PART 8: ROADING

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8.1 REFERENCED DOCUMENTS

Planning and Policy

- Timaru District Council Policies – Roading and Transport Related
- Land Transport Act (1998)
- Traffic Regulations (1976)
- Canterbury Regional Council *Metro Strategy* (2010)
- Canterbury Regional Council *Canterbury Regional Public Transport Plan* (2014)
- Land Transport NZ *Traffic Control Devices 2004 Rule*
- Land Transport NZ *Setting of Speed Limits 2017 Rule*
- New Zealand Transport Agency *Planning Policy Manual – for integrated planning and development of state highways* (2007)
- New Zealand Asset Management Support *New Zealand Infrastructure Asset Valuation and Depreciation Guidelines* (2006)

Design

- AS 2890.5:1993 *Parking facilities - On-street parking*
- Austroads *Guide to Traffic Management Set* (including *Part 6: Intersections, Interchanges and Crossings, Part 8: Local Area Traffic Management*
- Austroads *Guide to Pavement Technology Set* and the New Zealand Supplements
- Austroads *Guide to Road Safety Set* (including *Part 6: Road Safety Audit, Part 8: Treatment of Crash Locations, Part 9: Roadside Hazard Management*)
- Austroads *Guides to Road Design Set* (including *Part 3: Geometric Design, Part 4: Intersections and Crossings, Part 4B: Roundabouts, Part 6: Roadside Design, Part 6A: Pedestrian and Cyclist Paths*
- Christchurch Transport Operations Centre *CTOC Regional Special Conditions*
- Ministry for the Environment *National Guidelines for Crime Prevention through Environmental Design (CPTED) in New Zealand*
- New Zealand Heavy Haulage Association Design *Road Design Specifications for Oversize Loads*
- NZS 4121:2001 *Design for Access and Mobility: Buildings and Associated Facilities*
- NZS 4404:2010 *Land development and subdivision infrastructure*
- NZTA RTS series
    - *Guidelines for the Implementation of Traffic Controls at Cross Roads RTS 1*
    - *Guidelines for Street Name Signs RTS 2*
    - *Guidelines for Flush Medians RTS 4*
    - *Guidelines for Rural Road Marking and Delineation RTS 5*
    - *Guidelines for Safe Kerbline Protection RTS 8*
    - *Road Signs and Markings for Railway Level Crossings RTS 10,*
    - *Guidelines for Facilities for Blind and Vision-Impaired Pedestrians RTS 14*
    - *Guidelines for Urban-Rural Thresholds RTS 15*)
- New Zealand Utilities Advisory Group *The National Code of Practice for Utilities' Access to the Transport Corridors*
- Timaru District Council *Road Bridge Policy*
- Waka Kotahi NZTA *New Zealand Supplement to the Austroads Guide to Traffic Engineering Practice Part 14: Bicycles*

- Waka Kotahi NZTA *Overdimension vehicle route maps (OVRM)*
- Waka Kotahi NZTA *P43 Specification for Traffic Signals*
- All Waka Kotahi NZTA guidelines
    - *Pedestrian Network Guide (PNG)*
    - *Cycling Network Guidance (CNG)*
    - *Public Transport Design Guidelines (PTDG)*
    - *Road Safety Audit Procedures for Projects*
    - *Speed Management Guide*
    - *Speed Management Guide – Toolbox*
    - *Policy and Planning Manual (PPM)*
    - *Traffic Control Devices Manual*
- All Waka Kotahi NZTA manuals and TNZ standards (including T/10 *Skid Resistance Investigation and Treatment Selection* and the *Bridge Manual*)
- Worksafe NZ *New Zealand Code of Practice for Electrical Safe Distances* NZECP 34:2001

Construction

- All Waka Kotahi NZTA manuals and specifications
- Road Safety Manufacturers Association *Compliance Standard for Traffic Signs* 2010
- NZS 8603:2005 *Design and application of outdoor recreation symbols*

Where a conflict exists between any Standard and the specific requirements outlined in the Infrastructure Design Standard (IDS), the IDS takes preference (at the discretion of the Council).

8.2 INTRODUCTION

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 current versions of the:

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

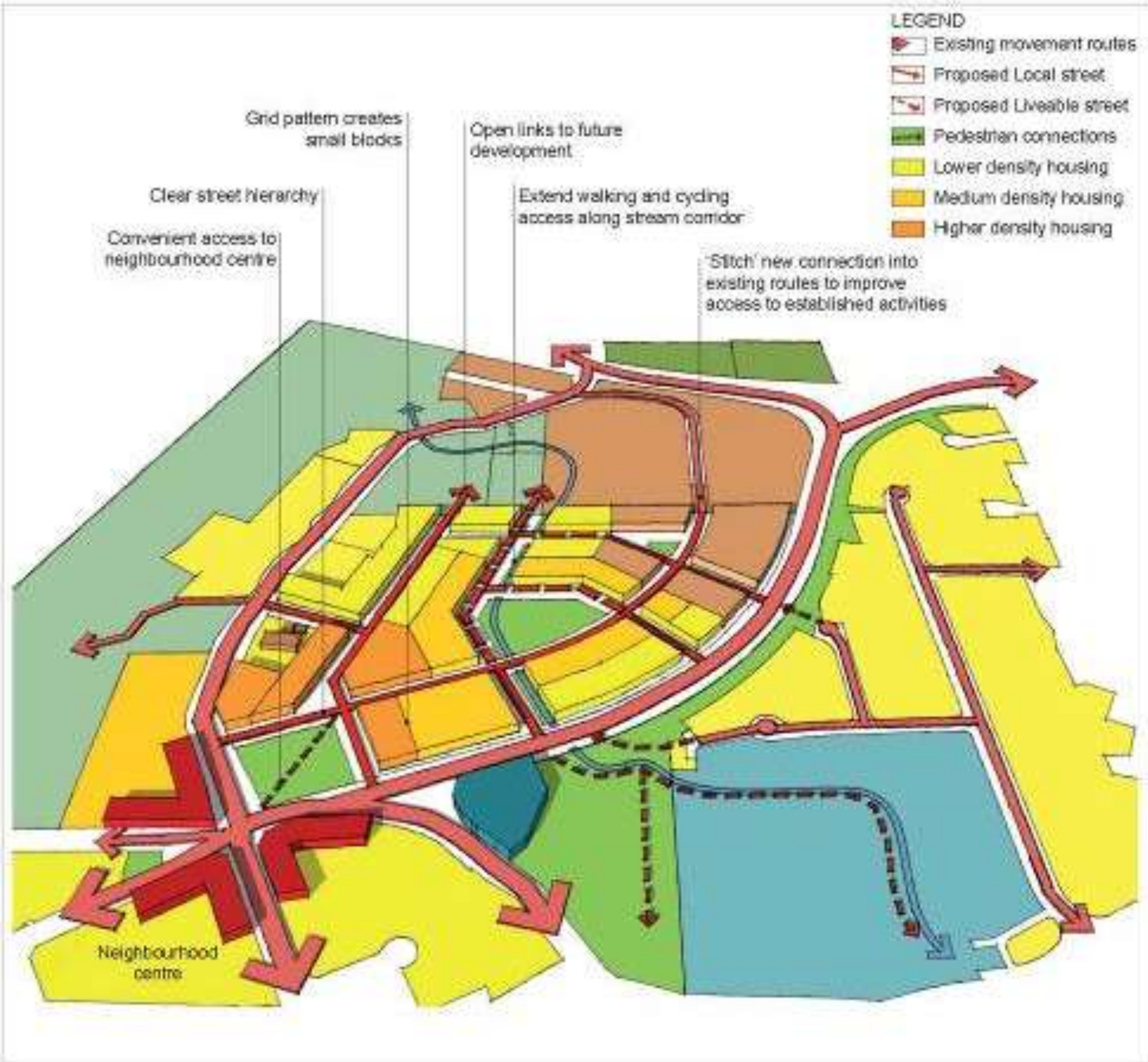
8.3 CREATING GOOD URBAN INFRASTRUCTURE

To create good urban structure, acquire a good understanding of the urban design principles which underlie the layout of blocks, streets and open spaces in new developments and the inter-relationship between them. While the focus is on new public spaces, also consider the three dimensional character of the spaces which are formed by buildings on private areas within the blocks. The relationship between public and private areas is an essential part of creating places for people.

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

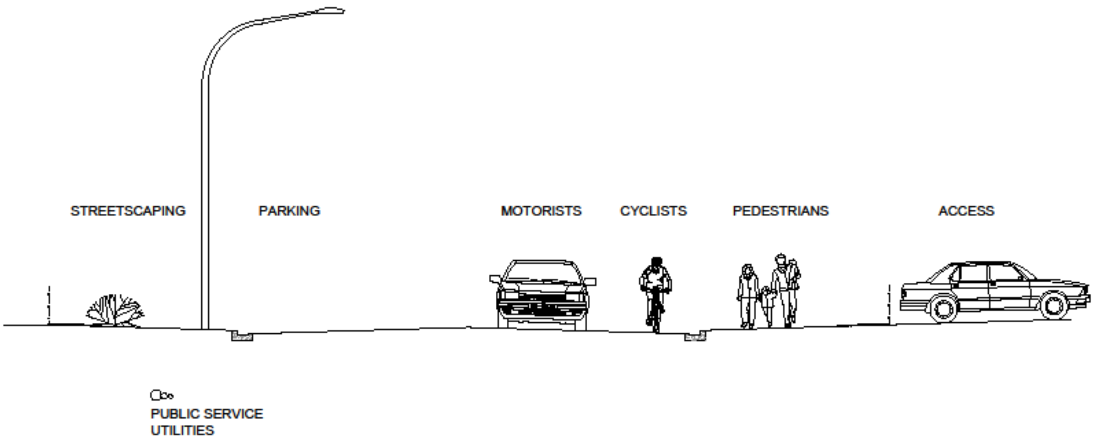
The road network and associated linkages need to be highly connected, to reflect the desired lines and destinations within the area and also in surrounding neighbourhoods. This encourages people to walk or cycle where practicable, rather than using their car, particularly for shorter local trips. Figure 1 illustrates this interconnectedness. When this can be achieved, it results in energy savings and creates a safer and more pleasant neighbourhood.

Figure 1 Streets and linkages arranged in an informal grid



Streets can serve a wide range of functions, whilst providing valuable and unique areas of community space (see Figure 2). 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.

Figure 2 Street functions



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

- safe – the layout must be safe for all users, including pedestrians, cyclists, public transport users 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;
- comprehensible – the road layout must be easy to read and follow, for both residents and visitors;
- accessible - the road design should incorporate footpaths, kerb cutdowns, raised thresholds, refuge islands, etc 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 IDS to a development.

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;
- the scope of the work e.g. legal requirements for road elements such as the provision of appropriate transport facilities, suitable access to the existing transport network;
- transport infrastructure and services issues (e.g. vehicle, cycle, public transport, pedestrian);
- traffic-loading, traffic modelling and volume data and projections used and calculations to determine Equivalent Standard Axles (ESAs);
- geometric data;
- geotechnical data, including site assessments, subgrade information and CBR's;
- pavement design methodologies used and corresponding metalcourse calculations;
- surface treatment information;
- road drainage control and edge treatment;
- hydraulic data (e.g. road level, flood level);
- slope stability (during construction and permanent) and retention details;
- utility service conflicts and programmed work issues;
- traffic safety audits;
- streetscape and amenity features.

8.4.2 Safety audit

Safety auditing is an important component in the design of all facilities on legal road. Safety audits provide a check that the proposed design is safe for all users. Safety audits should be integrated throughout the design of new transport facilities.

Provide an independent safety audit at the concept or subdivision consent stage, and for any Variations, which also considers the development's potential to generate high trip volumes requiring specific changes to the road infrastructure. If an audit is not submitted with a resource consent application, a condition of consent shall be issued requiring a safety audit at the Application for Engineering Acceptance.

An independent safety audit of the constructed asset must also be undertaken and submitted as part of the as-built record. The 224 Certificate will not be issued until safety audit requirements have been addressed.

Carry out safety audits in accordance with *Road Safety Audit Procedures for Projects* and *Guide to Road Safety Part 6: Road Safety Audit*. Use the *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, 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, sump grates 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. Copies of concrete test results are not required for retaining walls;
- construction records and test results for retaining wall components;
- post-construction safety audit.

Provide details in a form complying with the requirements of Part 11: As-Builts.

8.5 ACTIVE MODE NETWORK

8.5.1 Pedestrian Facilities

a) Footpaths

The number of footpaths required for each road classification must comply with the requirements in the *District Plan* and follow guidance provided in the footpath policy.

Footpath widths are measured from the footpath edge of the kerb or service strip. The service strip may be sealed with the path. The minimum widths set out in Table 1 must **be clear of all obstructions** such as vegetation when fully mature, light standards, traffic signs, utility furniture and bollards. The building or fence line is the preferred path of travel for the majority of pedestrians who have a vision impairment and should always be prioritised as the continuous accessible path of travel (CAPT). Extra widening will be required wherever such obstructions cannot be avoided or relocated.

Table 1 Minimum footpath widths

Adjacent land use	Minimum width (m)	Preferred location
Residential	1.8	Between Berm and Service Strip
Retail/town centre	2.5	Between Street furniture and Frontage Zones
Industrial	1.8	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) Residential footpath widths of 1.2m are agreeable in situations of a secondary path where the other footpath in the road reserve is identified as a primary route.
3) Allow for any planting (e.g. trees) between the footpath and the kerb.
4) On slopes, it is most practicable to construct the footpath against the kerb.
5) Transitional widths may be required on the boundary between residential and retail/town centres.

Where topography or existing features preclude providing the minimum widths, 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, columns/poles) or adjacent berm areas (e.g. trees, shrubs or structures) or shifts laterally to join another footpath.

Wherever the footpath deviates from pedestrian desired 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.

Use the Timaru District Council *Footpath Policy* when designing a footpath. https://www.timaru.govt.nz/council/publications/policies/footpath-policy.

AS/NZS 2890.6:2009 Parking Facilities – Off-street parking for people with disabilities and the *National Policy Statement on Urban Development 2020 – May* 2022 should be considered in the design of pedestrian facilities.

b) Road crossings for pedestrians

Road crossings for pedestrians, both at intersections and in the mid-block, should provide for the logical and safe movement of pedestrians. Selection of the appropriate crossing type requires consideration of:

- What is the street function and surrounding land uses?
- Who is expected to use the crossing?
- What is the best location of the crossing to meet pedestrian desire lines?
- What is the relationship and spacing to other crossings (mid-block and intersections) nearby?

Advice on the appropriate crossing type can be found in the *NZTA Pedestrian Network Guidance.*

Crossing facilities may be combined with kerb build-outs and pedestrian islands, to minimise the crossing distance for users. 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 pedestrian crossing facilities that comply with the *Guidelines for Facilities for Blind and Vision-Impaired Pedestrians RTS 14* at all road intersections and other locations. Provide tactile warning pavers or tactile ground surface indicators (TGSI) for vision-impaired pedestrians on public footpaths at all pedestrian crossing kerb cut-downs. Specify tactile types, preferably pavers, which will achieve the 20 year operational life of the contrast between the path surface and the tactile. Plastic TGSI are not permitted in Council paths.

Provide a one metre separation between new pedestrian cutdowns and existing columns/poles or signs. Ensure cycle ‘Give Way’ signs and any supplementary signs are located in a position which doesn’t impede pedestrians.

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

- *NZTA Pedestrian Network Guidance*
- *Guidelines for Facilities for Blind and Vision-Impaired Pedestrians RTS 14*
- *Austroads Guide to Road Design, Part 4: Intersections and Crossings -General*
- *Austroads Guide to Road Design, Part 4a - Unsignalised and Signalised Intersections*
- *Austroads Guide to Road Design Part 6A Paths for pedestrians and cyclists*
- *Austroads Guide to Traffic Management, Part 6 - Intersections, Interchanges & Crossings*

8.5.2 Cycle Facilities

Make provision for on-street and off-street cycle facilities, as required by the *Timaru District Plan,* to provide a multi-modal network. For streets on the cycle network a separated cycle facility may be more appropriate.

a) On-street facilities

Cycle lanes should be designed in accordance with NZTA Traffic Control Devices Manual Part 5 guidance as follows in Table 2.

Table 2 Cycle Lane Widths

	Posted speed limit	Desirable Minimum Width (m)
Cycle lane width – next to parking	Equal to less than 50km/h	1.8
	70km/h	2
Cycle lane width –next to kerb or between traffic lanes	Equal to less than 50km/h	1.8
	70km/h	1.9
	100km/h	2.5

For local urban roads, cycle facilities may be provided through narrow or wide kerbside lanes in accordance with *NZTA Cycle Network Guidance* as follows:

b) Separated (protected) cycle facilities

Separated cycleways are facilities exclusively for cycling. They involve some form of physical separation from motor traffic and are generally situated on or adjacent to the roadway, usually within the road reserve. The separation may involve horizontal and/or vertical components.

Separated cycleways can be either:

- one-way (uni-directional) ie cycling in the same direction as adjacent traffic usually on each side of the road; or
- contra-flow one-way (uni-directional) i.e. cycling in the opposite direction to adjacent traffic, usually on the right side of a one-way street when seen from the traffic perspective; or
- two-way (bi-directional) ie both directions for cycling accommodated within one facility on one side of the road.

There are a range of methods that can be employed to separate and protect cyclists from motor traffic, each offering different levels of actual safety (ie in terms of crash risk) and perceived safety (ie in terms of people’s subjective evaluations). Refer to the *NZTA Cycle Network Guidance* for design advice.

c) Cycle parking and wayfinding

Consider installing cycle parking facilities near bus stops, to ease the transfer between transport modes. Cycle parking guidance is available on the *NZTA Cycle Network Guidance* website.

Cycle network wayfinding should be designed in accordance with *NZTA Cycle Network Guidance*.

8.5.3 Off Road Linkages for Walking and Cycling

a) Linkage corridors

Linkages for pedestrians and cyclists 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 cul-de-sacs) and provide direct pedestrian access to bus stops. Use green linkages between cul-de-sacs, through public reserves or adjacent to waterways, or other natural features. Cul-de-sacs should be connected to other streets with walking and cycling linkages to ensure walkable blocks and overall connected networks.

The overall width of the linkage corridor needs to be adequate for the path and appropriate landscaping. Historically, minimal width linkages of 2.5 to 3.0m had been provided with little or no landscaping. These are unattractive to use and in some cases have been closed due to perceived CPTED security problems associated with them.

Therefore, providing wide, open and well-lit areas is extremely important to provide a secure and useable linkage. Figure 3 shows a well-designed linkage/accessway.

Figure 3 Good Linkage Corridor

Figure 3: Good accessway design example, low fences and overlooked by neighbours

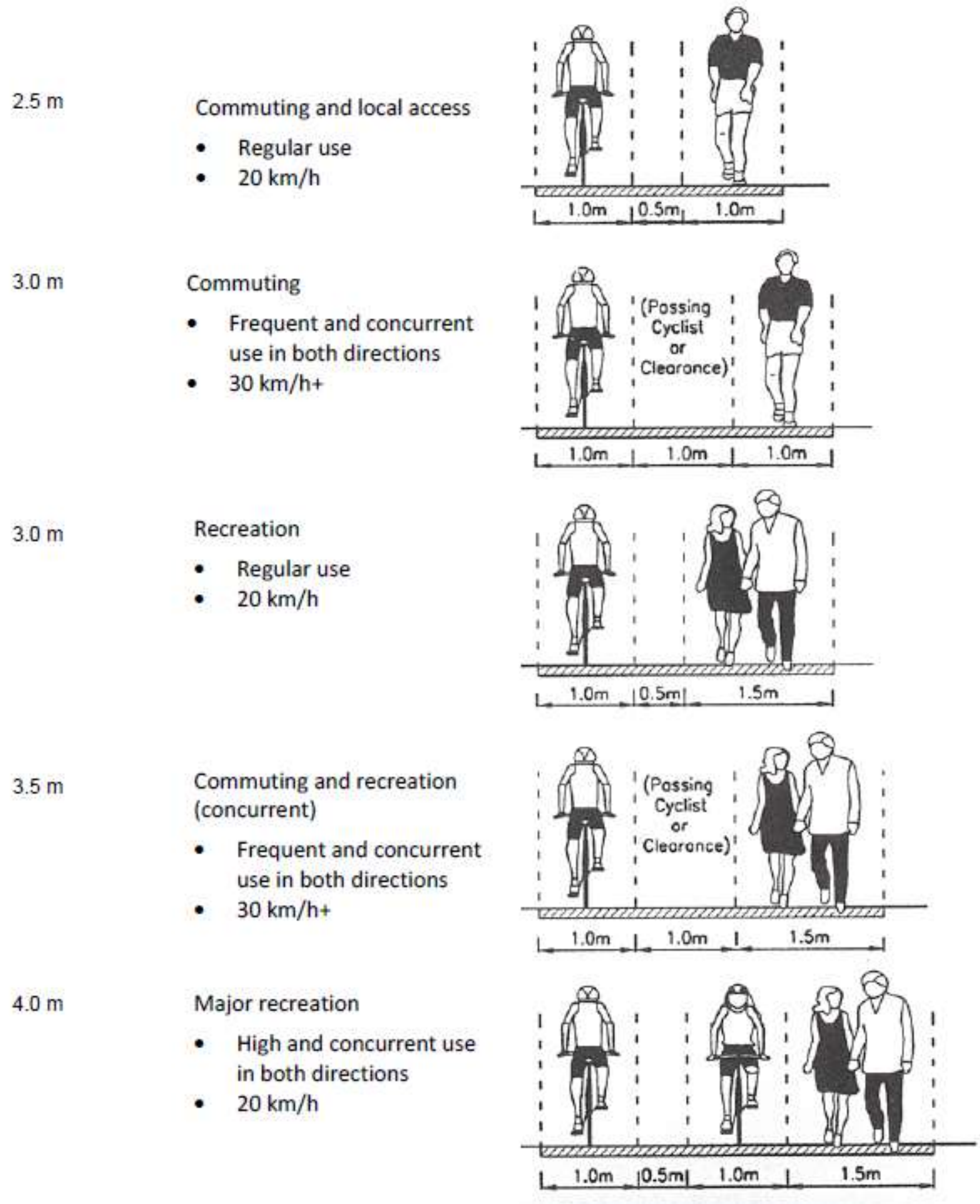
b) Paths in accessways

Design the paths so that they are suitable for pedestrians, people with disabilities, cyclists, skate-boarders, skaters, and prams. Note that motorised wheelchairs require 1.2m clear width.

The minimum clear width of formed paths in off road linkages is 1.8m 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.

The Council must pass shared paths by resolution.

Figure 4 Pedestrian/shared path widths



Source: Austroads Guide to Road Design Part 6A: Paths for walking and cycling, Figure A2

Seal the path and landscape the remaining land in a manner that does not compromise the security of people using the facility.

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

- *Crime Prevention Through Environmental Design*
- *A Guide to Road Design, Part 6A: Pedestrian and Cyclist Paths*
- AS/NZS 1158 Set *Lighting for roads and public spaces - series*

8.6 PUBLIC TRANSPORT

Existing and planned or potential public transport routes and stops shall be shown on plans and designed in accordance with the NZTA Public Transport Guide.

8.6.1 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 or U-turns 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. Refer to Environment Canterbury's *Regional Public Transport Plan* for further information.

8.6.2 Bus stops

Plan and co-ordinate the bus stop locations and associated infrastructure on the street with Timaru District Council at the resource consent stage. Extra space may be required to site bus shelters or other required infrastructure, which can be incorporated in the engineering design.

Bus stops must be located in accordance with the *NZTA Public Transport Guidelines*. Bus stops should be located close to key facilities to enhance accessibility for the community, as well as general locations around the town to facilitate people movements.

If the width of the roadway does not provide for roadside parking, allow for the construction of inset bus bays or bus boarders.

8.7 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. 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.

The place function and movement function of each link, determines its classification, and therefore its geometric characteristics and preferred speed regime.

The classifications of existing roads in the Timaru District are listed in the *District Plan.*

Be aware of any other network plans (such as the cycle network), local area traffic management schemes or neighbourhood improvement plans which may incorporate street requirements for the area.

8.7.1 Local roads

These roads provide direct access to abutting properties. They form the road network within the neighbourhood and may be subject to Local Area Traffic Management schemes to reduce speed and through traffic. The proportion of through traffic on local roads should be very low.

Local roads should not generally connect to major or minor arterials, except in exceptional circumstances and with the Council's approval.

8.7.2 Collector roads

These roads collect and distribute traffic to and from the primary road network and link with the local road network. Although a lower traffic volume is expected than for a road in the primary road network, there is a high proportion of through traffic. They may be either urban or rural.

8.7.3 Principal Roads

These roads primarily cater for traffic movement between the major areas of the District. They may be either urban or rural. Principal roads are essential to sustain overall travel within the District. Principal Roads are usually 2 lanes wide. The road reserve width is generally 19 or 20 metres and most facilities can be accommodated in this width. Intersections may require local widening where traffic demands are such that specific design is needed. If the road is a significant cycle route, a cycle lane would be marked. If not, a wider parking lane may be used by cyclists. Some parking restrictions may be required where additional facilities such as flush medians are needed

8.7.4 District Arterial Roads

District arterial roads are those which are of strategic importance to the District and are controlled by the Timaru District Council. They predominantly carry through traffic and are urban. Flush medians and right turn bays may be elements of these roads. Some degree of access and/or on-street parking control may be needed. Cycle lanes are generally marked if the cycle volumes warrant them.

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

8.7.5 Regional Arterial

These are roads of strategic importance to the region and are a significant element in the regional economy. In Timaru District, these are State Highways 79, 78 and route 72. These roads are under the control of Waka Kotahi (New Zealand Transport Agency) or the Timaru District Council and their form is consistent with the goals of the national land transport strategy.

8.7.6 National Routes

These are roads that make up routes of national strategic importance. They form part of the State Highway network (State Highways 1) and their prime function is to provide for through traffic while providing access to significant urban areas.

8.7.7 Traffic volumes

Identify the likely volumes of traffic that will be generated by a development, using the following average household trip generation rates.

Table 3 Household trip generation rates

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

If surveyed data is available for areas with similar characteristics, use this in preference to the values above, due to the variation in generation rates throughout the district. Some traffic count data is available at Waka Kotahi NZTA's *State Highway traffic monitoring* or Mobile Roads App.

https://maphub.nzta.govt.nz/public/?appid=31305d4c1c794c1188a87da0d3e85d04

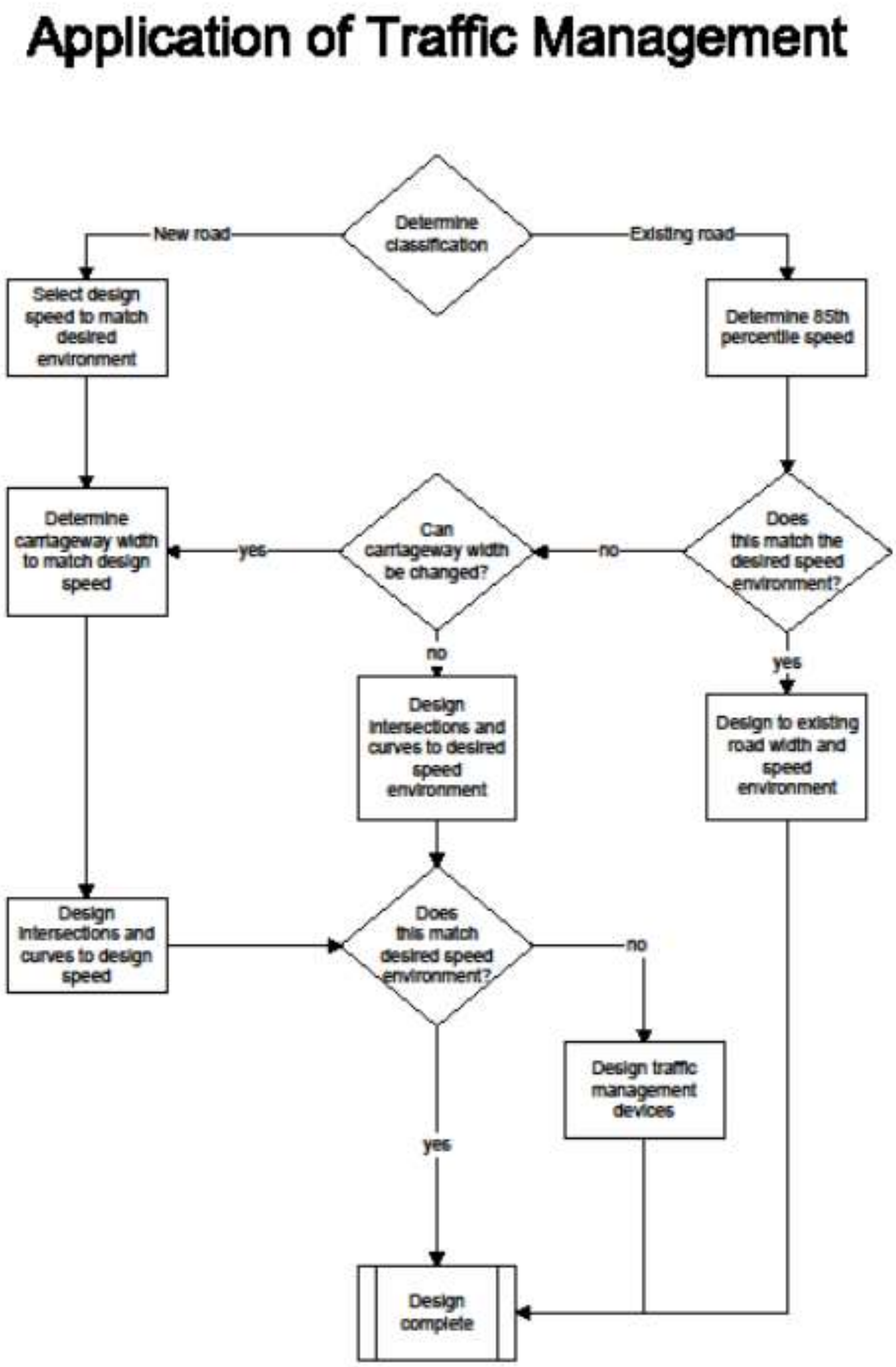
https://mobileroad.org

8.8 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, and 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 5 for determining alternative design options. If the use of traffic management devices is found to be the best management option, design considerations and device selection should be in accordance with the *NZTA Speed Management Guide.*

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.
- 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 entering 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. Roundabouts are another intersection design option for consideration.
- 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.

Find standards for the design of higher speed environments, such as are appropriate on various classified and rural roads, in the *Austroads* series and *NZTA Speed Management Guide.*

8.9 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;
- 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;

- Waste Collection and bin collection facilities;
- Over Dimension and Overweight Vehicles

Minimise life cycle costs and benefits for all new road elements. When choosing materials in particular, consider the replacement and maintenance cost whilst ensuring levels of service are met.

Council allows over-dimension and over-weight vehicles to operate on limited sections of the road network by permit, as per NZTA Over-dimension Route Maps.
https://nzta.maps.arcgis.com/apps/webappviewer/index.html?id=e00b3ac6ab524cb19a369fc5c2b4e6fa

The maximum dimensions for which permits are normally issued are:

- *Width: up to 11.5 m*
- *Height: up to 6.5 m*
- *Length of vehicle combination: up to 35 m.*

Avoid detailing permanent objects within the streetscape that will conflict with the over-dimension envelope on these routes. Reference the Heavy Haulage Association design specification from the following link when designing for OD routes:
https://www.hha.org.nz/assets/Resources/NZHHA-Roading-Design-Spec-For-OD-Loads-Version-8.pdf.

8.9.1 Access to existing roads

Discuss access to the existing road network with the Council, and also the New Zealand Transport Agency, if a State Highway is to be affected. The NZTA Policy and Planning Manual includes guidance on access to State Highways.

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

8.9.2 Cul-de-sac/Hammerheads/No exit streets

Cul-de-sac 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 *Timaru District Plan* for further information.

Provide walking and/or cycling linkages at the end of cul-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. Surface all turning heads with asphaltic concrete.

Hammerhead designs require specific approval.

Guidance set out by the Fire and Emergency New Zealand *Designers' guide to firefighting operations*[1] *- Emergency Vehicle Access* is best practice when designing Cul-de-sac, Hammerheads and No exit streets.

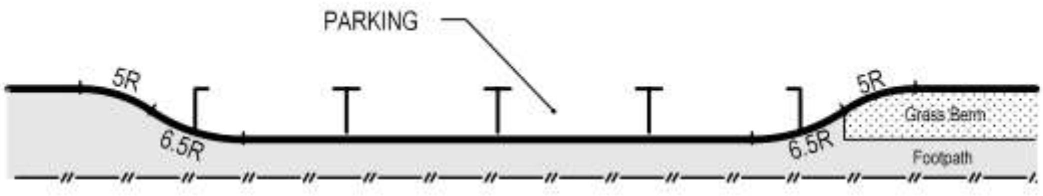
8.9.3 On-street parking

Design parking lanes widths from 2.0 - 2.5m depending on regular vehicle type using the parking lane. For example, in industrial areas a 2.5m wide lane will accommodate large trucks. Increase stall lengths to 6.5m in high turnover areas (time controlled parking of 1 hour or less).

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

Street-side parking in residential areas shall be provided in bays, rather than as part of the carriageway, provided at a rate of one space per three residential units and evenly distributed along the street. Where parking is reconstructed along existing roads, parking shall be provided in bays. Construct all parking bays to the same design loading as the adjacent road pavement and with a minimum width of 2.0m for parallel parking. Radii should match those shown in Figure 6.

Figure 6 Parking bay



When parking bays are located in front of properties, consider the possible location of the property access.

Design angle parking to the *District Plan* and *NZTA Traffic Control Devices Manual – Part 7: Parking Control.*

All road markings including parking lanes or spaces shall be in accordance with the *NZTA Manual of traffic signs and markings (MOTSAM) – Part 2: Markings*. Marking is required for all angle parking and where parking restrictions are in place. Mark mobility car parks in accordance with the *NZTA MOTSAM* Part 2. There will also be other circumstances where road marking of parking is advisable e.g. outside schools and on arterial or higher roads. Marking lanes on some Collector roads may also be appropriate depending on demand. Marking individual spaces may also be appropriate if there is high demand for

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[1] Fire and Emergency New Zealand, *Designers' Guide to Firefighting Operations – Emergency Vehicle Access – F5-02-GD,* https://www.fireandemergency.nz/assets/Documents/Business-and-Landlords/Building-and-designing-for-fire-safety/F5-02-GD-FFO-emergency-vehicle-access.pdf

parking as space markings help optimise the space available. There is generally no need for marking parking lanes on local roads.

The Council has delegated the approval of the installation of parking restriction signs to the Community boards. This is separate from and additional to engineering acceptance.

8.10 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. columns/poles, desire lines, landscaping and/or trees, at the time of design.

8.10.1 Comprehensibility

Comprehensibility 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 perimeter threshold treatment may be appropriate to reinforce traffic priority and assist with comprehending the layout.

Improve comprehension 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. Reduce confusion by minimising the use of cul-de-sac. There should be no cul-de-sac accessing other cul-de-sac. See clause 8.10.2 - Cul-de-sac/Hammerheads/No exit streets above.

8.10.2 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, roundabout or signal 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.

- Generally four-way intersections at grade must be roundabout or signal 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 left – right 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 or traffic signal control or have certain movements restricted. Consult with the Council before submitting the Design Report, including a Road Safety Audit, to ensure that the intersection conforms to the Council's requirements.

8.10.3 Unsignalised urban intersection spacing

Locate intersections sufficiently far apart to separate their traffic movements and provide drivers with sufficient lead-time for decision making, but also close enough to ensure a cohesive network and walkable blocks. Provide the spacing necessary to meet the requirements of the *Guide to Road Design, Part 4: Intersections and Crossings - General*. Discuss spacings for arterial – arterial intersections with the Council before the Design Report is submitted.

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*
- *Guide to Traffic Management, Part 6: Intersections, Interchanges and Crossings Management*
- *Timaru District Plan*

8.10.4 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 the *Guide to Road Design, Part 3: Geometric Design*, which provides guidance on the minimum sight distance requirements.

Reference the *Timaru District Plan* for minimum sight distance requirements from new vehicle crossings and intersections.

8.10.5 Permanent signs and markings

The Council has delegated the approval of the regulatory signage and road marking on existing roads to the Community boards. This is separate from and additional to engineering acceptance.

Consider the proximity of overhead power lines: design signs and other infrastructure to provide the clearances required in the *Code of Practice for Electrical Safe Distances*.

When signs are used within the road corridor, they must comply with the following standards and guidelines:

- *Setting of Speed Limits 2007 Rule*
- *Guidelines for Street Name Signs, RTS 2*
- *Road Signs and Markings for Railway Level Crossings, RTS 10*
- NZS 8603 *Design and application of outdoor recreation symbols*
- *Compliance Standard for Traffic Signs*
- *Manual of Traffic Signs and Markings Part 1*

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 one metre away from a vehicle entrance or kerb cutdown where possible.

8.10.6 Traffic signals

If the road controlling authority decides that traffic signals are necessary to provide safe and efficient access to the area, use the guidelines in:

- Austroads "Guide to Traffic Management, Part 6: Intersections, Interchanges and Crossings"
- NZTA "P43 Specification for Traffic Signals"
- CTOC "Regional Special Conditions"

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.

8.10.7 Roundabouts

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

Consider these issues in the design:

- the classification of the intersecting roads;
- pedestrian and cyclist safety;
- the vehicle types expected to use the intersection;
- the speed environment;
- the distribution of turning traffic;
- 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 and structural design of such roundabouts with the Council. Reinforced beams and apron behind the semi-mountable kerb may be necessary to protect from damage by trucks or other heavy vehicles.

Consider the location of stormwater management systems within roundabout raised structures.

Raise platforms on the approaches can reduce speeds and provide a safer crossing for pedestrians, see Figure 7.

Figure 7 Raised platform on approach at an urban Roundabout

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

- *Guide to Road Design, Part 4: Intersections and Crossings*
- *Guide to Road Design, Part 4B: Roundabouts*
- *Guide to Road Design, Part 6A: Pedestrian and Cyclist Paths*

8.11 SERVICE LANES, PRIVATE WAYS AND ACCESS LOTS

Access to a site (or sites) that will be provided by a private way must comply with the requirements of the *Timaru District Plan*.

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 the 50-year design life. This includes the provision of a secondary flowpath for stormwater, as detailed in clause 5.6.2 - Secondary flow paths (Stormwater and Land Drainage). When designing accessways, balance the long term maintenance costs for the residents against the benefits of providing access through a vested road.

Council may approve an extension to street collection of refuse/recycling bins. If this is envisaged, the carriageway shall be designed to accommodate the truck weight and dimensions.

Consideration for emergency vehicle access as outlined in the *Designers' guide to firefighting operations – emergency vehicle access – F5-02-GD* is also recommended when designing private access. This is of particular significance where access to a building is greater than 50m in length from the carriageway within the road reserve. In this instance, a minimum traffic lane width of 4 metres is recommended to enable adequate access and operation of emergency services.

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.

8.12 GEOMETRIC DESIGN

8.12.1 Design speed

Safe, Functional and Appropriate speed environment is the goal in designing new and existing roads:

- Safe: operating speed under favourable conditions where vehicular control is maintained
- Functional: Classification set by Timaru District Council
- Appropriate: design for the current and anticipated environment and traffic volumes of the segment

The *Traffic Speed Limits Bylaw* and its related register of speed limits, found at https://www.timaru.govt.nz/__data/assets/pdf_file/0009/182745/Chapter-11.pdf set out the speed limits for the listed roads. Use the *Speed Limits New Zealand Schedule 1* incorporated in the *Setting of Speed Limits Land Transport Rule* to estimate the relevant speed limit for new or reclassified roads in Timaru District. The Council will determine the relevant speed limit using the *Setting of Speed Limits Land Transport Rule*.

8.12.2 Horizontal alignment

Generally, horizontal curves conform to the *Guide to Road Design, Part 3: Geometric Design*. Design the elements of the road network for the appropriate design speed.

Establish the design vehicles at the start of the design process. At intersections kerb radii should be kept as small as possible to control entry speeds and minimise pedestrian crossing distances. On local residential streets the design approach may be such as a waste collection truck is the check vehicle, i.e. can access the street and can cross the centreline when entering.

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

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” effects.

Where horizontal curves of less than 60m radius are necessary for topographical or other reasons, extra widening of between 0.5 and 1.5m may be required, according to the width of carriageway available to moving traffic, the radius of the curve and the classification of the street. The *Guide to Road Design, Part 3: Geometric Design* 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-sac.

8.12.3 Vertical alignment

Gradient lengths must be as long as possible, with vertical curves provided in compliance with the *Guide to Road Design, Part 3: Geometric Design*.

Gradients at any point on the kerb line should not exceed 1:6 or be less than 1:400, 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 or frequent stormwater outfalls.

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 cul-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.

Design of roads should be completed so that no kerbs are overtopped by secondary flow in 2% annual exceedance probability (AEP) flood events.

No road level at a waterway crossing should be raised if this may cause unacceptable flooding. Culverts and the associated road formation shall be designed to limit secondary flow (fully blocked scenario) in a 2% AEP rain event. The design will limit the secondary flow over the road surface to a depth of 100mm above the crown line.

8.12.4 Carriageway Crossfalls

Normal carriageway crossfalls should be 3% for urban roads and unsealed crossfall should not exceed 4%.

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 for sealed carriageways, crossfall should not exceed 6%, when measured from the carriageway edge to the crown.

8.12.5 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%.

8.12.6 Cross-section design

For new roads, provide carriageway and legal road widths that comply with the *District Plan*. Use Table 4 when altering existing roads. Design widths as part of an optimal road cross-section, to achieve the following objectives:

- Provide a safe layout for all users.
- 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 4 Carriageway elements

Zone	Road classification	Road Reserve Width (m)	Minimum lane allocation and carriageway widths						Minimum sealed carriageway width (m)	Footpath requirement	Utility/Amenity Strip Requirement
			Traffic Lane	Shoulder	Parking		Cycle Lane				
Residential	Collector	22	2 x 3.0m	n/a	Both Sides	2.0m	Both Sides	Minimum 1.8m where provided	13.6	Both sides	Both sides
	Local	20	2 x 3.0m	n/a	Both Sides		Optional		10	Both sides	Both sides
Industrial	Collector	22	2 x 4.0m	n/a	Both Sides	2.5m	Both Sides		16.6	Both sides	Both sides
	Local	20	2 x 4.0m	n/a	Both Sides		Optional		13	Both sides	Both sides
Commercial	Collector	20	2 x 3.0m	n/a	One Side	2.2m	Both Sides		11.8	Both sides	Both sides
	Local	20	2 x 3.0m	n/a	One Side		Optional		8.2	Both sides	Both sides
Rural	Collector	20	2 x 3.5m	2x1.5m (sealed)	No	n/a	No		10	No	One Side
	Local	20	2 x 3.5m	2x0.5m (sealed)	No		No		8	No	One Side
Rural Res	Collector Local	20	2 x 3.5m	2x0.5m (sealed)	No	n/a	No		8	One Side	One Side

Notes:

1) Utility strip to be located at least 300mm, ideally 1.0m, from the kerb and channel or edge of seal.
2) Design traffic lane widths to the Guide to Road Design, Part 3: Geometric Design.
3) Traffic lane widths may be set as low as 2.5m if the designed speed environment is 30km/hr or lower.
4) Design cycle facilities in accordance with clause 8.6 - Cycle Facilities.
5) On higher category roads the movement function of the route becomes more critical. Therefore, consider the removal of on-street parking where indicated by capacity/road safety/road space allocation requirements.
6) Mark parking lanes in accordance with clause 8.10.3 – On-street parking.
7) Provide swales where required by the project brief or subdivision consent.
8) Mark edgelines to prevent shoulders being incorporated in the traffic lane

When proposing narrower or wider 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 and associated Road Safety Audit.

An assessment of the necessity to include particular stormwater quality and attenuation features within the road reserve could affect the proposed road reserve widths. *Part 5: Stormwater and Land Drainage* and Timaru District Council's *Stormwater Management Guide* may require referencing for the Design Report.

8.12.7 Traffic Lanes

Legally a lane for the use of vehicular traffic should be at least 2.5m wide. Traffic lanes widths need to consider the types of vehicle regularly using the road and the desired operating speed.

If the street is catering for many large vehicles, then wider lanes are needed for both travel and turning into and out of accesses. For streets with buses and coaches the minimum traffic lane width should be 3.2m. Narrower lanes help reduce speeds, 3.0m lanes are common where low speeds are desired.

Traffic lanes where cyclists are expected to mix with general traffic should be either wide enough for cyclists to ride adjacent to motor vehicles (4.2m); or so narrow that cyclists must 'take the lane' and ride behind or in front of motor vehicles (3m).

Avoid "in-between" widths of 3.2m - 4.2m where cyclists are expected to travel as this can create squeeze points for cyclists. Remove squeeze points to avoid conflicts between cyclists and motorists and limit the creation of unsafe situations for active transport modes.

8.12.8 Shoulders

The *Guide to Road Design, Part 3: Geometric 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.

Sealing of the shoulder varies from 0.25 – 2.0m, depending on traffic volumes and site conditions. Table 3 provides a baseline for provision of shoulders for collector and/or local roads.

On local rural roads, the shoulder widths may be determined by the width required to provide cycle facilities. A desirable minimum sealed width for cycling is 1.5m.

When cyclists use sealed shoulders, care must be taken to ensure that the shoulder is continuous and ideally maintained alongside passing lanes and across bridges, culverts and other infrastructure to ensure cyclists are not put at risk by being moved closer to motor vehicles travelling at high speed. Any lack of continuity should be identified and suitable treatment or warning provided for all road users.

8.12.9 Footpath and Cycleway 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%.

To provide access for wheelchairs and prams, steps must not be used on footpaths within public roads, unless approved by the Council.

Grassed areas for tree planting, which are additional to the minimum berm width, 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 five requires Council approval.

8.12.10 Grassed berms

Install berms where specified in the *Footpath Policy.* Berms could be planted in selected areas. Where the width from the legal boundary to the kerb or road edge exceeds 3.0m in residential areas, install a berm. District Plan requires minimum 1.8m footpath and 1m utility/service trench.

The minimum width for grassed berms is 0.7m. Service strips against property boundaries shall be a minimum width of 1.0m. 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.

8.12.11 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 grade no steeper than 1:5. These must be mowable with standard mowing machinery.

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. Refer to clause 8.19 – Retaining walls for design criteria.

Some of these structures may require building consent.

8.12.12 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 columns/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.

8.12.13 Medians

Medians will be based on Specific designs as they are not typical throughout the district.

Determining median widths is typically dictated by the function of the road, the type of median and intersection details. The *Guide to Road Design, Part 3: Geometric Design* clause 4.7 provides guidance on median functions, types and widths.

8.12.14 Hillside 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 8.12.6 - 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.

8.13 SPEED MANAGEMENT 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 or enforcement as well as engineering in the design process.

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

The installation of traffic management devices (TMD) is most appropriate to local residential streets where:

- the posted speed limit < 85th percentile operating speed < posted speed limit + 20km/hr;
- peak hour traffic volumes exceed 60 vehicles (equivalent to approximately 600 vehicles/day);
- 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 TMD 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*
- *Guide to Traffic Management, Part 8: Local Area Traffic Street Management*
- AS/NZS 1158 Set *Lighting for roads and public spaces - series*
- *Manual Of Traffic Sign and Markings Part 2*

- *Speed Management Guide, Volume 2: Toolbox – how to implement treatments and activities;* [*https://www.nzta.govt.nz/assets/Safety/docs/speed-management-resources/speed-management-toolbox-and-appendices-201611.pdf*](https://www.nzta.govt.nz/assets/Safety/docs/speed-management-resources/speed-management-toolbox-and-appendices-201611.pdf)

8.14 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 and/or cyclists.
- 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).

Detail surfacing or treatment interfaces, e.g. where a path/berm intersects with a kerb, to avoid acute angles and so facilitate compaction and reduce maintenance issues.

8.14.1 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 and 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.

Review Council's urban street tree policy when designing on-street planting.

8.14.2 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 (50-year minimum).

Some of these structures may require building consent, which the developer must obtain. The ownership of street furniture to be installed is to be confirmed with Council, when undertaken during private developments.

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, vehicle and pedestrian crossings or signs. Ensure they do not create a safety risk for people who are blind or visually impaired.

Reference can be made to Council's *Roadside Pride Policy* for direction on how the district intends to maintain or add to the attractiveness of our district's road network.

8.14.3 Site access

Design all kerb crossings and cut-downs in accordance with Council's vehicle access standard drawings. Urban and rural site accesses should be constructed in accordance with Council's current construction standard specifications.

Wherever access to property is required across a swale, the crossing design must be specific for the affected site(s).

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

- *Timaru District Council Proposed District Plan: Transport Chapter*
- *Guide to Road Design, Part 4: Intersections and Crossings -General*
- *Guidelines for the Implementation of Traffic Controls at Cross Roads, RTS 1*
- *NZTA Policy and Planning Manual for State Highways*

8.14.4 Roadside Treatment

Roadside treatment measures shall be included as part of any road design and safety audit reports. Risk assessments shall be undertaken as part of a safety audit and completed in accordance with the *Guide to Road Design, Part 6: Roadside Design, Safety and Barriers*.

Guide to Road Safety, Part 9: Roadside Hazard Management provide details on clear zones, hazards and safety barriers.

8.15 PAVEMENT DESIGN

8.15.1 Pavement and surface treatment design

Design roads to have an infinite life for the subbase and a 25-year life for the basecourse. Use a traffic growth rate of 2% per annum for design purposes. Heavy vehicle movement ratio important in determining design parameters.

Design roads to preferably be flexible pavements, with a 14-year life for chip seal and 24 years for asphaltic concrete, using the general principles of the current New Zealand Supplement of the *Guide to Pavement Technology.*

All roading and private access rights of way, prior to sealing, must comply with the Benkelman Beam criteria shown in Table 5.

Table 5 Benkelman Beam criteria

	Chip Seal		Thin AC or other mix	
Road Hierarchy	**Max Deflection (d0)**	**Min Bowl Ration (d250/d0)**	**Max Deflection (d0)**	**Min Bowl Ration (d250/d0)**
Regional/District Arterial	1.0mm	n/a	0.7mm	0.70
Principal Roads	1.0mm	n/a	0.7mm	0.70
Collector Road	1.2mm	n/a	1.0mm	0.65
Industrial Roads*	1.2mm	n/a	0.7mm	0.70
Local Roads	1.6mm	n/a	1.0mm	0.65
Service/Private Lanes	2.0mm	n/a	1.6mm	0.54

**Industrial Roads are not specified separately within Timaru District Council's Road Hierarchy, however a distinction in Benkleman Beam deflections has been included due to the heavier traffic carried by these roads*

Note: *or existing surfacing/pavement

The pavement design must detail the:

- asphaltic mix type and layer thickness. Refer to *NZTA M/10:2020* for further information;
- 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 8.12.8 – 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.
- coal tar - determine its presence through testing for PAHs and either specify to dispose of, encapsulate or reuse on site, whilst applying contaminated material handling methodologies.
- specifying the asphaltic mix type under the TNZ specification e.g. PA15HS for high traffic shear stress or PA20 otherwise.
- 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.

8.15.2 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.

8.15.3 Pavement materials

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

- materials – *DECSS* 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 noted in *Standard Drawing G-101C Kerb and Channel Profiles.*

8.15.4 Surfacing

All surfacing 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 6 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 6 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: This table is sourced from TNZ M/10:1998.

All newly constructed road surfaces must comply with the NAASRA roughness counts in Table 7.

Table 7 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, cul-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.
2) Pavement use codes refer to RAMM categories.

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

The general minimum surfacing requirement 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 50mm layer of paver-laid DG14 or AC14 laid over a Grade 5 chipseal.

Newly constructed road surfaces with a two-coat chipseal, albeit from significant reinstatement or new subdivision, will require a second coat be laid a year after surfacing completion. A contribution to 50% of a second coat shall be taken by Council at the time of subdivision or engineering clearance.

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.

8.16 DRAINAGE DESIGN

8.16.1 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. Take into account the road hierarchy when assessing the possible use of the legal road as a secondary flow path.

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
- TDC Stormwater Management Guidelines

8.16.2 Primary stormwater treatment

On-street or centralized 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. Provide on-street stormwater treatment depending upon the requirements of that particular water catchment area, as detailed in the resource consent or project brief. *Chapter 5 – Appendix B and E (Stormwater Devices and Stormwater Quality,* respectively) suggests macropollutant traps, swales and bio-retention devices (rain gardens and stormwater tree pits) as on-street stormwater treatment options. Council may also consider proprietary devices on a case by case basis. Refer to clause 5.6 - Drainage System Design for further information.

Do not detail sumps in kerb crossings. Where sumps are located in this position, consider the relocation of either the sump or crossing or detail the installation of a corner sump top and provide additional drainage capacity elsewhere if necessary.

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 100m, for maintenance purposes.

Provide a stormwater drain/catch pit in arterial and collector roads whenever the channel flow exceeds 25 litres/sec at a grade of 1 in 500 for a 5 year event. Provide a stormwater drain/catch in local roads whenever the channel flow exceeds 50 litres/sec at a grade of 1 in 500 for a 5 year event.

8.16.3 Subsoil drainage

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

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

8.16.4 Swales

Design swales for temporary water storage or retention as this provides attenuation of stormwater peaks. It may also reduce the downstream flood peak. Normally this design consists of shaped grass berms, with no permeability built in to the construction materials.

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 for guidance on design.

8.16.5 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.

8.17 STREET LIGHTING

Refer to Part 10: Lighting for street lighting requirements.

8.18 BRIDGES, CULVERTS AND OTHER STRUCTURES

Bridges, culverts 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 steel or concrete bridges and all culverts, this is 100 years. The use of timber for bridges is to be reserved for footbridges only. A reduced design life can be accepted depending on the specific circumstances. Refer to the *NZTA Bridge Manual* for specific design information. The TDC *Road Bridge Policy* provides some district specific considerations to incorporate.

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 5.6.5 - Bridges and culverts (Stormwater and Land Drainage) and TDC *SMG*. The length of these structures is also site-specific and must make allowance for waterway requirements during extreme events and the requirement for footpaths. Design the wing wall and anti-scour structures to provide support and to prevent scour, as required.

Design guardrails generally in accordance with the *Bridge Manual* except that:

- side protection in low speed environments (under 50km/hr) is not always required to comply with Appendix B of the *Bridge Manual*. Where Appendix B requirements are not achieved, provide a road safety audit or assessment with the site specific design in the design report, confirming the design impact speed used in the guardrail design.
- guard rail transition distances in speed zones of 50km/hr or less may be reduced.

Design barriers for cycle or shared paths to be 1.4m high and in accordance with the *Bridge Manual*. Design the barrier to resist the loads detailed in Appendix B clause B6.4 of the *Bridge Manual*. Consider where a Pedestrian Safety Fence is still appropriate for situations where the impact from cars and cycles is not being mitigated.

Other design issues include, but are not limited to:

- legal compliance – building and resource consents are required for bridges, culverts and other structures, as appropriate. Details and conditions of a Deed of Licence shall be agreed to prior to lodgement of an Application for Engineering Design Acceptance;
- technical requirements – provide space on bridges and culverts for cyclists. The surfacing of bridge decks must meet the site-specific traffic loading requirements including skid resistance requirements. Footpaths must be separated, where they are specified;
- waterway requirements - consider the effect of the road on the secondary flow path for any waterway crossing. Refer to clause 8.13.3 – Vertical alignment;
- aesthetic contribution – use the design of the new structure to enhance the attractiveness of the built environment.
- services using a bridge for support –refer clause 3.4.3 of *The National Code of Practice for Utilities' Access to the Transport Corridors* provide guidance on the installation of services on bridges. Obtain the Council's approval for the installation of services on bridges.
- existing structures – ensure lane widths are not compromised when retrofitting existing structures to cater for future traffic needs.

8.19 RETAINING WALLS

Only retaining structures that will be vested in Timaru District Council may be located on legal road. Retaining structures that support private assets or private property e.g. driveways, must be located outside of the legal road unless approved otherwise by Council.

Design guardrails generally in accordance with the *Bridge Manual* except that:

- side protection in low speed environments (under 50km/hr) is not always required to comply with Appendix B of the *Bridge Manual*. Where Appendix B requirements are not achieved, provide a road safety audit or assessment with the site specific design in the design report, confirming the design impact speed used in the guardrail design.
- guard rail transition distances in speed zones of 50km/hr or less may be reduced.

Consider where a Pedestrian Safety Fence is still appropriate for situations where the impact from cars and cycles is not being mitigated.

Other design issues include, but are not limited to:

- safety in design - including throughout the life cycle of the constructed works.
- legal compliance – building and resource consents may be required for retaining walls. Details the requirements for the Deed of Licence shall be agreed to prior to lodgement of an Application for Engineering Design Acceptance;
- aesthetic contribution – use the design of the new structure and any fall protection to enhance the attractiveness of the built environment;
- heritage – protect and retain existing historic retaining walls and design adjacent structures in context with these features;
- existing structures – ensure lane widths are not compromised when retrofitting existing structures to cater for future traffic needs.
- maintenance – ensure access for mowing and other maintenance activities.

Design retaining walls to ensure their continuous function (including during extreme events) throughout their design life as detailed in Table 8.

Table 8 Design and durability

Wall Type	Design Life (years)
A: Uphill of road	75
B: Uphill of road directly supporting infrastructure to be vested or existing private buildings, structures and urban gardens	100
C: Directly supporting road	100*
D: Not directly supporting road	75

Note*: The design life of minor walls (less than 1.5m height that can be maintained or replaced without impeding the function of the adjacent road) may be reduced to 50 years with the approval of Council.

State the key achievement criteria and assumptions in the Design Report, as detailed in clause 3.3.2 – Design Report. Specify hold points for construction, for inclusion in the Contract Quality Plan and required material or performance tests to be included in the Contractors Inspection and Test Plan.

8.20 AS-BUILT INFORMATION

Provide as-built information as set out in Part 11: As-Builts, including a safety audit of the constructed works.