also known as "local area streets" that may form part of a wider network.
- **Local Intermediate Road** (includes cul de sacs) – is a local road with lower traffic volumes and speeds primarily providing only property access in urban areas while maintaining some degree of connectivity best suited for walking and cycling between streets. Their design should encourage a low speed environment of 30-40kph. These roads are likely

to be closer to areas of demand such as shops and schools. They are also known as "neighbourhood streets".

- **Local Minor Road** (includes cul de sacs) – is a local narrower road that primarily provides for property access under certain conditions, maximising street amenity for example, they may provide a maximum travel distance of 150 metres in any direction in a low speed environment of 30 kph or less. They are also known as "residents streets" where pedestrians and cyclists can mix with vehicular traffic.

Local intermediate and minor roads should not generally connect to arterial roads, except in exceptional circumstances and with the Council's approval. Cul-de-sacs should not connect to other cul-de-sacs.

8.9.2 Collector roads

The function of collector roads is to provide the link between the local roads and the arterial roads.

In the urban area, collector roads usually have predominantly residential frontage and will often contain the bus routes within the neighbourhood. A speed environment of up to 50kph or 60kph in urban areas is expected.

In rural areas collector roads may link smaller rural communities to the arterial road network.

8.9.3 Arterial roads

Arterial roads cater primarily for traffic movement, and property access is a secondary function. Arterial roads are the dominant elements of the roading network connecting the major localities of the region, generally reaching to and around urban boundaries. They are constructed and managed to minimise their local access function and are subject to tighter access controls than collector and local roads to promote efficient traffic flow. Arterial roads inter-connect rural, suburban, commercial and industrial areas. Generally, they cater for trips of intermediate length and some are essential routes to more remote parts of the region.

These roads must be designed in conjunction with the appropriate roading authority. Discuss access to the existing road network with the Council and New Zealand Transport Agency at the consent stage, if a State Highway will be affected. Use the *Planning Policy Manual* and State Highway Geometric Design Guide for the design of any works on or adjacent to a state highway.

8.9.4 Traffic volumes

To conservatively estimate the likely volumes of traffic that will be generated by a residential development, the following average household trip generation rates may be used.

Table 1 Household trip generation rates

Flat urban areas	10 trips/household/day
Hillside & rural areas	8 trips/household/day

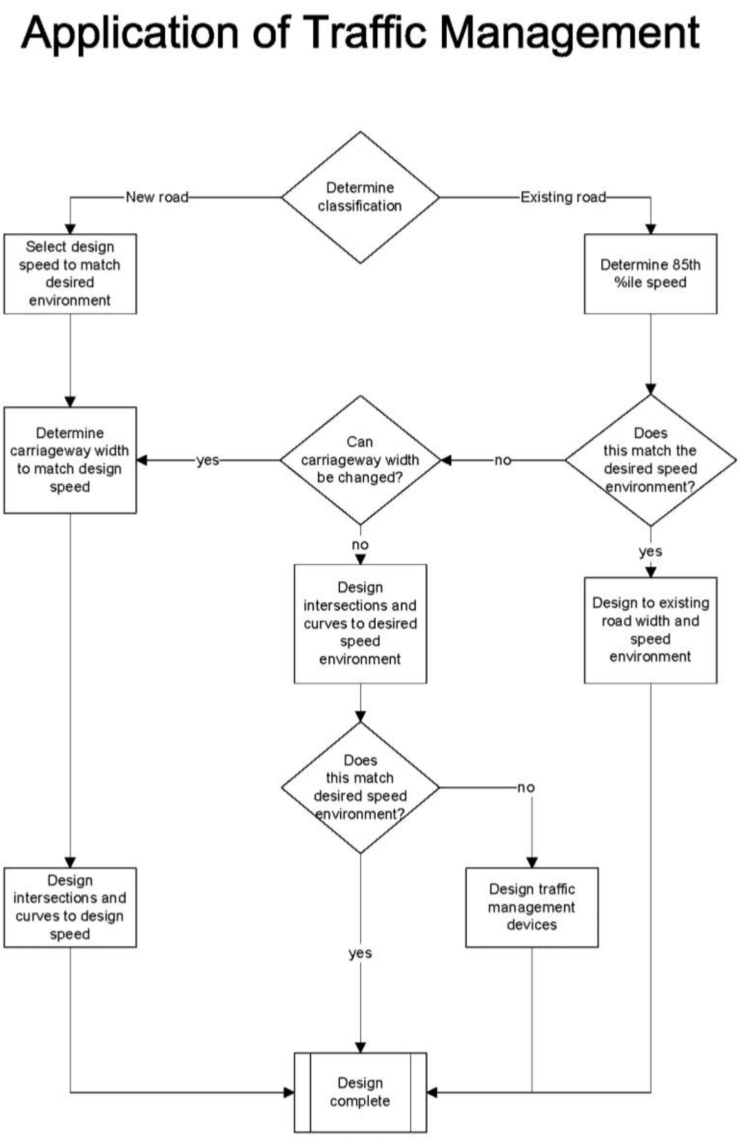
If surveyed data is available, use this in preference to the values above, due to the variation in generation rates throughout the district.

8.10 SPEED ENVIRONMENT

The speed environment of roads can have a huge impact on the actual and perceived safety of the facilities; therefore it is important to design for the appropriate speed of the roads involved. Determine the speed environment for the road classification first as it is the primary design control. All other factors relate to and can reinforce the design speed e.g. road alignment, width, intersection location and treatment, landscaping. Ensure that the speed environment is consistent along the road section.

Traffic management devices should not be installed where the speed environment does not require alteration. Use the process in the flow chart in Figure 4 for determining alternative design options.

Figure 5 Application of traffic management



Traffic speed for lower speed environments may be controlled, so that it is conducive to a mixed use street environment and function, through a variety of means:

- roadway width – a narrow roadway may provide space for only one vehicle at a time. Parked vehicles reduce the available space for moving vehicles so that there may only be a single usable lane.
- if cyclists use the road, their presence may control the traffic speed and the design requirements of the road.
- landscaping – appropriately designed on-street landscaping can visually narrow the road. It can also be used with changes to the kerb alignment to physically narrow the roadway.
- corners – the use and spacing of tight corners to maintain short lengths of straight road makes it difficult to gain speed.
- intersection spacing – short lengths of road between intersections make it difficult to reach high speeds.

- intersection design – tight kerb radii force motorists to slow down when turning at an intersection. This can be combined with an intersection treatment (e.g. change in road width or surfacing) to indicate a change in the speed environment to drivers.
- traffic calming – localised road narrowing, changes in road texture, changes in the road alignment (both horizontal and vertical) can all be used to reduce speeds on local roads and to create safe crossing points for pedestrians and cyclists.
- rural thresholds – localised narrowing of the road through kerbs, road markings, signage and/or roadside planting can provide a signal to drivers that they are entering a residential area with lower speed limits.

Use standards for the design of higher speed environments, such as are appropriate on various classified and rural roads, in the *Austroads* series and NZTA (TNZ) manuals and State Highway Design Guide.

8.11 ROAD DESIGN

Areas that require particular attention during the road design are:

- speed environment;
- intersection design and spacing;
- connections and intersections with the existing transport network;
- capacity;
- safety;
- future road linkages to unzoned land;
- bus movement requirements and bus stop locations and facilities;
- pedestrian and cycle facilities;
- parking requirements;
- road crossings for pedestrians;
- access requirements of mobility impaired pedestrians;
- the connection of off-road facilities to roads and property access;
- lighting;
- road surfacing;
- drainage.

Minimise life cycle costs for all new road elements. These are the costs over the expected life of the road involving operation, maintenance, renovation and disposal. When choosing materials in particular, consider the replacement and maintenance cost whilst ensuring levels of service are met.

8.11.1 Access to existing roads

Discuss access to the existing road network with the Council, and also New Zealand Transport Agency, if a State Highway is affected.

The safety and efficiency of the existing roads must be maintained or improved, when considering connections or accesses from the development.

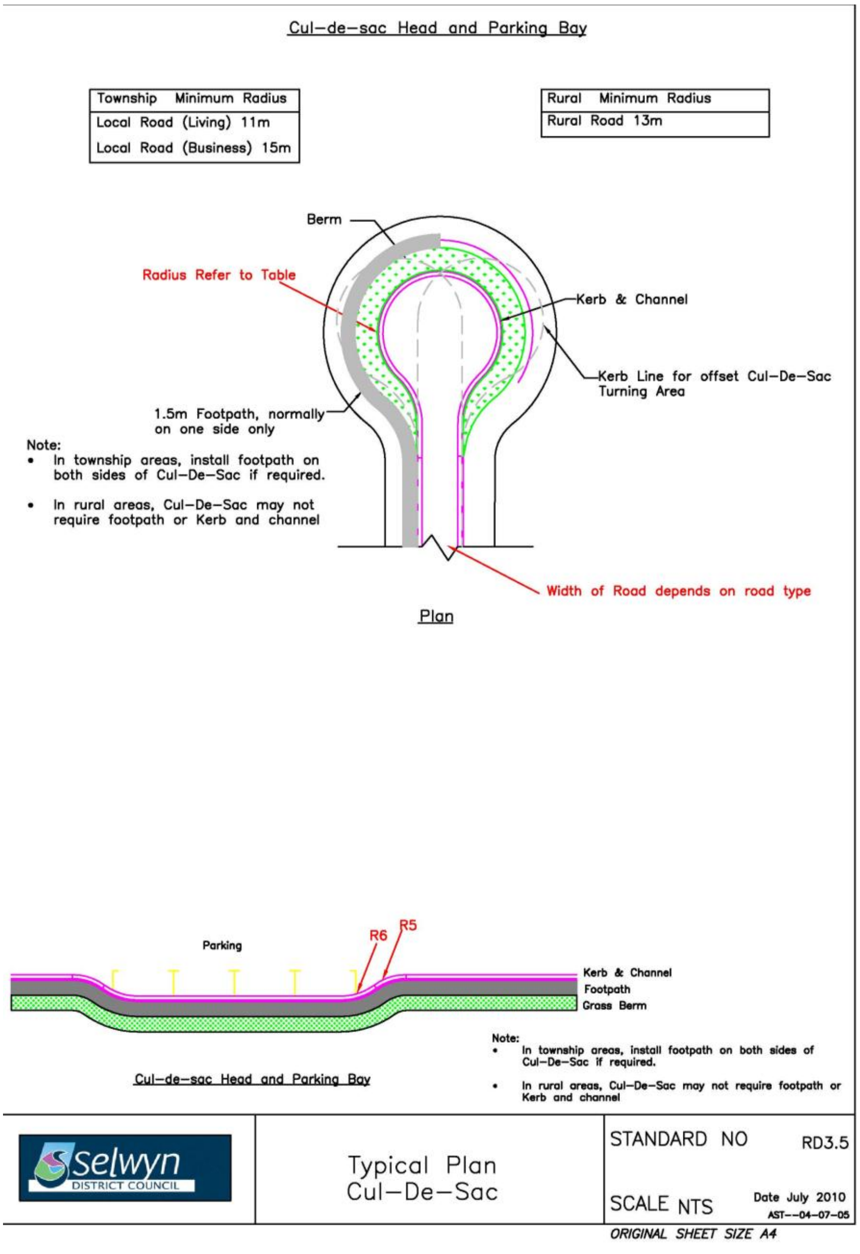
8.11.2 Cul-de-sacs/Hammerheads/No exit streets

- Cul-de-sacs should be no longer than 150 metres and can provide pleasant residential environments with a sense of community and little traffic but a balanced approach to their use is required. Refer to the following; Selwyn District Council Subdivision Design Guide – Design Guide for residential subdivision in the urban living zones for further information.

Where possible, provide walking and/or cycling linkages at the end of culs-de-sac to parks, reserves or other roads. When designing large cul-de-sac heads, consider incorporating islands or other measures to break up large expanses of seal. However the islands or other measures need to cater for road use by refuse and recycling trucks. Surface all turning heads and hammerheads with asphaltic concrete in urban areas.

See Figure 6 for an example of a turning circle complying with the *District Plan*. Figure 3.5 of NZS 4404 details hammerheads.

Figure 6 Cul-de-sac head and parking bay



8.11.3 On-street parking

The off-street parking requirements for various activities are listed in the *District Plan.*

- Acceptable widths for parking lanes vary from 2.2m minimum to 3.0m for high turnover areas, refer to *Manual of Traffic Signs and Markings* for further information.

Provide mobility car parks which meet the requirements of NZS 4121 where required by the brief or resource consent.

Wherever parking in residential areas is provided in bays, rather than as part of the carriageway, it should be at the minimum rate of one space per three residential units and evenly distributed along the street. Construct all parking bays to the same design loading as the adjacent road pavement and with a minimum width of 2.5m for parallel parking. Minimum radii should match those shown in Figure 5 and if parking in the cul-de-sac is desired ensure that.

When parking bays are located in front of properties, consider the likely location of the property access, which may need restriction by a Consent Notice or Covenant on the land title.

Wherever parking is provided at 90 degrees to the kerb line, a minimum stall depth of 5.0m and a stall width of 3.0m is preferred. Provide mobility car parks to the dimensions specified in NZS 4121. Make allowance for additional footpath width for a 0.8m overhang wherever the kerb is to act as a wheel stop (included in the 5.0m stall depth).

Mark the parking lane or spaces as agreed with Council. Marking is required for all angle parking and where parking restrictions are in place. Mark mobility car parks in accordance with the *Manual of Traffic Signs and Markings* or as agreed with Council. There will also be other circumstances where roadmarking of parking is advisable e.g. outside schools and on arterial roads in urban areas.

The Council approves the installation of parking signs and parking restrictions in accordance with the *Traffic and Parking Bylaw*. This is separate from and additional to engineering acceptance.

8.11.4 Rural Mail Boxes

The property owner is responsible for installing a mail box to meet the requirements of the rural post delivery operator and New Zealand Post.

Locate rural mail boxes and posts a minimum of 2.5 metres clear distance from the edge of the carriageway - frangible posts are preferred.

8.12 INTERSECTION DESIGN

The potential for crashes to occur at intersections is higher than other areas of the road network, due to the number of conflicting vehicle, cycle and pedestrian movements. Proper design of intersections can reduce the number of conflicts, while providing for a range of turning movements at the intersection.

Consider traffic safety issues due to the location of existing above-ground structures e.g. poles or trees, at the time of design.

8.12.1 Permeability

Permeability of the network improves the ease with which people can negotiate their way through and around an area.

Generally, the geometry of any road intersection should be designed so that the major route is the through road and has traffic priority. Wherever the roads are of equal classification or one classification different, a roundabout may be used. This can also limit vehicle speeds. Wherever a local road intersects with a classified road, a threshold treatment may be appropriate to reinforce traffic priority and assist with understand the layout.

Improve permeability by designing each classification of road to reflect its function, through consistency of appearance, width and geometric design of the road; e.g. the main arterial roads may have a central median. Minimise the use of cul-de-sacs and, in particular, cul-de-sacs accessing other cul-de-sacs. See clause 8.11.2 - Cul-de-sacs/Hammerheads/No exit streets above.

8.12.2 Intersection types and controls

To support the safety and efficiency of the road network, roads should preferably only intersect if they are classified the same or are one level different in status. If it is unavoidable that roads more than two classification levels apart must intersect, then the Council may consider applying movement controls such as left in/out only or entry only.

Within new residential areas, appropriate intersection types include:

- Priority or roundabout l controlled T or Y-intersections (3-way), depending on the balance of traffic flows and classification of the approach roads. All approach legs to Y junctions should be separated by 120 degrees and T junctions by 90, 90 and 180 degrees.
- Four-way intersections at grade generally should be roundabout controlled due to their high crash risk. Local roads should not intersect with the main road network as cross roads and should only form cross junctions with themselves where necessary. Where unavoidable and a reasonable volume of traffic across the busier road is anticipated, offset the quieter roads as a right – left stagger, to minimise the risk of crashes.

Wherever traffic from the planned roading network for a development will access a classified road, the intersection may require roundabout control or have certain movements restricted. Consult with the Council before submitting the Design Report, to ensure that the intersection conforms to the Council's requirements.

8.12.3 Unsignalised urban intersection spacing

Locate intersections sufficiently far apart to separate their traffic movements and provide drivers with sufficient lead-time for decision making. The minimum spacing requirements must be the greater of those listed in Table 2 and 2a or the spacing necessary to meet the requirements of the *Austroads Guides to Road Design and Guides to Traffic Management*. Discuss spacings for arterial – arterial intersections with the Council before the Design Report is submitted.

Table 2 Minimum intersection spacing in urban areas

Posted (legal speed limit) km/hr	**Road types**	**Minimum spacing**
100	All	800
90	All	500
80	All	400
70	All	305
60	All	220
50	State Highways, Arterials and Local Business Roads	160
50	Collector roads	125
50 or less	Local roads	75

Table 2a Minimum intersection spacing in rural areas

Posted (legal speed limit) km/hr	**Road types**	**Minimum spacing**
100	All	800
90	All	500
80	All	400
70	All	305
60	All	220
50	All	160

Note:
1) Distances are measured centreline to centreline.
2) To allow for future intersections into undeveloped land adjacent or opposite to this development there may be a requirement to double these distances..
3) Where the frontage road is divided by a median, intersection spacing may need to be increased to provide for construction of adequate-length turning bays

4) This table is derived from Austroads.
5) Intersection spacings less than 75 metres will be considered for lower volume roads using design speeds less than 50km/hr

Use the following standards and guidelines for the design and operation of intersections and vehicle crossings:

- Guidelines for the Implementation of Traffic Controls at Cross Roads, RTS 1
- Austroads Guides to Road Design and Traffic Management
- CSS: Parts 1-7

8.12.4 Sight distances

Adequate sight distances at an intersection must be provided as sight distance is fundamental to safe intersection design. When designing intersections and/or small radius curves, use *Austroads Guides to Road Design and Traffic Management*, which provides guidance on the minimum sight distance requirements.

Refer to the *District Plan, Appendix 10 Rural and Appendix 13 Townships* for minimum sight distances for intersecting roads from Vehicle Crossings and minimum spacings required between adjacent vehicle crossings.

8.12.5 Permanent signs and markings

Locate street name signs between 450mm and 1500mm behind the new kerb or 600mm and 1500mm behind the new shoulder and within the area formed by the intersecting legal road boundaries, as specified in *RTS 2*. Ensure that reconstruction projects include the relocation of the street name sign, if the works make its old position inappropriate. Position signs at least 1500 mm away from a vehicle entrance or kerb cutdown where possible.

When signs and markings are used within the road corridor, they must comply with the following standards and guidelines and be placed where they can be readily seen by approaching motorists:

- Setting of Speed Limits 2003 Rule
- Traffic & Parking Bylaw
- Guidelines for Street Name Signs, RTS 2
- Traffic Control Devices Manual, Part 9, Level Crossings
- NZS 8603 Design and application of outdoor recreation symbols
- CSS: Parts 1-7
- Compliance Standard for Traffic Signs
- Manual of Traffic Signs and Markings Part 1 and 2

The Council has delegated the approval of the regulatory signage and roadmarking on existing roads to Council's roading department. This is separate from and additional to engineering acceptance.

8.12.6 Traffic signals

If Council decides that traffic signals are necessary to provide safe and efficient access to the area, use the guidelines in the *Austroads Guides Traffic Management Parts 6,9,10 and Road Design Part 4* also *NZS 5431 Specification for Traffic Signals* for the design and operation of the traffic signals. The location and design of each installation must conform to the requirements and approvals set by the Council, to enable coordination of the traffic signals.

8.12.7 Roundabouts

Roundabouts provide control at intersections in a variety of circumstances e.g. they can control speeds and improve traffic flows. Their location must be agreed with the Council at the consent stage.

Consider these issues in the design:

- the classification of the intersecting roads;
- the vehicle types expected to use the intersection;
- the speed environment;
- the distribution of turning traffic;
- pedestrian and cyclist safety;
- landscaping;
- heavy vehicle access requirements.

Roundabouts at the intersection of local roads can be used to control speeds, and may be designed with semi-mountable aprons for effective traffic calming. The semi-mountable apron slows cars (it must be high enough to discourage drivers from over-running it), whilst providing for the larger turning requirements of vehicles such as rubbish trucks and emergency vehicles. Discuss the geometric design of such roundabouts with the Council.

Use the following standards and guidelines for the design and operation of roundabouts:

- Austroads Guides - Traffic Management TM6 and various, Road Design RD4, 4A, 4B, 6 and various
- CSS: Parts 1-7

Refer to clause 10.8.12 - Protection of sightlines (Reserves, Streetscape and Open Spaces) for planting in roundabouts.

Council has a preference for splitter islands to be used where there are roundabouts to deter wrong-way movements on streets. These need to be designed to cater for narrow streets and larger vehicles. In some circumstances the splitter island and roundabouts may need to be designed to allow larger vehicles to drive over them.

8.13 SERVICE LANES, PRIVATE RIGHT OF WAYS AND ACCESS LOTS

Vehicle access to a site (or sites) that will be provided by a private right of way must comply with the requirements of the *District Plan, Rural Volume Appendix 10 and Townships Volume Appendix 13.*

There shall be no more than 5 individual vehicles entrances (crossings) on each side along any 1 km section of State Highway and Arterial road, measured 500 metres either side of a proposed entrance.

Accessway design and construction standards, including drainage, for service lanes, private ways and access lots must comply with the requirements for an equivalent construction within legal road, including a minimum 75-year design life. This includes the provision of a secondary flowpath for stormwater, as detailed in clause 5.6 – Drainage System Design. When designing accessways, balance the long term maintenance costs for the residents against the benefits of providing access through a vested road.

Refuse and recycling collections will not be provided within private rights of way or service lanes unless the collection vehicles can safely negotiate the rights of way and exit or turn at their ends and in addition, the property owners indemnify Council against any damage to the carriageway that may occur as a result of use by the refuse/recycling vehicle. The specific requirements for either refuse/recycling truck access or refuse/recycling container storage areas at the road boundary needs to be considered. Council refuse and recycling trucks use a mechanical arm to lift and empty bins and need to be able to access the bins to lift these.

Some properties can have up to three wheelie bins, for rubbish, recycling and organics. Adequate space along the kerbside of the serviced carriageway is required so that the mechanical lifting arms on the collection vehicles can reach the bins from the carriageway and empty them. Bins are approximately 550 mm wide and a space of 500 mm is required between bins or between bins and street poles.

For the short-term storage of refuse/recycling wheelie bin containers, an area may need to be set aside as a collection point close to the vested road carriageway if approved by Council. This must be accessible so that the containers can be mechanically lifted by the refuse truck working from the road. Adequate clearance and a level platform needs to be provided away from water races, road side swales, trees and landscaping.

As work within private ways, service lanes and accessways will not be taken over by the Council upon completion; the Council will be placing the onus for confirming both the suitability of design and construction on the developer.

These works must comply with the requirements of Part 3: Quality Assurance.

In urban subdivisions shared sealed accessways are expected to meet the requirements for Benkleman beam tests detailed in Table 7.

8.14 ON SITE MANOEUVRING AREA

The manoeuvring area to and from any parking space and parking aisle shall be designed to accommodate a B85 vehicle in accordance with *AS/NZS 2890.1:2004*.

In areas where a hazard or congestion is likely at the manoeuvring area to and from an access driveway or ramp these shall be designed to accommodate a B99 vehicle in accordance with *AS/NZS 2890.1:2004 Parking Facilities*. If there are special circumstances or severe space limitations and relatively low traffic volumes a B85 vehicle may be used.

The manoeuvring area to and from a loading space and loading aisle shall be designed to accommodate a 8.0 metre medium rigid track with a turn radius of 10.0 metres as referenced in *Land Transport RTS 18 NZ On-Road Tracking Curves 2007*.

8.15 GEOMETRIC DESIGN

8.15.1 Design speed

Classified roads such as arterials and collectors are typically designed to a higher speed than local roads. *Austroads Road Design Guides* states that major urban roads should be designed for an operating speed 10km/hr above the legal speed limit. The desired speed environment or target speed for local urban roads may determine the design speed. Refer to *Austroads Guide to Traffic Management Part 8: Local Area Traffic Management*.

Austroads Rural Road Design states that rural roads should be designed for the 85th percentile operating speed.

The *Speed Limits Bylaw* and its related register of speed limits, found at, www.selwyn.govt.nz/council-info/key-documents/bylaws/current-bylaws/speed-bylaws-maps set out the speed limits for listed roads.

8.15.2 Horizontal alignment

Generally, horizontal curves should conform to *Austroads Guide to Road Design – Parts 2,3,4,6,7 and various*, as appropriate.

Design the elements of the road network for the appropriate design speed.

Design the kerb radii at road intersections generally as detailed in Table 3. To minimise pedestrian crossing distances it may be appropriate to have lower kerb radii to be confirmed with Council. Also road widths and traffic volumes or the traffic type may suggest an alternative radius is more appropriate.

Design intersections of a collector or arterial road to meet the tracking curve requirements in *New Zealand on road tracking curves for heavy vehicles RTS 18.*

Table 3a Vehicle Types - Road Classification Rural or Rural/Residential

Road Classification	Vehicle Type	Minimum Intersection Kerb Radius (m)
Arterial	B Train	14.0
Collector	Semi trailer HCV	12.5
Local Business	B Train	12.5
Local Major	Semi trailer HCV	9.0
Local Intermediate	Single unit HCV	9.0
Local Minor	Single unit HCV	6.0

Table 3b Vehicle Types - Road Classification Urban

Road Classification	Vehicle Type	Minimum Intersection Kerb Radius (m)

Arterial	B Train	14.0
Collector	Semi trailer HCV	12.5
Local Business	B Train	12.5
Local Major	Semi trailer HCV	9.0
Local Intermediate	Single unit HCV	6.0
Local Minor	Single unit HCV	4.5

Avoid reverse curves where possible. If they are necessary, balance and separate them by a sufficient length of straight road to allow for a satisfactory rate of superelevation reversal (where the design speed is greater than 50kph).

Curves in the same direction in close proximity must be compounded. Avoid "broken back" curves.

Where horizontal curves of less than 60m radius are necessary for topographical or other reasons, depending on the road classification extra widening of between 0.5 and 1.5m may be required, according to the width of carriageway available to moving traffic and the radius of the curve. *Austroads Road Design Guides* provides further information to calculate this extra widening.

Horizontal curves in 50kph areas are usually circular with a minimum centreline radius of 80m for through streets, reducing to 20m for cul-de-sacs unless designing to reduce vehicle speeds.

8.15.3 Vertical alignment

Gradient lengths must be as long as possible, with vertical curves provided in compliance with *Austroads Guide to Road Design – Parts 2,3,4,6,7 and various*, where necessary.

Gradients at any point on the kerb line should not exceed 1:6 or be less than 1:500, with a minimum gradient of 1:300 on the outside kerb line of any curve. Kerb grades less than 1:500 may be acceptable in conjunction with underchannel piping and/or with frequent stormwater outfalls provided.

Where the change of gradient exceeds 1%, generally join the change with appropriate vertical curves of not less than 30m for through roads and 20m in culs-de-sac.

Design the crown line at intersections to ensure a smooth ride on the main road. Normally, this means running the crown of the minor road into the nearside edge of the main road lane line or quarter point.

No road level at a waterway crossing should be raised if this may cause unacceptable flooding. Culverts typically have a 20% annual exceedance probability (AEP) flow capacity, such that a proportion of a 2% AEP flood may flow across the road. The flood level, which may affect many houses upstream, is then determined by the road crown. Refer to Part 5.

8.15.4 Crossfalls

Normal carriageway crossfalls should be 3% for urban roads and unsealed crossfall should not exceed 4%. The carriageway crossfall must be formed in accordance with the *CSS: Part 6* camber detail, SD 623.

Some variation from this requirement may be necessary in cases where a differential level between kerb lines is adopted and/or the crown is offset from the centreline.

Design turning circles to avoid an excessive differential between the crown and fender. Minimum crossfall must be 2% for asphaltic concrete and 2.5% for chipseal. Wherever an off-centre cul-de-sac head is used, offset the road crown to create symmetrical crossfall conditions.

Generally, crossfall for rural unsealed roads should not exceed 6%, when measured from the carriageway edge to the crown.

8.15.5 Superelevation

Normally superelevation is not applied to urban local roads. For speed limits over 50kph, specific design of superelevation will be required. Where superelevation is required, the maximum value on local and collector roads is 5%. For arterial roads confirm super elevation design with Council as higher values may be accepted.

8.15.6 Cross-section design

Provide carriageway and legal road widths that comply with the *District Plan*. Design these widths as part of an optimal road cross-section, to achieve the following objectives:

- Provide a safe layout for all users.
- Provide the required capacity for all road users including cyclists and pedestrians where required.
- Minimise the capital costs of construction by not exceeding the desirable widths for high cost elements like carriageway, cycleway and footpath;
- Minimise the ongoing maintenance costs by designing and constructing elements to achieve their design life;
- Provide all the specified roadway elements;
- Provide bus lanes or bus priority measures where required;
- Reinforce the speed environment through appropriate lane and carriageway widths;
- Provide an attractive streetscape, adding to the amenity and character of the area;
- Facilitate a safe, efficient and effective drainage system by ensuring that the new works do not detrimentally affect the existing drainage pattern or road users;

Table 3 Carriageway elements (Optimal)

Road classification	Min traffic lanes	Cycle facilities	Shoulder / parking lane	Median
Arterial – Urban	2	Separate preferred Or marked in c/way	parking lane	painted and/or kerbing
Arterial – Rural	2		Shoulder	painted and/or kerbing
Collector – Urban	2	marked in c/way	parking lane	painted and/or kerbing
Collector - Rural	2	within traffic lane	Shoulder	No
Local – Business	2	within traffic lane	parking lane	No
Local Major – Urban	2	within traffic lane	parking lane	No
Local Intermediate – Urban	2	within traffic lane	parking lane	No
Local Minor – Urban	1	within traffic lane	parking bays or parking lane	No
Local – Rural	2		shoulder	No

Notes:
1) Provide swales where required by the project brief or subdivision consent.
2) Mark parking lanes in accordance with clause 8.10.3 – On-street parking.
3) Medians may be either formed or roadmarked islands (flush medians) as approved.

The desirable maximum urban traffic lane width is 3.5m. This may be increased to 3.7m, to provide wide kerbside lanes. For cycle lanes a minimum lane width of 1.2 metres is preferred. Additional road widths are recommended for cycle lanes on roads with higher operating speeds. *Austroads Guide to Road Design – Parts 4,6A and various and Guide to Traffic Management - various.* The absolute minimum lane width of 2.5m is acceptable where:

- the legal road is limited;
- the road is in a low speed environment;
- there are few heavy vehicles.

When proposing narrower widths or where all elements may not be provided, carefully consider the reasons and balance them against the above objectives. Submit a non-conformance report detailing the process of trading off these objectives to arrive at the non-complying design widths, as part of the Design Report.

8.15.7 Shoulders

Austroads Guide to Road Design states that the minimum formed shoulder width for a rural road with traffic volumes over 150 vpd is 1.5m. Make an allowance for off-road parking areas on roads with 1.0m shoulders.

Table 4 Rural Shoulder width

Design Traffic Volume (AADT)	Formed Widths (m)	Sealed widths (m)
Single lane road <150vpd	2.0	0.5
150 -500	1.5	0.5
500 -1000	1.5	0.5
>1000	2.0	0.5

Notes: 1) This table is derived from Austroads.

Sealing of the shoulder will vary depending on traffic volumes and site conditions. Mark edgelines to prevent shoulders being incorporated in the traffic lane. On local rural roads, the shoulder widths may be determined by the width required to provide cycle facilities.

8.15.8 Medians

Determining median widths is typically dictated by the function of the median and intersection details. *Austroads* provides guidance on median functions, types and widths.

8.15.9 Hillside road construction

Where the road is or will be constructed on a slope, this can affect the ability to provide all the required elements of a streetscape and therefore impact on the achievable widths for some or all of those elements. Consider batter stability and property access, in addition to issues detailed in clause 8.14.6 - Cross-section design.

Options available for hillside construction:

- Design narrower legal road widths. Wider widths may be impracticable as it may be impossible to utilise more than a certain width due to crossfall restrictions. Property access may also be compromised if wide roads require high cuts or retaining walls.
- Use localised widening to construct passing or parking bays or to accommodate heavy vehicles.
- Provide a lesser standard of elements; through restricted parking, constructing only one footpath or combining elements e.g. shared cycle paths and footpaths.
- Construct retaining walls.
- Locate pedestrian and cycle facilities separately from the carriageway.

8.16 TRAFFIC CONTROL DEVICES

Initiatives to enhance road safety are built around the three E's – engineering, education and enforcement. Engineering the environment to 'solve' a problem may not always be the most efficient solution but is likely to be the most expensive. Consider education and enforcement as well as engineering in the design process.

Design a road at the outset for its environment and function, as it may be costly and difficult to retrospectively alter the speed environment. Analyse the existing speed environment, including the 85^{th} percentile speeds, for assessment against the design operating speed and comparison to the constructed speed environment.

The installation of traffic control devices (TCD) to slow vehicles down may be appropriate in local residential streets where:

- the posted speed limit < 85^{th} percentile operating speed < posted speed limit + 20km/hr;
- peak hour traffic volumes are relatively high;
- the length of the road segment under consideration > 250m;
- the road has a documented crash history of the type that could be corrected by the devices considered for implementation;
- there are significant pedestrian safety issues.

Install TCD in classified or rural roads:

- at the transition from the open road to a lower speed limit;
- to enhance pedestrian safety;
- to reduce conflict points.

Use the following standards and guidelines for the design and operation of traffic management devices:

- Guidelines for Urban-Rural Thresholds, RTS 15
- Austroads Guide Traffic Management Part 10

- AS/NZS 1158 Set Lighting for roads and public spaces - series
- CSS: Parts 1-7
- Manual of Traffic Signs and Markings Part 1and 2

8.16.1 Device selection

When designing traffic control devices, be clear about the objective of the measure's installation and the strategy or strategies that the device should achieve. Make the differentiation clear between "neighbourhood improvement" type works and traffic management works, to ensure the measures don't have unexpected effects. Wherever possible, make the objective measurable, to allow an assessment of its effectiveness.

Both the street environment and traffic control management must be in tune with each other, and compatible with the desired character of the street. Select traffic management devices which reinforce the road function, through inhibiting inappropriate behaviour or through changing the user's perception of the environment. Where alternative devices support the same objectives, consider the degree of effectiveness required and the likely environmental effects. Ensure that alternative devices do not create inequitable barriers for disabled people.

Factors such as traffic noise and air pollution can have significant impacts both locally and remotely. When selecting the device, consider other environmental effects e.g. noise from deceleration and acceleration, increases in travel distances or traffic volumes on arterial roads.

8.16.2 Design considerations

Overuse of devices will reduce their effectiveness globally, as will the passage of time reduce it locally, as drivers become familiar with them. Regardless of this, ensure a degree of consistency in the use of traffic management devices:

- Use similar devices in similar ways.
- Design devices so that drivers can recognise and react to them appropriately both in approach speed and alignment.
- Provide roadmarking, signage and lighting to support the device's purpose.
- Ensure sight distances comply with sight distances in Austroads Guide to Road Design Parts 4, 4A,4B,4C and Guide to Traffic Management Part 6.
- When designing the device layout, first consider where in the street the device is best placed to achieve the objectives.
- Design longitudinal vertical gradients under 3% at intersections where traffic management devices will be installed.

Austroads Guide to Traffic Management Part 8, has a range of indicative operating speeds for various devices. Space devices with a high degree of restraint, like road humps, 80 -120m apart.

8.16.3 Vertical deflection devices

Design raised tables and platforms to be 75 – 100mm above the road surface, with flat platforms between 2 – 6m long. The design height of the table or platform should be related to the type of transition from the ramp to the platform or road surface. Rounded transitions are smoother to travel over than sharp transitions so may require a greater height increase.

Road humps constructed in accordance with *CSS: Part 6* SD 631 may be used depending on the device operating speed required.

Consider the types of traffic which will negotiate these devices. Where buses and heavy vehicles will regularly negotiate devices, specify flatter ramps (1 in 20) and longer platforms (6.0m). Cyclists also prefer longer ramps (1 in 15) but these do not reduce speed as effectively as short ramps (1 in 12).

8.16.4 Horizontal deflection devices

Design bicycle lanes to bypass horizontal deflection devices where demand warrants it and particularly on higher traffic volume roads. If cycles use the traffic lane, eliminate squeeze points in, before and after devices.

Assume operating speeds of 10-20 km/hr for slow points and design them with deflection angles between 10 to 30 degrees. Where bicycle usage is not significant, design lane widths between 2.8 and 3.0m.

Roundabouts are also horizontal deflection devices and are discussed in clause 8.12.7 - Roundabouts.

8.16.5 Diversion devices

Construct pathways through diversion devices for bicycles and pedestrians and ensure that the devices can cater for the permitted users.

Design modified ‘T’ intersections with mountable kerbs and reinforce changed priorities where appropriate. Combine left in/left out islands with central median islands to improve efficiency.

8.16.6 Thresholds

Design perimeter entry thresholds which are at least 5.0m long and entirely flush with the intersecting road. Provide for the turning movements of commercial vehicles and buses. Where entry thresholds incorporate a raised section this should be located at least 6.0 metres from the intersecting road kerbline.

Install rural thresholds only where there is more than 20km/hr between the posted speed limits on each side of the threshold site and where there are no existing constraints which reduce the speed environment. Typically speed thresholds have kerbs 30 to 40 metres long. Vertical elements are an essential component of rural thresholds and include evergreen planting, signs, lights and their poles. Utilise horizontal elements like planting, medians and lane narrowing. Refer to *Guidelines for Urban-Rural Thresholds-RTS 15* for widths in differing traffic conditions.

8.16.7 Signage

Reinforce the effectiveness of signage by combining it with other devices.

The Council has delegated the approval of the installation of regulatory signs and roadmarking, including stop, give way and prohibited traffic movement signs, to Council's roading staff. This is separate from and additional to engineering acceptance.

8.16.8 Pedestrian Crossings

Typically the installation of zebra crossings or signalised pedestrian crossings will only be installed where they meet the warrant for it, as defined in *Manual of Traffic Signs and Markings Part2: Markings 4.02.01(c).*

Ensure that all the traffic control devices are visible. Signs or raised studs, which comply with *CSS: Part 6*, or supplementary lighting, may be required. For lighting, refer to Part 11: Lighting. Also refer to 8.17.8 Road Crossings for pedestrians.

8.16.9 Road markings

Install centrelines on rural roads with an AADT over 250 or where a road with an AADT over 100 has frequent or substandard horizontal or vertical curves and a minimum seal width of 5.0 metres. The desirable seal width is 5.5 metres. Install centrelines on classified urban roads carrying substantial volumes of non-local traffic.

Install lane lines wherever there is more than one lane in the same direction. Reinforce centrelines and lane lines with raised pavement markers on roads with a fine textured surface.

Install edge lines on rural roads with an AADT over 750 or where a road with an AADT over 250 has frequent or substandard horizontal or vertical curves. Install edge lines on urban arterial roads and where the lane requires definition or may conflict with parking. All road markings shall be reflectorised markings.

On classified urban roads install parking lines to encourage better parking.

Check the requirement for no overtaking and no stopping lines. The Council has delegated the approval of no stopping line installations to the Community boards. This is separate from and additional to engineering acceptance.

Where road markings are required, use the following standards and guidelines:

- Guidelines for Flush Medians, RTS 4
- Guidelines for Safe Kerbline Protection, RTS 8
- Guidelines for Rural Road Marking and Delineation, RTS 5
- NZ Supplement to Guide to Traffic Engineering Practice, Part 14: Bicycles
- CSS: Parts 1-7
- Manual of Traffic Signs and Markings Part 2

8.17 STREETSCAPE

The streetscape elements include paths, grassed berms, trees, shrub beds, streetlights, structures and hard landscaping. These can provide various benefits including:

- a network of safe, pleasant, comfortable, convenient and efficient paths.
- positive guidance for pedestrians, cyclists and motorists.
- seats, lighting, litter bins (where required) and other facilities.
- enhancement of the street environment by the inclusion of grassed areas, specimen street trees and plant beds, built structures e.g. fences, low walls, art works.
- attractive 'rain gardens' with safe overflow provision, which can provide a water quality and air quality improvement component for air and water borne vehicle pollutants.

Discourage vehicle access to berms, footpaths and swales by using landscape elements (e.g. kerbing, bollards, planting or fences).

8.17.1 Footpaths

The number of footpaths required for each road classification must comply with the requirements in the *District Plan*.

Footpath widths are measured from the footpath edge to the kerb or service strip. The service strip may be sealed with the path. The minimum widths set out in Table 6 must **be clear of all obstructions** such as vegetation when fully mature, light standards, traffic signs, utility furniture and bollards. Extra widening will be required wherever such obstructions cannot be avoided.

Figure 7 Extra footpath widening

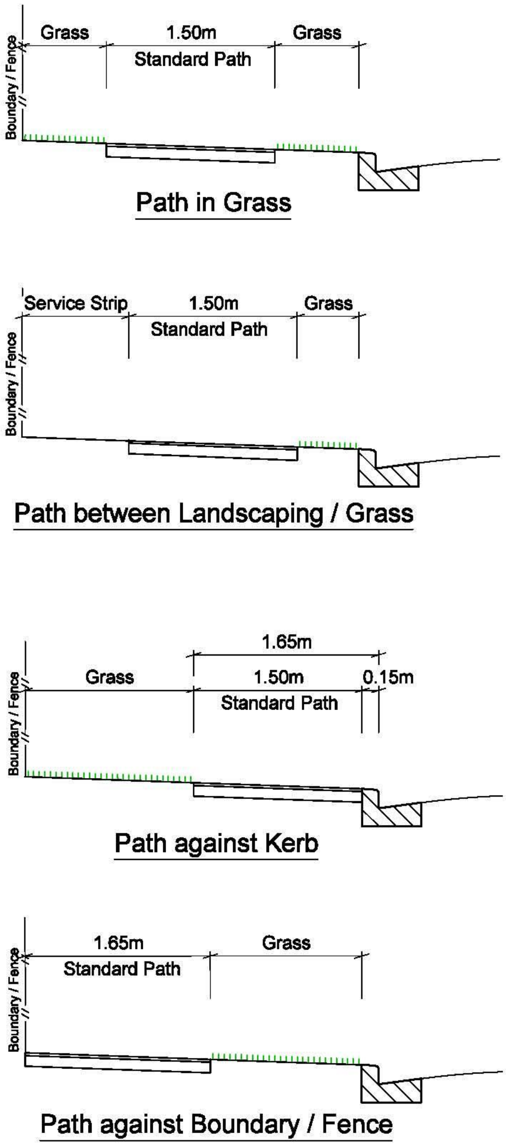


Table 5 Minimum footpath widths

Adjacent land use	Minimum width (m)	Preferred location
Residential	1.5	Varies
Retail/town centre	2.5	Adjacent to kerb
Industrial	1.5	Adjacent to kerb

Notes:
1) Residential footpaths are normally separated from the kerb by a grass berm and from the road boundary by a service strip.
2) Allow for any planting (e.g. trees) between the footpath and the kerb.
3) On slopes, it is most practicable to construct the footpath against the kerb.
4) Transitional widths may be required on the boundary between residential and retail/town centres.

Where topography or existing features preclude providing the minimum widths in Table 5, discuss options with the Council.

Lateral changes of the footpath direction should normally be achieved using smooth continuous curves. This is particularly relevant where the path deviates around obstacles (e.g. utility boxes, poles) or adjacent berm areas (e.g. trees, shrubs or structures) or shifts laterally to join another footpath.

Wherever the footpath deviates from pedestrian desire lines and positive guidance is required, install plant beds, fences or comparable barriers. Wherever possible, plant shrubs to soften the appearance of the guidance element. Also consider the needs of people with disabilities e.g. mitigate the possible safety risks for a person with a visual impairment by indicating the change.

The following documents should also form the basis of the design:

- Equity and Access for People with Disabilities Policy
- Guidelines for Planting for Road Safety
- NZS 4121 Design for Access and Mobility – Buildings and Associated Facilities
- CSS: Parts 1-7

8.17.2 Crossfalls and gradients

The optimum crossfall for sealed footpaths is 2.0%, with a minimum of 1.25% and a maximum of 3%. Grass areas and plant beds between the footpath and the carriageway or on median islands must have crossfalls flatter than 6% for ease of maintenance.

To provide access for wheelchairs and prams, ramps must be used on footpaths within public roads, unless approved by the Council.

Grassed areas with tree planting beside the berm, must be specifically designed. In these areas, steeper slopes may be permitted provided that the area can be mown or otherwise easily maintained. Gradients up to one in two may be planted. The treatment of all gradients steeper than one in four requires Council approval.

8.17.3 Grassed berms

Berms may be planted in selected areas with the approval of Council. Where the width from the legal boundary to the kerb or road edge exceeds 2.5m in residential areas, install a berm.

The minimum width for grassed berms is 0.7m. Typical cross sections, showing minimum berm widths, are shown in *CSS: Part 6*. Service strips against property boundaries may be a minimum width of 300mm. The smallest area of berm permitted is $2m^2$ and areas smaller than this must be formed and sealed/paved as footpath.

Where adjoining pavement surfaces meet, forming a point in the grass area with an angle of less than 60 degrees, square or round off the point of the grass berm to be no narrower than 0.7m.

8.17.4 Batters

Generally, batters should match any existing stable slope of similar material. Flatter slopes that are integrated into the natural landscape are preferred.

Where the formed batter is not required to cater for foot traffic, grassed batters are permitted, to a maximum of one in four. These must be mowable, as defined in clause 10.8.9 – Grassed Berms (Reserves, Streetscape and Open Spaces).

The top edge of every fill, and the toe of every cut, must have a crossfall of 3% and extend at least 500mm beyond the outside edge of the footpath. If there is no footpath, measure this dimension from the back of the kerb or the outside edge of the trafficable shoulder as applicable.

Retain all new cut faces or stabilise with vegetation. Slopes steeper than one in two must be retained. Structures supporting the road must be located on legal road. Locate stabilised faces or retaining structures that support private assets or property outside of the legal road.

Some of these structures may require building consent.

8.17.5 Utilities

Show any existing utilities and services on the drawings.

Both existing and proposed underground and above-ground utility services can impact on the design through conflicts with the proposed carriageway elements. The cost of relocating existing utilities is significant and may therefore not be a viable option. Existing roads are often reconstructed at a lower finished level but restrictions on lowering carriageways, and the corresponding kerb, due to the presence of utilities can lead to property and upstream drainage problems.

To ensure there is no conflict with the road geometrics or between any utilities and proposed street features or planting, become familiar with the required clearances from both existing and proposed above-ground and underground utilities. Ensure they do not create a safety risk for people who are blind or visually impaired. Refer to clause 9.5.3 – Typical services layout and clearances (Utilities) for guidance and standards for the work. Any conflicts should be resolved during the design process.

Pothole existing underground services, to confirm both their location and depth. When utilities constraint the design, there are a range of solutions available:

- Consider moving the carriageway alignment. This can allow either underground utilities to be positioned towards the centreline or underground utilities and poles to be positioned outside of the carriageway or footpath.
- Design element widths to achieve the same result as moving the carriageway alignment.
- Provide a lesser standard of elements, through restricting parking or constructing only one footpath.

8.17.6 On-street planting

Plant beds are generally used to soften the street environment and to provide visual guidance to pedestrians, cyclists and drivers. Landscaping is also an important component of traffic management devices but must be carefully designed to enhance the safety and effectiveness of these devices. The location of streetlights, sight line visibility and hazard criteria are critical when designing the on-street planting.

Refer to the *Tree Planting Policy* and clause 10.8 - Landscape Planting (Reserves, Streetscape and Open Spaces), before designing plant beds or street trees.

8.17.7 Street furniture

Landscaping structures such as planter boxes, seats, bins, sculptures, memorials and entrance structures on legal roads must be constructed in long-life materials (20-year minimum). Vandal resistant material shall be used and elaborate brass fittings etc are not acceptable. Materials used must be low maintenance and require specific Council approval. Refer to clause 10.6.3 – Structures (Reserves, Streetscape and Open Spaces) for further information.

In low speed environments, locate continuous structures like low walls at least 450mm behind the kerb, with a maximum height of 700mm if adjoining the footpath.

Locate them so that they do not obstruct the sightlines of intersections, pedestrian crossings or signs. Ensure they do not create a safety risk for people who are blind or visually impaired.

Some of these structures may require building consent, which the developer must obtain.

8.17.8 Road crossings for pedestrians

Generally old style zebra crossings are not commonly used in the district, see section 8.16.8 – Pedestrians. Preferably provide pedestrian crossing facilities that comply with *CSS: Part 6* at all road intersections and other locations, wherever these will provide logical and safe movement of pedestrians. Mid-block crossing facilities may be combined with kerb build-outs and pedestrian islands, to minimise the crossing distance for users.

Provide a one metre separation between new pedestrian cutdowns and existing poles or signs.

Pedestrian islands or other facilities, to aid safe crossing of roads, may be required in areas where high numbers of pedestrians are expected to be crossing (e.g. local commercial areas, reserves, schools, retirement homes, public facilities).

Provide tactile warning pavers for vision-impaired pedestrians on public footpaths at all pedestrian crossing kerb cut-downs in collector and arterial roads.

Avoid designing pedestrian crossing facilities that can be interpreted by pedestrians as official zebra crossings.

Use the following standards and guidelines for the design and operation of pedestrian crossing facilities:

- Traffic Control Devices 2004 Rule
- NZTA Pedestrian Planning and Design Guide (2007)
- Guidelines for Facilities for Blind and Vision-Impaired Pedestrians RTS 14
- CSS: Parts 1-7

8.17.9 Site access

Design all kerb crossings and cut-downs to ensure the satisfactory passage of the design vehicle, as laid out in AS/NZS 2890.1:2004 *Parking Facilities Part 1: Off- street Parking.*

Wherever access to property is required across a swale, the crossing design must be specific for the affected site(s). The designs shown in *CSS: Part 6* are acceptable design solutions.

For access to property required across a water race, the crossing design shall be as noted in Stock Water Races – 13.6.13 Bridges and Culverts.

The dimensions of all vehicle crossings must comply with the District Plan.

Use the following standards and guidelines for the design and operation of intersections and vehicle crossings:

- Austroads Guide to Road Design Parts 4, 4A,4B,4C and Guide to Traffic Management Part 6.
- Guidelines for the Implementation of Traffic Controls at Cross Roads, RTS 1
- CSS: Parts 1-7

8.17.10 Clear zones

The clear zone is the width from the edge of the traffic lane in which an errant vehicle can recover. To provide this zone, locate new hazards e.g. above-ground utilities, street furniture and trees, streetlights, at a distance from the edge of the traffic lane greater than the widths in Table 7. Remove or treat existing roadside hazards within this distance.

Table 6 Clear zone widths – Arterial or Collector Roads

One way AADT	≤ 50km/hr	70km/hr	100km/hr
≤ 1000	3.0m[1]	3.4m	6.0m
>5000	3.0m[1]	5.4m	9.0m

Note:
1) Where the above setbacks are not achievable, discuss alternative options with the Council early in the design process.
2) Interpolate between the given values for AADT between 1000 and 5000.
3) This table is sourced from *Austroads*.

Street trees planted within clear zones should have frangible trunks.

Some on-street structures in urban areas cannot feasibly be relocated. If they are not frangible, they should be protected. Formal barriers may not be the best option. Alternatives to barriers that could be considered in low speed urban areas include frangible planting and bollards.

When providing a barrier to a hazard within the clear zone, include the barrier deflection when determining the offset between the edgeline and the structure.

Austroads Guide to Road Design RD 2,3,4,6 & 7 and *various* provide details on clear zones, hazards and safety barriers.

For street light pole minimum setbacks from roads other than arterial and collector roads and paths refer to Lighting -11.9.11.

8.18 PAVEMENT DESIGN

8.18.1 Pavement and surface treatment design

Design roads to have an infinite life for the subbase and a 50-year life for the basecourse. Use a traffic growth rate of 2% per annum for design purposes.

Design roads to preferably be flexible pavements, with a 50-year life, using the general principles of the current New Zealand Supplement of the *Austroads Guide to Pavement Technology*.

All roading must comply with the Benkelman Beam criteria shown in Table 9.

Private access rights of way in townships serving more that 3 properties shall have maximum Benkleman Beam test results less than 2.5 mm.

Table 7 Benkelman Beam criteria

Traffic Loadings (heavy vehicles/day)	95% of readings (mm)	Maximum (mm)
>500	<1.2	1.5
100-499	<1.6	2.0
<99	<2.0	2.5

Note: 1) See CSS: Part 6 clause 11.6.3 – By Benkelman Beam for more detail on analysing test results.

The subgrade foundation shall have a minimum CBR of 8 for roads and 5 for private rights of way.

The pavement design must detail the:

- geotechnical requirements – test the subgrade and establish an in-situ or soaked CBR. Establish a correlation between the local soils and the test methods used;
- structural design – design pavements to meet the (modified) life-cycle requirements of the New Zealand Infrastructure Asset Valuation and Depreciation Guidelines as modified by the Council. The pavement designs are, however, restricted to a 50-year life for the basecourse layer.

Other considerations in the design may include, but should not be restricted to:

- type of edge restraints – in most urban environments a concrete edge restraint or kerb and channel must be provided. In other areas, provide road shoulders, as defined in clause 8.15.7 – Shoulders, to prevent edge break.
- semi-rigid and rigid pavements – semi-rigid and rigid pavements (e.g. those that require structural layers of asphaltic concrete, cement or bitumen stabilised metalcourses, concrete roads and similar) require specific design.
- the local subgrade – many sites have subgrades where the CBR values are so low that the pavement design requires a sacrificial layer of aggregate, sand or the use of geotextiles.
- the subsurface drainage – the Council recognises that the lack of subsurface drainage outfalls often results in the inability to avoid a "bath-tub" design where the pavement materials will, at times, become saturated. However, the acceptance criteria related to life-cycle traffic loadings still apply.
- the local water table – basecourse layers must be above the water table during a 1 in 10-year flood event.
- cover to underground services – maintain adequate cover to utilities when the project proposes lowering the road level or crown.

8.18.2 Reducing waste

When designing the development, consider ways in which waste can be reduced.

- Plan to reduce waste during demolition e.g. minimise earthworks, reuse excavated material elsewhere.
- Design to reduce waste during construction e.g. prescribe waste reduction as a condition of contract.
- Select materials and products that reduce waste by selecting materials with minimal installation wastage.
- Use materials with a high recycled content e.g. recycled concrete subbase, foamed bitumen. Proposed recycled materials will need approval from the Council to ensure that environmental contamination does not occur.

See the Resource Efficiency in the Building and Related Industries (REBRI) website for guidelines on incorporating waste reduction in your project *www.rebri.org.nz*

8.18.3 Pavement materials

The design and construction of the road must comply with the following criteria:

- materials – see CSS: Part 1 for details of approved pavement materials, gradings, etc. Any proposed variations from these materials, such as the use of cement- stabilised metalcourses or concrete roads, will require specific design;
- the extent of work – pavement materials must extend at the same thickness beyond the edge control devices, such as kerb and channel or the concrete edge restraints, as detailed in CSS: Part 6.

Any on site checks of metal courses undertaken by Council staff of subbase and/or basecourse surfaces associated with any routine monitoring of the construction works are expected to achieve a minimum Clegg Impact Value (CIV) of 35 in trafficable areas and 20 in pedestrian areas.

8.18.4 Surfacing

All surfacings must meet site-specific traffic loading requirements including skid resistance requirements as defined in TNZ T/10 *Skid Resistance Investigation and Treatment Selection*. Skid resistance should exceed either the values in Table 9 or a British Pendulum number of 50.

The selection of surfacing material is critical. Consider the benefit, performance and life-cycle costs of the material, particularly for pavers as these surfaces have higher maintenance costs i.e. select pavers for traffic management purposes, not just aesthetic reasons. Do not use pavers in narrow road medians or small islands as this location significantly increases maintenance difficulties.

Table 8 Skid resistance criteria

Site Category	Site Definition	Sideways Force Coefficient (SFC)
1	Approaches to railway level crossings, traffic lights, pedestrian crossings, roundabouts.	0.55
2	Curve < 250m radius Down gradients > 10%	0.50
3	Approaches to road intersections Down gradients 5 – 10% Motorway junction area	0.45
4	Undivided carriageway (event – free)	0.40
5	Divided carriageway (event – free)	0.35

Note: 1) This table is sourced from TNZ M/10:1998.

All newly constructed road surfaces must comply with the NAASRA roughness counts in Table 11.

Table 9 NAASRA roughness criteria

Surfacing	Average (mm/km)	Maximum (mm/km)
All new asphaltic concrete and open graded porous asphalt surfaces	55	75
Asphaltic concrete and open graded porous asphalt overlays and shape corrections	65	90
Chipseal through streets with 10,000-20,000+ vehicles per day (Pavement Use T6 and T7).	60	80
Chipseal through streets with 2,000-9,999 vehicles per day (Pavement Use T4 and T5).	65	85
Chipseal through streets, culs-de-sac and rights of way with 0-1,999 vehicles per day (Pavement Use T1-T3).	70	90

Note:
1) See CSS: Part 6 clause 11.7 – Testing for more detail on analysing test results.
4) Pavement use codes refer to RAMM categories.

All surfacing materials must meet the appropriate *CSS* requirements.

The general minimum surfacing requirement in urban areas is a two-coat (wet lock) chipseal – grade 4 and grade 6. At the head of a cul-de-sac, the minimum surfacing requirement is a 30mm layer of paver-laid AC10 laid over a Grade 5 chipseal.

In rural areas if the intersecting road is sealed the new road should be sealed with surfacing as in the urban area above.

Vehicle entranceways in commercial areas to be used by larger, heavier articulated vehicles shall have a minimum depth of asphalt of 40 mm.

Any cobblestone or similar interlocking block formations in trafficable areas are to be laid to a herringbone pattern, with a 150 mm minimum deep AP65 subbase. All block paving shall conform to NZS 3116:2002, Concrete Segmental and Flagstone Paving.

Cast in place exposed aggregate concrete paving is not preferred on roadways due to concerns with skid resistance and long term maintenance issues. Council may agree to small areas of such paving and may depending on likely vehicle operating speeds agree to use of this paving in isolated areas.

Skid resistance on the new surface through all intersections must match that of the existing road, particularly back to the transition point (TP) of the road. Skid resistance can be improved through grooving in asphaltic concrete.

8.19 DRAINAGE DESIGN

8.19.1 Road drainage control

All road runoff must be contained in the legal road or within land over which drainage easements have been created in favour of Council.

Guidance and standards for the work can be found in:

- Integrated Catchment Management Plans (ICMP) for the development area
- Part 5: Stormwater and Land Drainage
- CSS: Parts 1-7

8.19.2 Primary stormwater treatment

On-street treatment of stormwater is a required part of the design. Design for the removal of contaminants throughout the stormwater system, but particularly before the stormwater enters existing open water-bodies.

Collect surface water in kerbs and channels or within grassed swales, depending upon the requirements of that particular water catchment area, as detailed in the resource consent or project brief.

All pipework downstream from sumps contained within the carriageway must have a minimum internal diameter of 225mm. Sump or access chamber spacing must not exceed 90m, for maintenance purposes.

Provide a stormwater outfall in classified roads whenever the channel flow exceeds 25 litres/sec at a grade of 1in 500 for a 10 year event. Provide a stormwater outfall in local roads whenever the channel flow exceeds 50 litres/sec at a grade of 1 in 500 for a 10 year event. Refer to *WWDG Part B* chapter 22.10.

8.19.3 Subsoil drainage

In areas of high groundwater, install subsoil drainage to protect the carriageway subgrade and/or metalcourse.

The subsoil drainage pipework must be drilled PVC or other approved perforated pipe.

8.19.4 Swales

Primary treatment is achieved by a detailed design that uses suitable permeable material to allow soakage to subsoil levels. Volumes undergoing primary treatment through infiltration can be increased through longer resident times in permeable swales. Provide opportunities for sediment to settle out in swales through slower velocities, longer resident times and dense grass cover, as these all slow overland flows.

Planting installed in the swale should not include bark, similar organic mulch or other loose easily transported material.

Note that repeated use of vehicles or the heavier ride-on mowers will substantially reduce the permeability of swales that have been constructed for primary treatment - take this into account. See Part 5: Stormwater and Land Drainage and Part 10: Reserves, Streetscape and Open Spaces, for guidance on design of swales.

8.19.5 Drainage patterns

The existing drainage pattern may provide a constraint on possible design solutions. Ensure that the upstream catchment, including existing channels, can drain through the new works without ponding and that property outfalls, either at the kerb or at the boundary, are not raised above inlet levels. Thoroughly investigate the catchment around the project area, to determine accurate falls, transition levels and the most effective outfall.

8.20 STREET LIGHTING

Refer to Part 11: Lighting for street lighting requirements.

8.21 BRIDGES, CULVERTS, RETAINING WALLS AND OTHER STRUCTURES

Bridges, culverts, retaining walls and other structures within the legal road perform a key role in ensuring continuity of access for the public. Design these items to ensure their continuous function (including during extreme events) throughout their design life. For timber bridges, this is 70 years. For steel or concrete bridges and all culverts, this is 100 years. For all other structures, this is 50 years. Refer to the *Bridge Manual* for specific design information.

Determine the width of bridges and culverts in conjunction with the site-specific current and future road requirements for carriageway widths. Take into account the land drainage requirements, as set out in clause 5.6.6 - Bridges and culverts (Stormwater and Land Drainage) and Chapter 13 of the *WWDG*. The length of these structures is also site-specific and must make allowance for waterway requirements during extreme events. Design the wing wall and anti-scour structures to provide support and to prevent scour, as required.

Other design issues include, but are not limited to:

- legal compliance – building and resource consents are required for bridges, culverts, retaining walls and other structures, as appropriate;
- technical requirements – bridges and culverts must have separated footpaths, space for cyclists and suitable guard-rails/handrails. The surfacing of bridge decks must meet the site-specific traffic loading requirements including skid resistance requirements;
- waterway requirements - consider the effect of the road on the secondary flow path for any waterway crossing. Refer to clause 8.15.3 – Vertical alignment;
- aesthetic contribution – use the design of the new structure to enhance the attractiveness of the built environment;
- existing structures – ensure lane widths are not compromised when retrofitting existing structures to cater for future traffic needs.

8.22 RURAL VEHICLE ENTRANCE AND ROADSIDE DRAINS

Council requires vehicle entrances to be formed across roadside drains with appropriately sized class 2 reinforced concrete pipes. A number of these drains carry high volumes of water and as a minimum a 300m diameter pipe is preferred. Concrete headwalls may be required to ensure there is adequate support as approved by Council.

8.23 WATER RACES

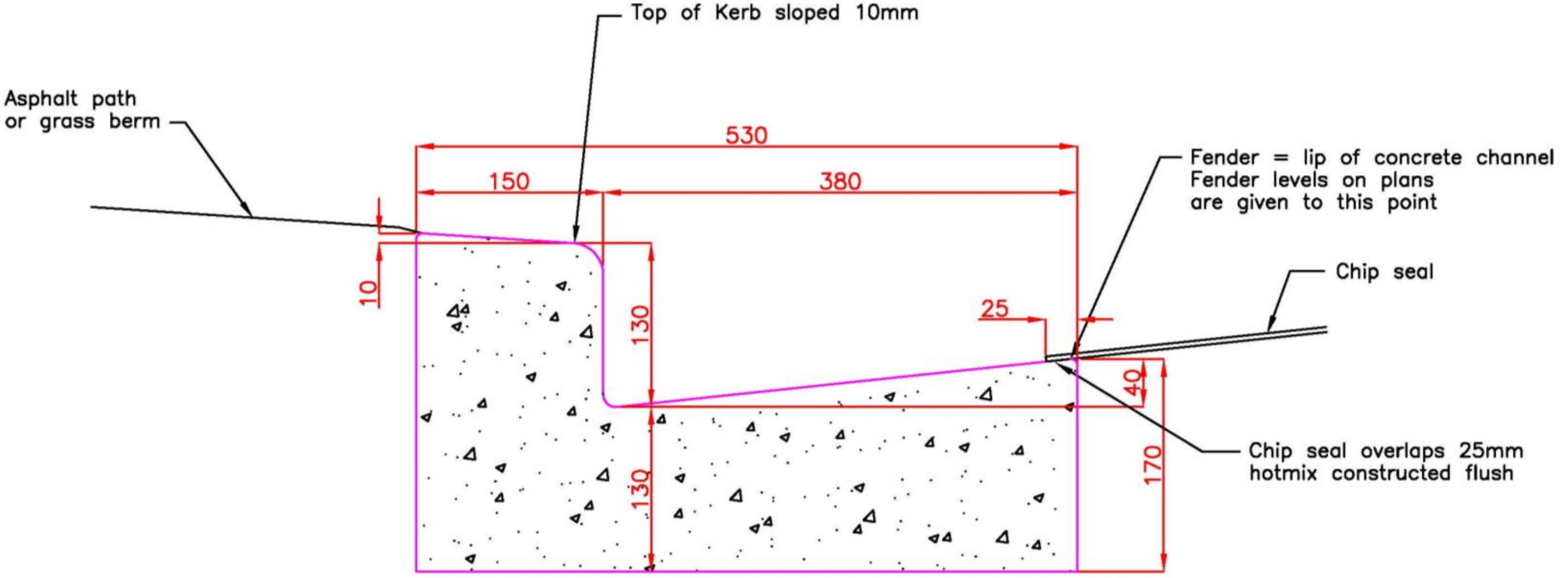
Refer to Part 13: Water Races for roading and vehicle access requirements across water races.

8.24 AS-BUILT INFORMATION

Provide as-built information as set out in Part 12: As-Builts, including a safety audit of the constructed works as requested in the resource consent conditions or project brief.

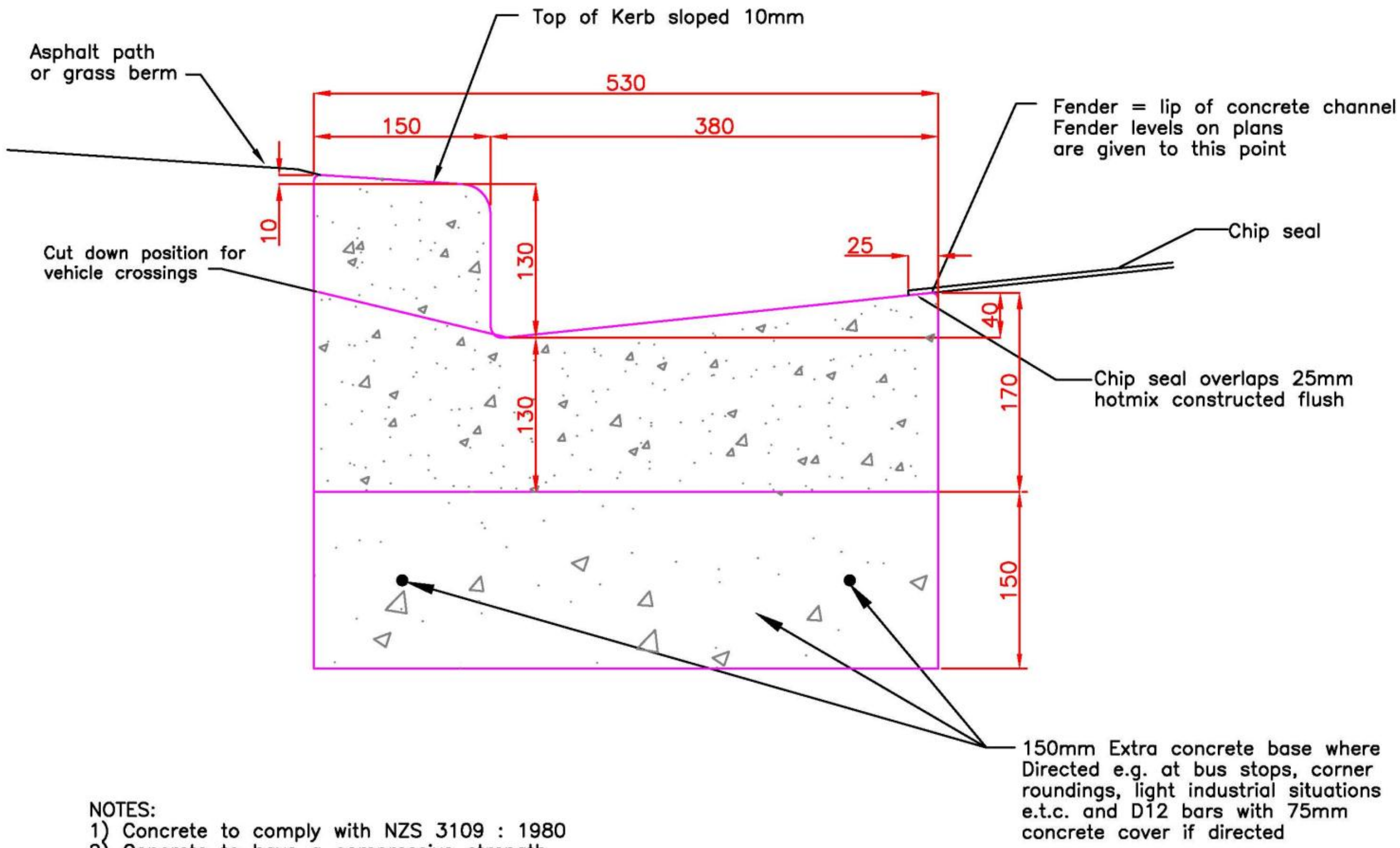
APPENDIX 1 STANDARD DRAWINGS

RD	1.0	Standard Kerb and Channel
RD	1.0A	Standard Kerb and Channel with expansion for Heavy Vehicle
RD	2.0	Low Profile Kerb and Channel
RD	2.0A	Low Profile Kerb and Channel with expansion for Heavy Vehicle
RD	3.0	Standard Road Construction
RD	3.2A	Rural Vehicle Entranceway Standard for Local Roads
RD	3.2B	Rural Vehicle Entranceway Standard for Arterial and Collector Roads
RD	3.2C	Commercial and Heavy Vehicle Entranceway Standard for All Roads
RD	3.2D	Rural Vehicle Entranceway with Culvert Standard for Local Roads
RD	3.6	Standard Detail of R.O.W. section
RD	3.7	Typical Cross Section Rural Type Vehicle Entranceway
RD	3.7A	Typical Cross Section Rural Type Vehicle Entranceway
RD	4.5	Township Vehicle Entranceway Standard



NOTES:
1) Concrete to comply with NZS 3109 : 1980
2) Concrete to have a compressive strength of 25 MPA at 28 days.

Selwyn District Council	Detail of Standard Kerb and Channel	STANDARD NO RD 1.0 DATE 1 MAY 2010 SCALE 1:5

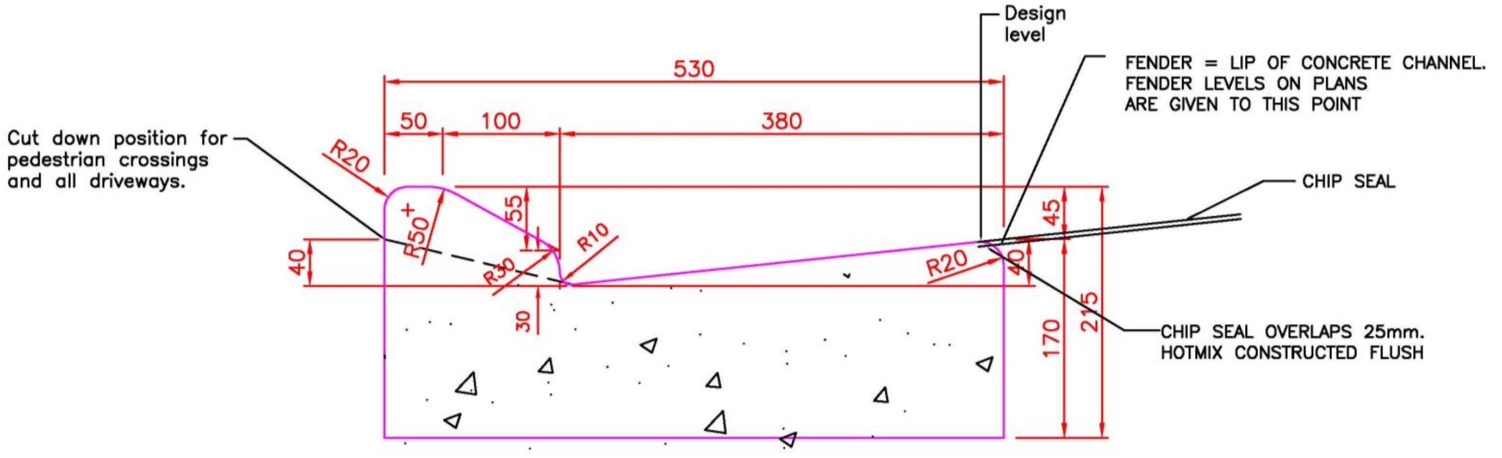


NOTES:
1) Concrete to comply with NZS 3109 : 1980
2) Concrete to have a compressive strength of 25 MPA at 28 days.

Selwyn DISTRICT COUNCIL

Detail of Standard Kerb and Channel
with Expansion for Heavy Duty Crossing

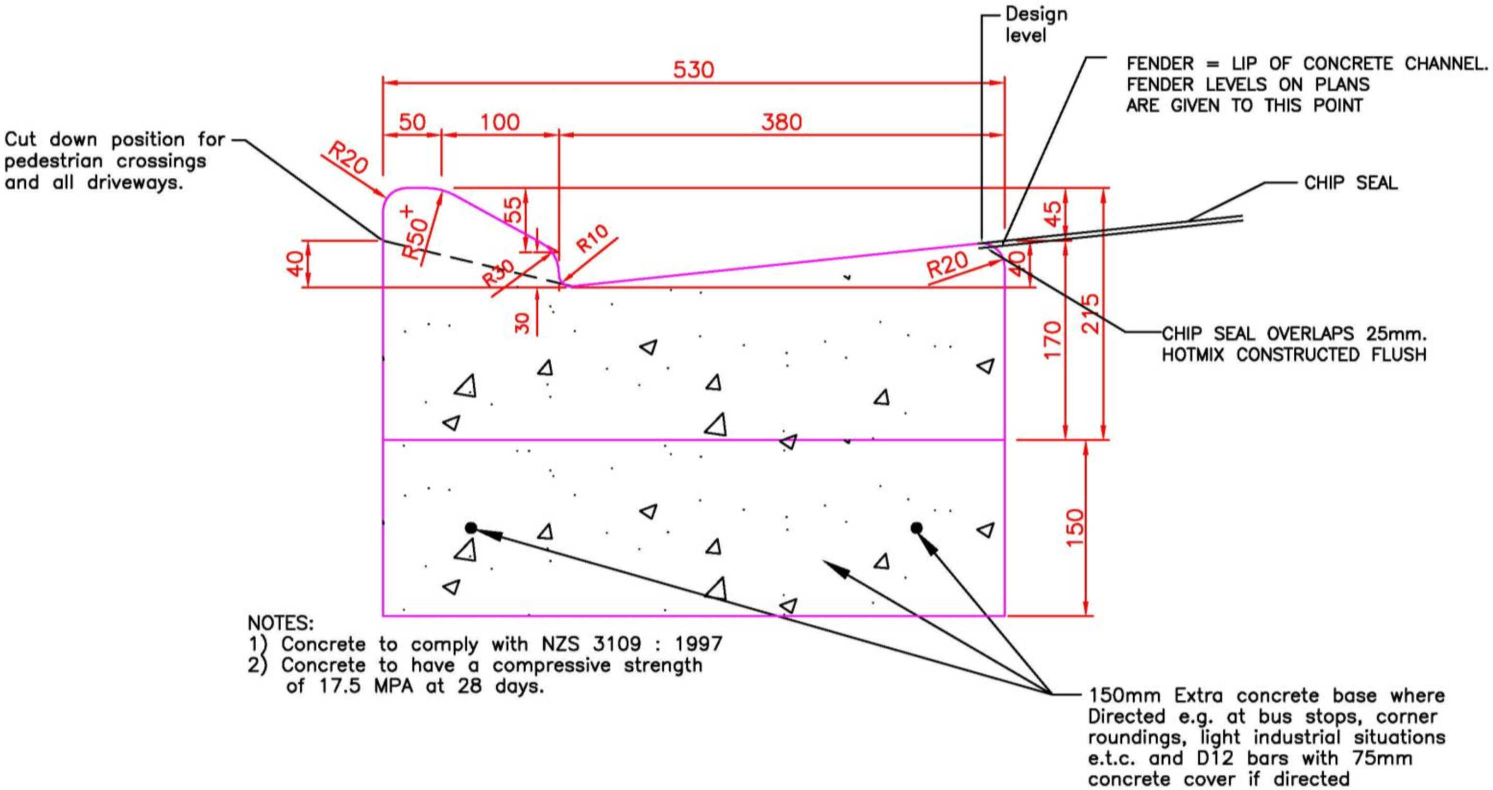
STANDARD NO RD 1.0A
DATE 1 MAY 2010
SCALE 1:5



NOTES:
1) Concrete to comply with NZS 3109 : 1997
2) Concrete to have a compressive strength of 17.5 MPA at 28 days.

Selwyn DISTRICT COUNCIL	Low Profile Kerb and Channel	STANDARD NO RD 2.0 DATE MAY 2010 SCALE 1:5 AST-04-02-07-05

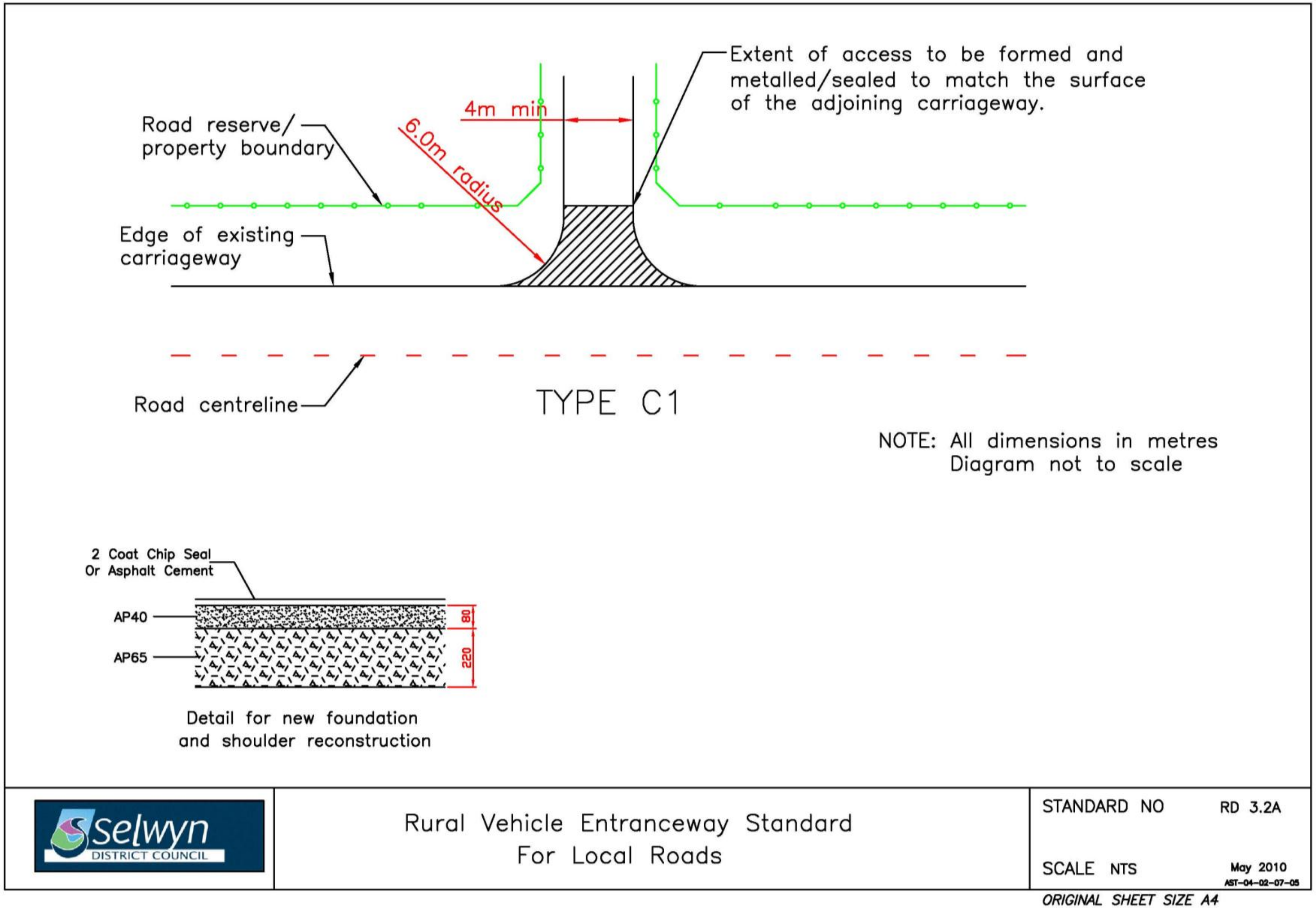
ORIGINAL SHEET SIZE A4

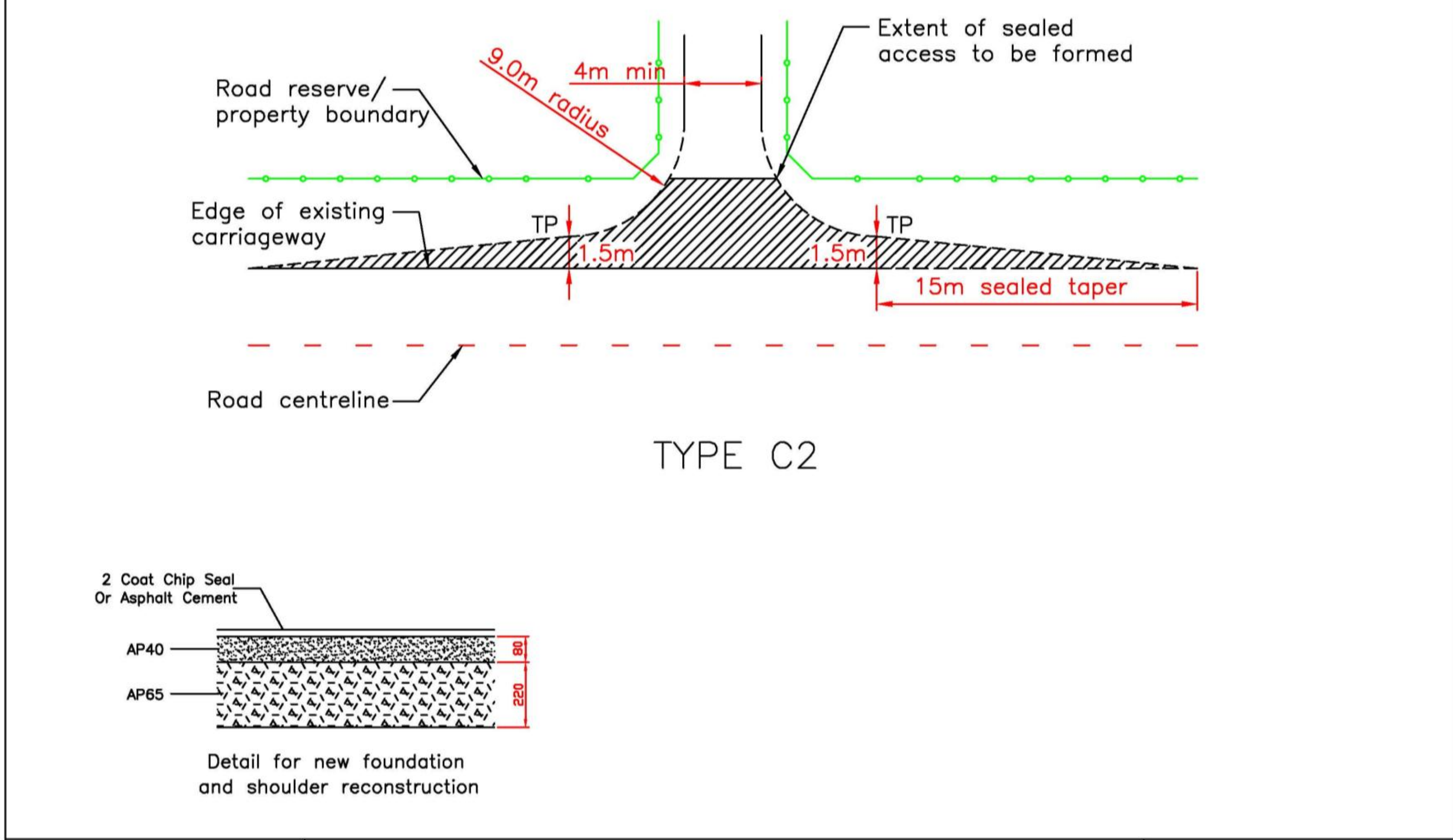


NOTES:
1) Concrete to comply with NZS 3109 : 1997
2) Concrete to have a compressive strength of 17.5 MPA at 28 days.

Selwyn DISTRICT COUNCIL	Low Profile Kerb and Channel with Expansion for Heavy Duty Crossing	STANDARD NO RD 2.0A DATE MAY 2010 SCALE 1:5 AST-04-02-07-05

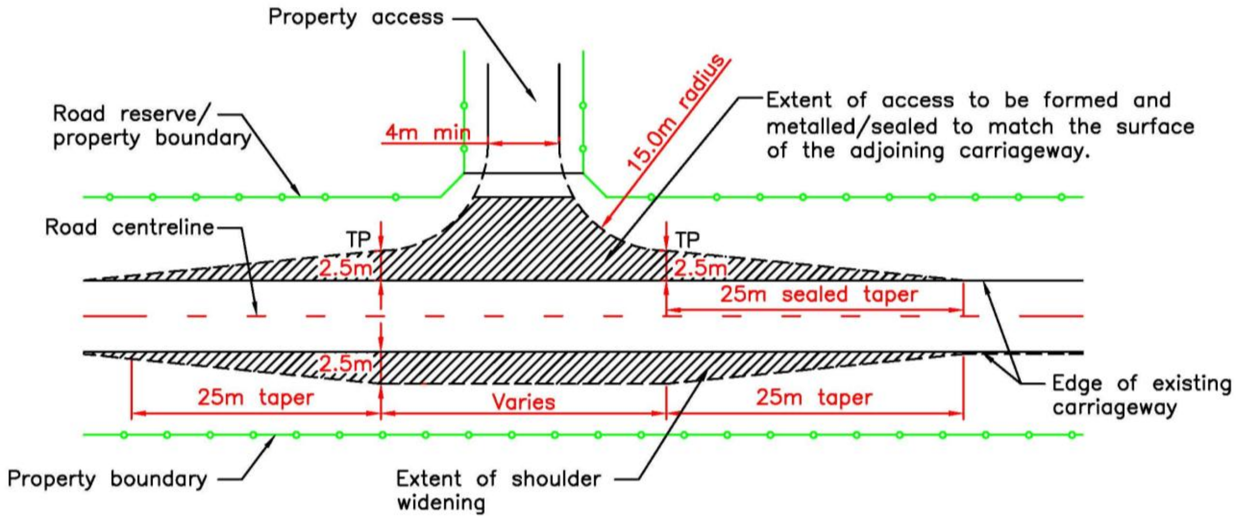
ORIGINAL SHEET SIZE A4


Extent of access to be formed and metalled/sealed to match the surface of the adjoining carriageway.
4m min
6.0m radius
Road reserve/ property boundary
Edge of existing carriageway
Road centreline
TYPE C1
NOTE: All dimensions in metres
Diagram not to scale
2 Coat Chip Seal Or Asphalt Cement
AP40
AP65
80
220
Detail for new foundation and shoulder reconstruction
Rural Vehicle Entranceway Standard For Local Roads
STANDARD NO RD 3.2A
SCALE NTS
May 2010
AST-04-02-07-05
ORIGINAL SHEET SIZE A4



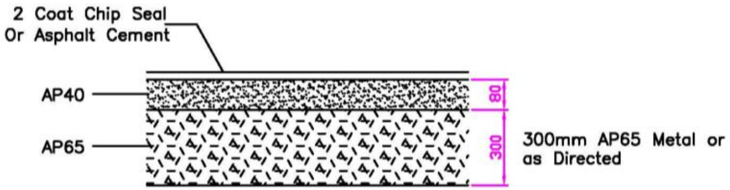
Selwyn DISTRICT COUNCIL	Rural Vehicle Entranceway Standard For Arterial and Collector Roads	STANDARD NO RD 3.2B SCALE NTS June 2010 AST-04-02-07-05

ORIGINAL SHEET SIZE A4



TYPE D

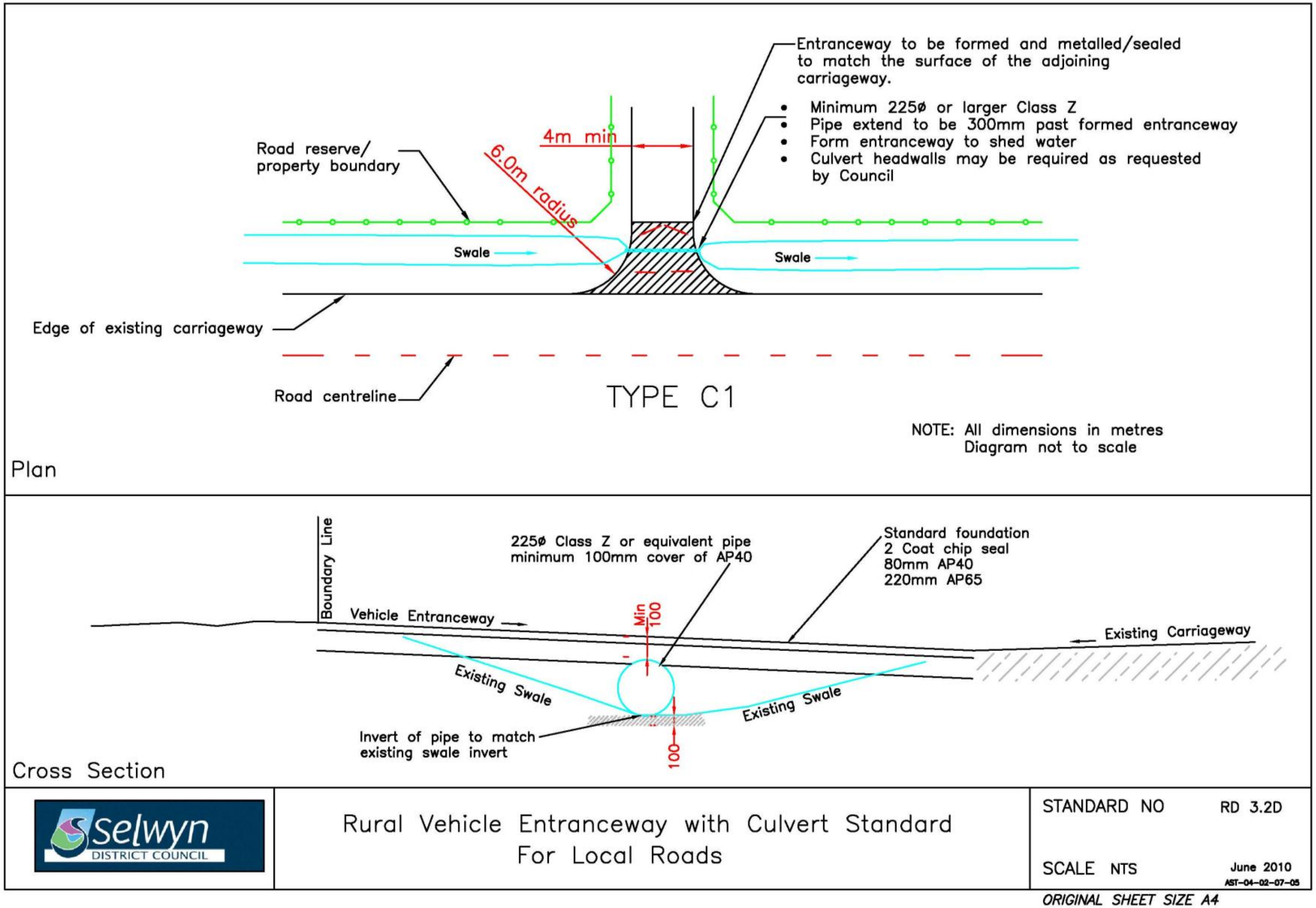
NOTE: All dimensions in metres
Diagram not to scale

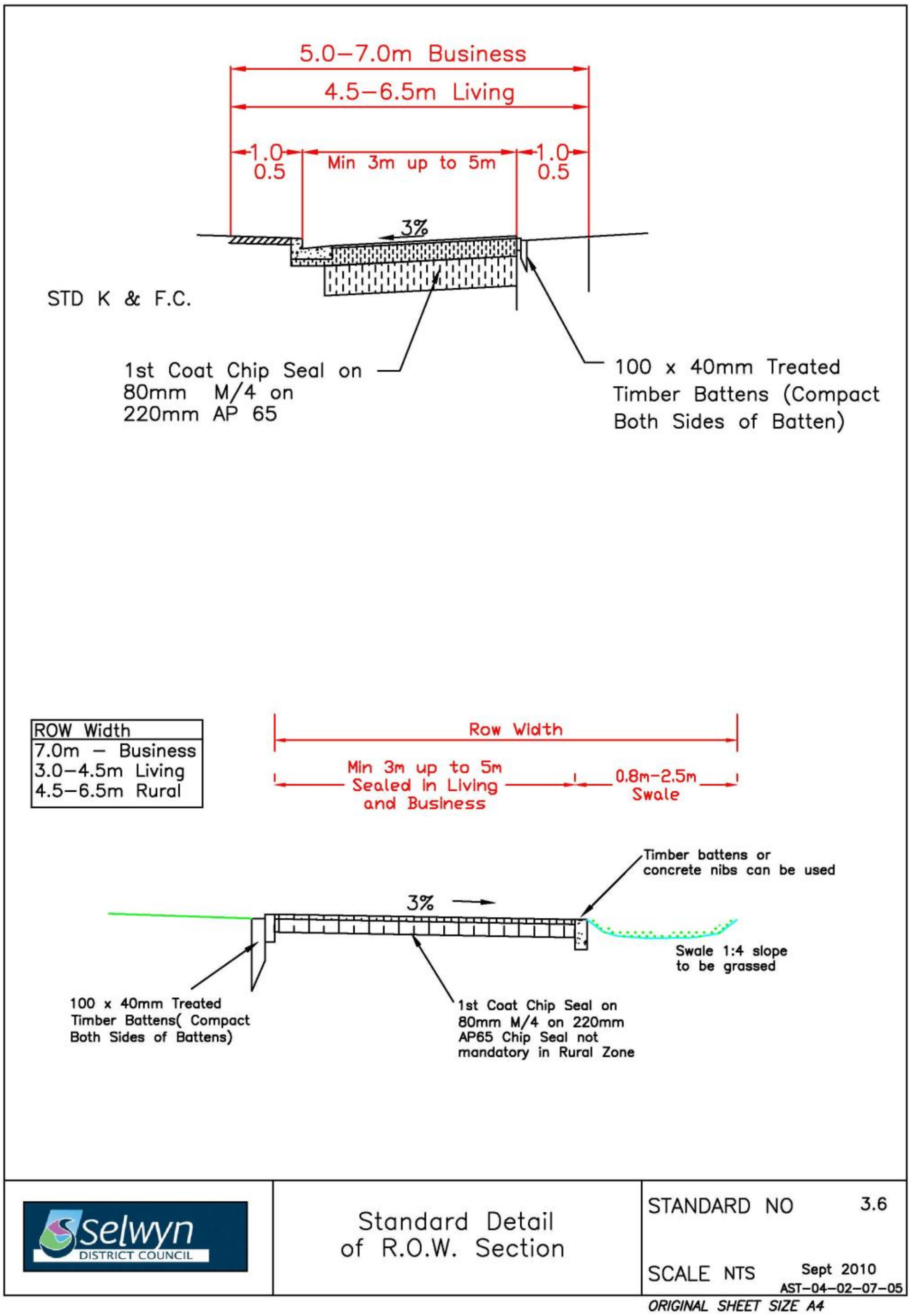


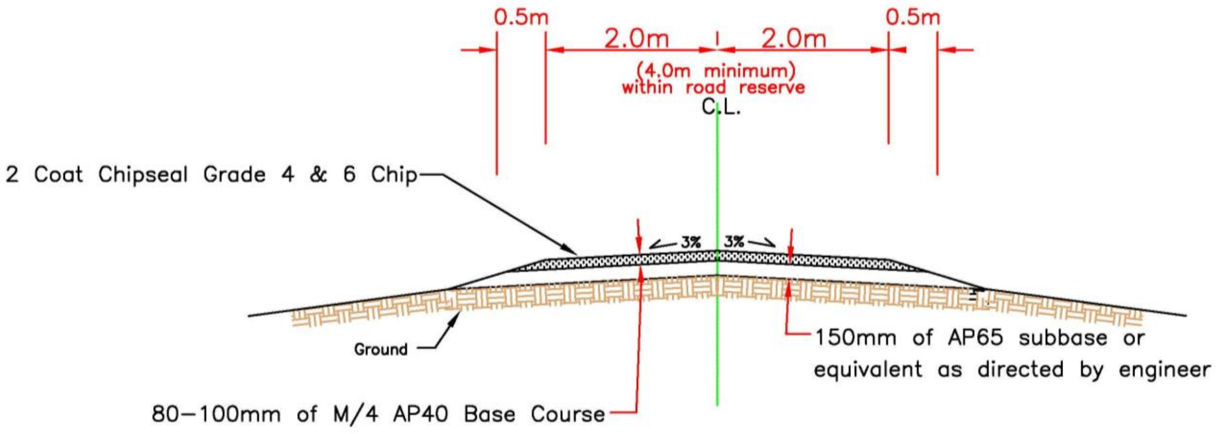
Detail for new Heavy Duty foundation
and shoulder reconstruction

Selwyn DISTRICT COUNCIL	Commercial and Heavy Vehicle Entranceway Standard For All Roads	STANDARD NO	RD 3.2C
		SCALE NTS	May 2010 AST-04-02-07-05

ORIGINAL SHEET SIZE A4


Entranceway to be formed and metalled/sealed to match the surface of the adjoining carriageway.
• Minimum 225ø or larger Class Z
• Pipe extend to be 300mm past formed entranceway
• Form entranceway to shed water
• Culvert headwalls may be required as requested by Council
Road reserve/ property boundary
4m min
6.0m radius
Swale
Swale
Edge of existing carriageway
Road centreline
TYPE C1
NOTE: All dimensions in metres
Diagram not to scale
Plan
Boundary Line
225ø Class Z or equivalent pipe minimum 100mm cover of AP40
Standard foundation
2 Coat chip seal
80mm AP40
220mm AP65
Vehicle Entranceway
Min 100
Existing Carriageway
Existing Swale
Existing Swale
Invert of pipe to match existing swale invert
100
Cross Section
Selwyn DISTRICT COUNCIL
Rural Vehicle Entranceway with Culvert Standard For Local Roads
STANDARD NO RD 3.2D
SCALE NTS
June 2010
AST-04-02-07-05
ORIGINAL SHEET SIZE A4


5.0–7.0m Business
4.5–6.5m Living
1.0
0.5
Min 3m up to 5m
1.0
0.5
3%
STD K & F.C.
1st Coat Chip Seal on
80mm M/4 on
220mm AP 65
100 x 40mm Treated
Timber Battens (Compact
Both Sides of Batten)
ROW Width
7.0m – Business
3.0–4.5m Living
4.5–6.5m Rural
Row Width
Min 3m up to 5m
Sealed in Living
and Business
0.8m–2.5m
Swale
Timber battens or
concrete nibs can be used
3%
Swale 1:4 slope
to be grassed
100 x 40mm Treated
Timber Battens(Compact
Both Sides of Battens)
1st Coat Chip Seal on
80mm M/4 on 220mm
AP65 Chip Seal not
mandatory in Rural Zone
Selwyn
DISTRICT COUNCIL
Standard Detail
of R.O.W. Section
STANDARD NO 3.6
SCALE NTS
Sept 2010
AST–04–02–07–05
ORIGINAL SHEET SIZE A4



Two Way Cross Fall

NOTE:

–150mm of AP65 subbase may be sufficient depending on the strength of subgrade material. Minimum subgrade strength of CBR ≥ 10.0 required.(Clegg Impact Valve ≥ 25)

–For heavy duty vehicle use CBR ≥ 7.0.(Clegg Impact Valve ≥ 35)

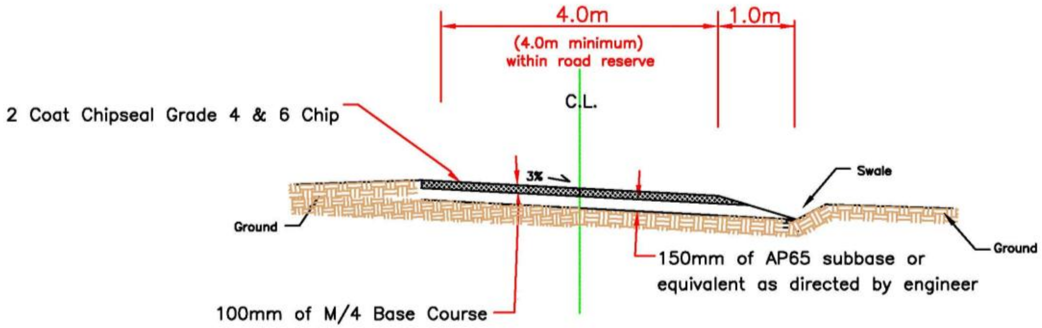
–Subbase to be compacted to 95%(minimum) of optimum dry density.

–Minimum width of 4.0m from edge of seal to road/property boundary.

–Minimum width of accessway on private property may vary. (See District Plan)

Selwyn DISTRICT COUNCIL	Typical Cross Section Rural Type Vehicle Entranceway	STANDARD NO 3.7 SCALE NTS June 2010 AST-04-02-07-05

ORIGINAL SHEET SIZE A4



One Way Cross Fall

NOTE:
- −150mm of AP65 subbase may be sufficient depending on the strength of subgrade material. Minimum subgrade strength of CBR ≥ 10.0 required.(Clegg Impact Valve ≥ 25)
- −For heavy duty vehicle use CBR ≥ 7.0.(Clegg Impact Valve ≥ 35)
- −Subbase to be compacted to 95%(minimum) of optimum dry density.
- −Minimum width of 4.0m from edge of seal to road/property boundary.
- −Minimum width of accessway on private property may vary. (See District Plan)

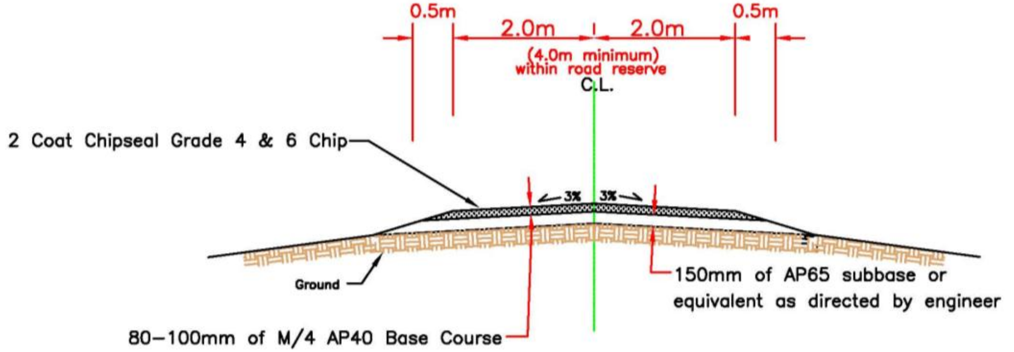
Selwyn DISTRICT COUNCIL

Typical Cross Section
Rural Type Vehicle Entranceway

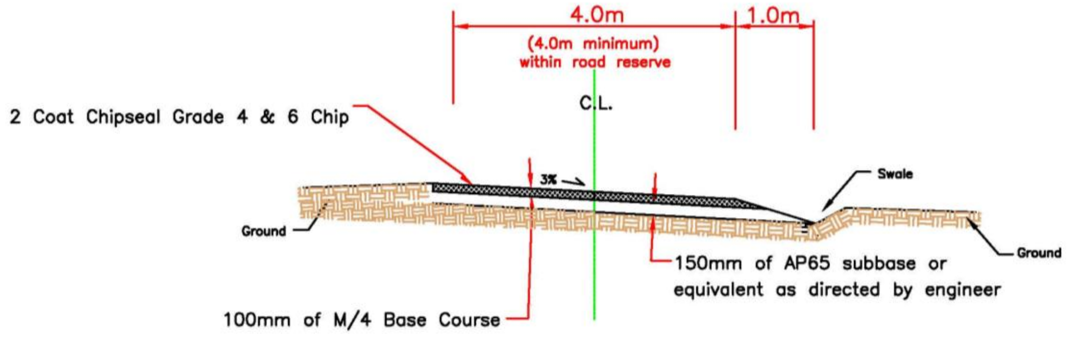
STANDARD NO 3.7A

SCALE NTS

Oct 2008
AST-04-02-07-05



Two Way Cross Fall

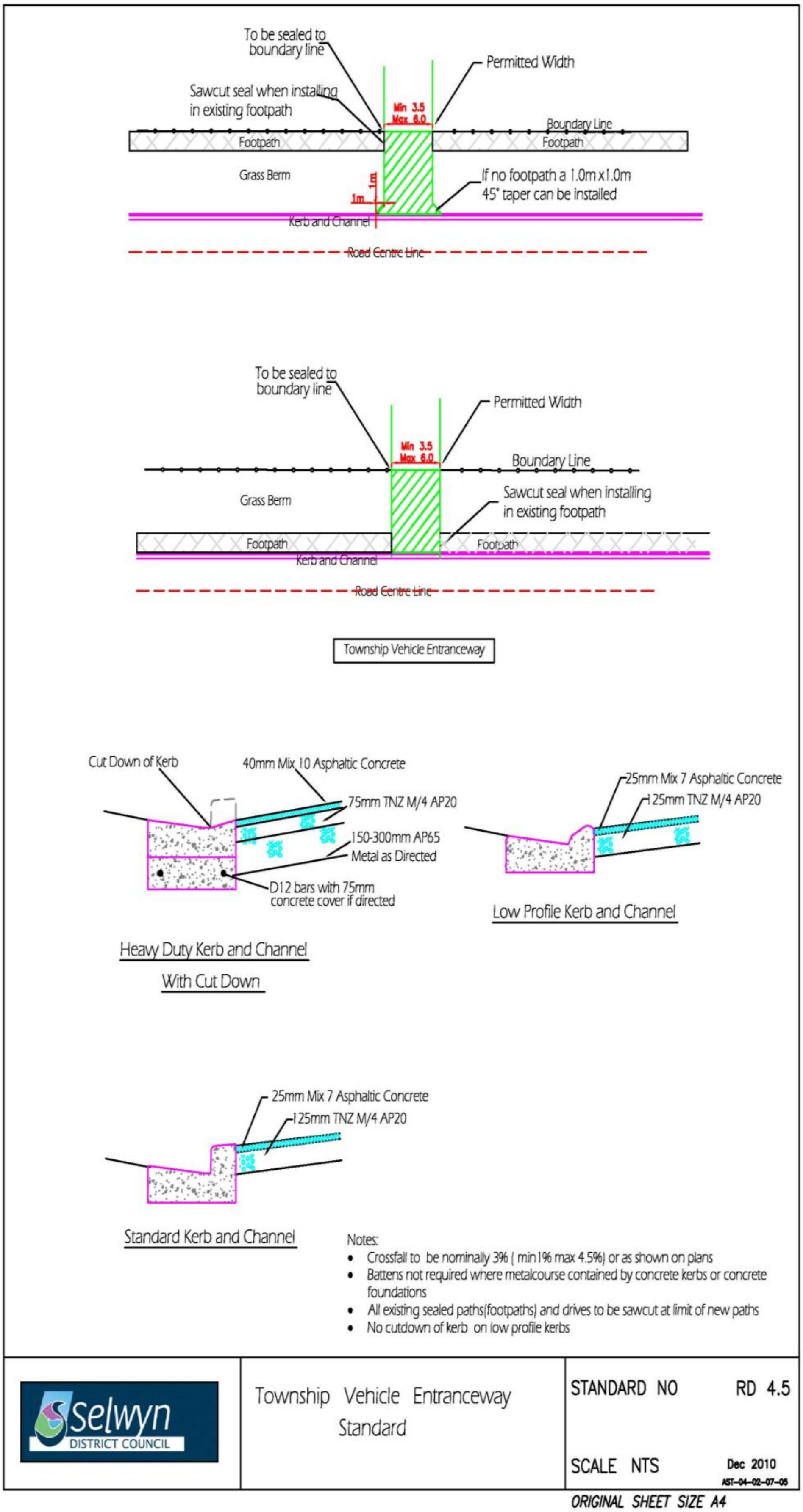


One Way Cross Fall

NOTE:
- –150mm of AP65 subbase may be sufficient depending on the strength of subgrade material. Minimum subgrade strength of CBR ≥ 10.0 required.(Clegg Impact Valve ≥ 25)
- –For heavy duty vehicle use CBR ≥ 7.0.(Clegg Impact Valve ≥ 35)
- –Subbase to be compacted to 95%(minimum) of optimum dry density.
- –Minimum width of 4.0m from edge of seal to road/property boundary.
- –Minimum width of accessway on private property may vary. (See District Plan)

Selwyn DISTRICT COUNCIL	Typical Cross Section Rural Type Vehicle Entranceway	STANDARD NO	3.7B
		SCALE NTS	May 2010 AST-04-02-07-05

ORIGINAL SHEET SIZE A4


To be sealed to boundary line
Permitted Width
Sawcut seal when installing in existing footpath
Min 3.5 Max 6.0
Boundary Line
Footpath
Footpath
Grass Berm
1m
1m
If no footpath a 1.0m x 1.0m 45° taper can be installed
Kerb and Channel
Road Centre Line
To be sealed to boundary line
Permitted Width
Min 3.5 Max 6.0
Boundary Line
Grass Berm
Sawcut seal when installing in existing footpath
Footpath
Footpath
Kerb and Channel
Road Centre Line
Township Vehicle Entranceway
Cut Down of Kerb
40mm Mix 10 Asphaltic Concrete
75mm TNZ M/4 AP20
150-300mm AP65 Metal as Directed
D12 bars with 75mm concrete cover if directed
Heavy Duty Kerb and Channel With Cut Down
25mm Mix 7 Asphaltic Concrete
125mm TNZ M/4 AP20
Low Profile Kerb and Channel
25mm Mix 7 Asphaltic Concrete
125mm TNZ M/4 AP20
Standard Kerb and Channel
Notes:
• Crossfall to be nominally 3% (min1% max 4.5%) or as shown on plans
• Battens not required where metalcourse contained by concrete kerbs or concrete foundations
• All existing sealed paths(footpaths) and drives to be sawcut at limit of new paths
• No cutdown of kerb on low profile kerbs
Selwyn DISTRICT COUNCIL
Township Vehicle Entranceway Standard
STANDARD NO RD 4.5
SCALE NTS
Dec 2010
AST-04-02-07-05
ORIGINAL SHEET SIZE A4