SC6.4.3.13 Townsville road hierarchy

SC6.4.3.13.1 Introduction

The Townsville road hierarchy is a planning tool to guide good-practice transport planning and management, with the aim of balancing the needs of both the land use and the roadway system. A road hierarchy establishes each roadway function such that appropriate objectives for that roadway and design criteria, can be developed and implemented. These objectives and design criteria are aimed at achieving an efficient road system whereby conflicts between the roadway and the adjacent land use are minimised, and the appropriate level of interaction between the roadway and land use is permitted. The road hierarchy also forms the basis of ongoing planning and system management aimed at reducing the conflict between existing incompatible functions.

The use of road hierarchy categories as part of the land use and transport network planning process enables optimisation of the relationships and key roles associated with accessibility, connectivity, amenity, and safety for all road/land users, including vehicles, bicycles, pedestrians, and public transport. The road hierarchy categories and sub-categories contained herein are pertinent and appropriate with the current transport environment in the Townsville area. As time passes, and the transport system and its relationship with land uses changes, these road hierarchy principles will require further development and refinement.

Editor's note—this sub-section deals mainly with issues relating to "Roads". Issues relating to 'Streets" are dealt with in more detail in other parts of the Development manual planning scheme policy.

(1) Integrated Regional Transport Planning Framework

Integrated land use and transport planning must be embedded and applied in a wide range of circumstances – from strategic planning to detailed design for one mode or across all modes. This road hierarchy sub-section contains specific information for managing the interface between land use and roadway systems. This sub-section is to be used with regard for the overarching planning framework. The Integrated Regional Transport Planning (IRTP) Framework for Queensland (Queensland Government, 2003) is a preliminary transport planning guide that can provide the more general guidance not covered by this road hierarchy sub-section and has been adopted by Townsville City Council.

The IRTP Framework, applies to all facets of transport planning, including:

(a) public transport, walking and cycling networks;

(b) road upgrades;

(c) new road, rail or multi-modal corridors;

(d) heavy-vehicle safety and efficiency;

(e) policy positions; and

(f) entire local government areas or regions.

The IRTP Framework aims to:

(a) reduce the need to travel and the length of trips;

(b) provide a choice of travel options for people and goods, and promote sustainable choices;

(c) make it safe and easy for people to access goods, services and destinations, particularly by public transport, walking and cycling;

(d) increase the share of trips by public transport, walking and cycling;

(e) provide for the safe and efficient delivery of freight;

(f) minimise the need for new transport infrastructure; and

(g) achieve desired outcomes using the most cost-effective package of measures.

(2) Structure of the road hierarchy

Based on the desired outcomes, directions and principles contained in the IRTP Framework, this sub-section establishes a four level road hierarchy that manages the interface between land use and roadway system and

guides system planning and management in urban and rural areas. Figure SC6.4.3.13.1 shows the basic structure of the four level road hierarchy, and the four levels are explored in more detail in SC6.4.3.13.3, and in SC6.4.3.13 Attachment A: Urban and rural traffic environments map, SC6.4.3.13 Attachment B.1: Road hierarchy elements and their objectives in urban areas, B.2: Road hierarchy elements and their objectives in rural areas, C.1: Townsville road hierarchy map (existing), C.2: Townsville road hierarchy map (future), D.1: Road hierarchy desirable performance criteria in urban areas and D.2: Road hierarchy desirable performance criteria in rural areas.

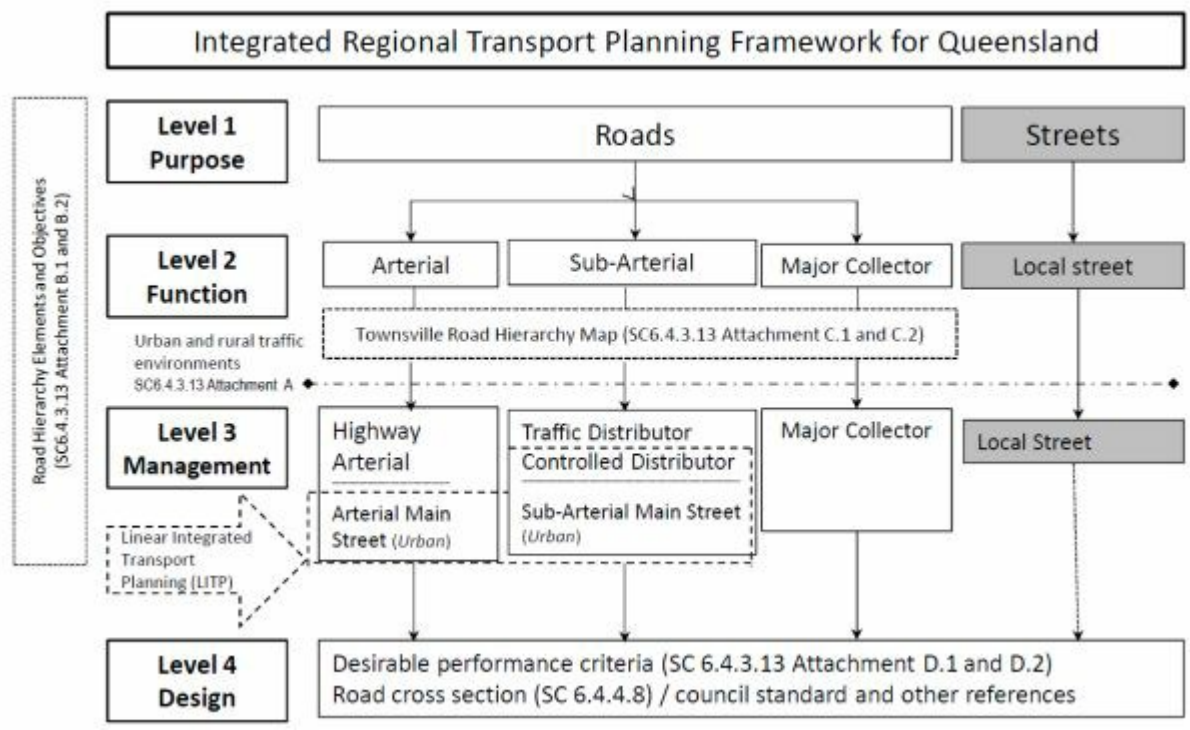


Figure SC6.4.3.13.1 Structure of the four level road hierarchy

(3) Road hierarchy objectives

The four level road hierarchy aims to meet the following objectives, and will assist council and the state government with meeting appropriate standards for roadway construction:

(a) to systematically classify roads into a framework around which council and the state government can plan and implement various land use, infrastructure construction, maintenance, and management schemes and projects such as:

(i) identifying the effects of development decisions in and on surrounding areas and roadways within the hierarchy; and

(ii) developing design that facilitates urban design principles such as accessibility, connectivity, efficiency, amenity and safety;

(b) to guide network planning and management for all modes (private, passenger and commercial/industrial transport) and users (motorised and non-motorised); and

(c) to clarify policies and decisions in designing new networks and in managing existing road systems in order to provide a rational basis for management of the network under the current or future planning schemes, for example:

(i) enabling investment and traffic management efforts to be concentrated on those links able to cope efficiently with transport needs;

(ii) enabling council and the state government to adopt appropriate standards of construction on traffic routes; and

(iii) enabling the network to be optimised to accommodate access and non-transport functions.

(d) The ways in which these objectives may be implemented within a well-formed road hierarchy include:

(i) concentrating longer distance flow onto routes in less sensitive locations;

(ii) ensuring land uses and activities that are incompatible with traffic flow are restricted from routes where traffic movement should predominate;

(iii) preserving areas where through traffic is discouraged;

(iv) identifying treatments such as barriers, buffers, and landscaping to preserve amenity for adjacent land uses;

(v) ensuring activities most closely related to frontage development, including social interaction and parking, can be given more space when environmental and access functions are allowed to predominate;

(vi) ensuring safe traffic operation by controlling access onto roads, and separating different types of traffic in higher order road corridors;

(vii) ensuring efficient traffic operation for through traffic whilst designing new roads as part of a safe system approach;

(viii) enabling the orderly planning of heavy vehicle and dangerous goods routes;

(ix) planning for and providing public transport routes;

(x) planning for and providing pedestrian and bicycle routes; and

(xi) identifying facilities for pedestrians, cycles and public transport.

(4) Scope

This document is a planning tool for all road agencies and authorities and delays involved in land use and transport planning/management processes in Townsville. The road hierarchy elements can be applied in areas such as:

(a) planning – in designating a Strategic Transport Network for a region, consisting of roadways and other facilities for the movement of goods and people;

(b) management - in designating and programming improvements to achieve the desirable performance criteria over time for each element of the road network;

(c) environment – in managing the road network to facilitate efficient operation, which will assist in achieving environmental sustainability and improve amenity to the region's inhabitants;

(d) safety – in managing the road network by controlling access onto traffic carrying roads, providing appropriate design standards, and proper use of the network by the vehicle fleet to facilitate safe movement of all road users; and

(e) congestion management – in planning and managing the road network to ensure traffic volumes carried are appropriate to roadway functional and management attributes.

(5) Definition of urban and rural

The application of the road hierarchy requires the terms urban and rural to be defined for the purpose of this policy.

Urban	developed area which may comprise densely developed uses such as residential, commercial, industrial, education, recreation or a mix of these. In general, this is characterised by evenly spaced street lighting, kerbed streets, frequent closely spaced driveways (preferably none on traffic carrying roads). This will also include land designated for future urban development.
Rural	sparsely developed area which may comprise rural development, rural residential development, isolated pocket of urban development and environmental area. In general this is characterised by unkerbed streets, both sealed and unsealed roads, infrequent driveways and large tracts of undeveloped land. Street lighting may only be at intersections and points of safety concerns.

These terms do not necessarily align with definitions within legislation but relate to the character of the land for

the purpose of providing access and thoroughfare. For the specific purpose of showing urban and rural traffic environments for the Townsville road hierarchy, a map has been provided in SC6.4.3.13 Attachment A.

If a rural development is located in the adjacent urban fringe area or adjoined/contained a part of continuous existing network connection, it may be required to be designed similar to the adjacent road network environment, e.g. urban road cross section.

(6) Terminology

Category	Those elements of the road hierarchy defined at Level 2 of the road hierarchy.
DTMR	Department of Transport and Main Roads.
Environmental cell	Contains local streets with a slow speed and pedestrian priority environment, and generally bounded by major collector roads.
LITP	Linear Integrated Transport Plans: a means of planning between the roadway and the adjacent environment in an integrated manner.
MUTCD	*Manual of Uniform Traffic Control Devices.*
RPT	Regular public transport.
Specific cell	A part of the urban fabric that is contained within a block bordered by traffic carrying roads or other physical boundaries.
Sub-category	Those elements of the road hierarchy defined at Level 3 of the road hierarchy.
VPD	Vehicles per day.

SC6.4.3.13.2 General principles

(1) Network Linkage

Ideally, only roadway elements with the same place in the hierarchy, or one position higher or lower in Level 2 of the hierarchy, should intersect.

For example:

(a) arterial roads should only intersect with sub arterial roads and other arterials;

(b) sub-arterial roads should only intersect with arterials, other sub-arterials, or major collectors;

(c) major collectors should only intersect with sub-arterials, other major collectors, or local streets; and

(d) local streets should only intersect with collectors or other local streets.

However, road networks have evolved out of step with this linkage principle in practice.

In certain situations it may be acceptable for roadway categories separated by two positions within Level 2 of the hierarchy to intersect. For instance, a local street may intersect with a sub arterial road, or a collector with an arterial, without significant adverse ramifications. In other cases, a permeable grid local network creates too many street-road intersections, and some of these have to be blocked off to limit points of access for vehicles (creating cul-de-sacs). Paved footpath access into the local area for pedestrians and cyclists could be maintained, providing the desired pedestrian and cyclist access onto the arterial roads, without adverse impact on traffic flow, safety and local amenity.

It may even be acceptable for roadway categories separated by three positions in Level 2 of the hierarchy to intersect in certain cases. That is, a local street may intersect with an arterial road, provided it is not an uninterrupted flow facility, without significant adverse effects. This may be the case, for example, where a service road provides access directly to a two or four lane arterial road in an urban area, or two lane highway in

a rural area.

Despite their development history and desired function in the road hierarchy, local streets may need to be compromised to provide connectivity for the public transport network.

(2) Size of precincts free from unwanted traffic

The spacing of arterials or traffic routes has the effect of defining the size of development areas that are penetrated only by streets. The size of these "cells" has a direct influence on issues such as the local traffic environment, whether or not "difficult traffic routes" can be avoided, the feasibility of sustaining low vehicle speeds in the local area, the number and frequency of connections to surrounding arterials, and access to bus routes around and through the area. Traffic should be distributed appropriately amongst the local streets to ensure that amenity levels are not exceeded and adequate connectivity is maintained.

The specific area and environmental cell concepts can be accommodated with relative ease as part of a new subdivision plan but it is often more difficult to impose the specific area concept onto an existing system. However, it is important to have a target in mind when assessing the requirements of the road systems in a particular area.

(a) Urban areas

While the size and shape of a specific area is commonly constrained by fixed elements such as existing infrastructure, topography and property boundaries, the idealised form is of the order of 1 km × 1 km for an urban specific area. This size would typically encompass four environmental cells, each 0.5 km × 0.5 km. The boundaries of the specific areas will be partially defined by the existing major road system, which in turn has generally been developed to a large extent as a result of historical events rather than recent planning initiatives. Other features may also be used as boundaries.

The aim is to define specific areas which:

(i) are relatively homogeneous in land use;

(ii) have only that traffic necessary for the functioning of the area, i.e. they are free of non-essential or through traffic; and

(iii) have a balance between the volume of essential traffic and the nature of the area. For example, higher volumes may be more acceptable in industrial areas than in residential areas.

(b) Rural areas

While the specific area concept is most relevant to an urban area, it also applies to rural areas, although in a slightly different context. Specific areas in rural areas should be linked by a system of through traffic carrying roads. The dimensions and form of a specific area will vary in rural areas due to the reduced development densities. As a result, specific area sizes in rural areas will be significantly larger than in urban areas.

(3) Abutting development and access to it

Restriction of access points to abutting land uses is one of the key parameters in the road hierarchy. Decisions on access points to new developments are linked to the strategic function of the road and the types of traffic and trips that it serves, as well as the type of environment intended to result. The allocation of accesses as part of a management regime is not identical to a "road classification" system, but may supplement it.

Decisions on network types, especially at the local level, will have long-term effects on the traffic character of an area, and inevitably the quality of service on the surrounding traffic routes. The road hierarchy provides a means of classifying and designing a roadway according to its purpose, function and management. It is intended that this process be carried out within the constraints of the network, as it is imperative that corridor continuity be considered. Notwithstanding past decisions that have resulted in existing constraints, this may mean that corridor continuity may need to be targeted as a long term goal.

In addition to corridor continuity, future development potential should also be addressed in the road hierarchy. The planning scheme earmarks a considerable quantity of land for future urban development, industrial, commercial or residential. Classification of existing roadways in these areas should support future amendments to the hierarchy and the associated changes in performance criteria. For example, an existing road may

currently serve a collector function, but as the area is subdivided into urban development in the future, the potential future function of the road may require allowances to be conformed at an earlier time so that the performance criteria of its future function can be met.

It is important to note that some non-residential land uses such as schools, parks and local shops have to be located within or near the specific areas they serve. These may be accessed by a sub-arterial road, or, if this is not possible, it is desirable that they are accessed via a major collector road rather than the local street environment. The conflicting land use requirements in these circumstances mean that network considerations must be carefully examined in terms of connectivity, network efficiency and compatibility between private vehicle, public transport, non-motorised and freight networks. Integrated land use and hierarchical transport planning can overcome this shortcoming to a large extent.

(4) Relationships between networks

"Cells" may be sized and have access limited to manage entry of unwanted traffic. However, different networks will have different entry criteria. As mentioned in SC6.4.3.13.2(1) above, network linkage principles may vary between motorised vehicles and active transport modes such as public transport, pedestrian and bicycle. For example, passenger transport networks are often focused on middle order roads to balance point to point travel times, network reach, connectivity and passenger safety. Similarly, freight networks will be based on specific freight criteria and result in different networks for freight when compared to other traffic networks. In some areas, freight networks may enter into small industrial cells and utilise low order roads to access depots. The overlay of modal networks is a key consideration in establishing the functional category for a specific link in the road network.

SC6.4.3.13.3 Four level road hierarchy

A four level road hierarchy has been developed, based on the functional objectives of each category or sub-category within the hierarchy. Level 1 begins with a broad distinction between roads and streets, and the following three levels listed with an increasing degree of detail with respect to functional objectives. The Levels are defined as follows:

Level 1. Purpose relates to the primary objective of the element, whether to carry through traffic or provide direct property access.

Level 2. Function relates to the relationship between the roadway and land use it serves (i.e. how the roadway serves the land use). This level of the hierarchy is common to traditional road hierarchy concepts.

Level 3. Management relates to the implementation of policies to achieve the envisaged function based upon the attributes of the element and of the adjacent land uses.

Level 4. Design relates to specification of the form of the element in order to achieve its functional objectives.

Note—the relevant standard drawings include SD-002 Typical Road Cross Sections – Collector Roads , SD-003 Typical Road Cross Sections – Sub Arterial Roads and SD-004 Typical Road Cross Sections – Arterial Roads.

(1) Hierarchy Level 1 - Purpose

Level 1 of the hierarchy defines roadways as either:

(a) roads to carry through traffic; or

(b) streets for access to property and collection of local traffic.

This classification applies to both rural and urban areas.

The definition of a roadway in one particular category serves to indicate a planning intent in relation to the functions that will be permitted on that roadway. Thus, measures are likely to be adopted on streets that relate to amenity and environmental capacity, for example, by removal of through traffic, or direction of local traffic to a particular collector street. At the other end of the scale, treatments on arterial roads will principally be related to increasing traffic carrying capacity. This would tend to be by removal of some incompatible lower order functions, such as limiting access to properties, disallowing any further new accesses, or reducing the number

of intersecting roads.

Figure SC6.4.3.13.2 below illustrates the relationship between traffic mobility and land access in a functionally classified roadway system.

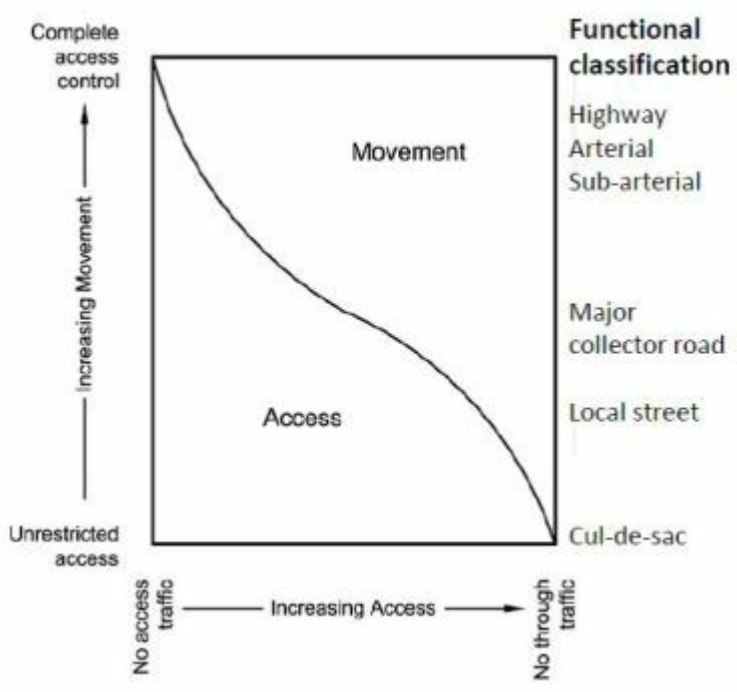


Figure SC6.4.3.13.2 Relationship between traffic mobility and accessibility

Source: Adapted from a figure in NCHRP Report 348, Access management Policies and Guidelines for Activity Centres, Transportation Research Board, Washington DC, 1993

Note—the functional classification has been modified to suit the Townsville context.

(2) Hierarchy Level 2 - Function

Within the two broad groups of roads and streets in the first level of the hierarchy, four functional roadway categories have been identified, reflecting the different ways in which they serve land use and carry traffic.

The functional classification indicates the relative importance of the traffic mobility function as opposed to the amenity/access functions, and how these conflicting aims are to be prioritised and managed.

The four functional categories in Level 2 of the hierarchy are:

- arterial road – to carry long distance through traffic external to specific areas;
- sub arterial road – to carry through traffic between specific areas and arterial roads in a supporting role to the latter;
- collector road – to provide connectivity between the environmental cells and the traffic carrying road and to provide grouped property access; and
- local street – to provide direct property access and immediate local movements.

Based on the current and future land use zoning in the Townsville City Plan, the Townsville road hierarchy map (see SC6.4.3.13 Attachment C.1 Townsville road hierarchy map (existing) and SC6.4.3.13 Attachment C.2 Townsville road hierarchy map (future)) has been developed all Level 2 categories. To enable easier application of the road hierarchy, the same overarching objectives and category names have been applied for both urban and rural areas. It should be noted that some links are identified as a conceptual location with respect to spacing, hierarchical connectivity and continuation of links between start and end points. Therefore, if significant development is planned to occur in a large or multiple parcels of undeveloped land in either an urban or rural area, then it may be necessary to reassess that area road hierarchy plan within a whole network.

(a) Arterial road

The primary objective of arterial roads is to provide major through routes for traffic. All longer distance traffic movements should be directed onto the arterial roads. Arterial roads should form a principal connection between major regional centres and towns. It can also serve a line haul function for public transport. Arterial roads will often be elements of the various networks with high order functions. For instance, the network of over dimension freight routes is likely to be primarily on arterial roads.

These corridors should provide for regional cycle movements, but travel speed, volume and composition is such that cycle movements should desirably be kept separate from general traffic. In general, arterial roads have high design standards for efficiency and no direct frontage access.

In rural areas it is recognised that many arterial roads have direct property access. This results from the large size of properties, the reality of limited road infrastructure and the infrequent number of vehicles with direct access. On such roadways the main goal is to provide a highly efficient traffic flow (increased speed and increased capacity), balanced with safe access.

For all arterial roads it is desirable that, over time, no new accesses are permitted and that existing accesses be removed, or at least consolidated, or turning movement restricted.

(b) Sub-arterial road

Sub-arterial roads carry through traffic and should be more convenient than using the "streets" network; therefore a high level of efficiency and safety should be provided. In general, sub-arterials do not serve the longer distance regional movements and do not provide continuity across arterials. However, they do serve to provide connections between arterial roads and may be used to provide such additional connections for through movements.

In urban areas, sub-arterial roads typically provide connection between residential, commercial or industrial areas and arterial roads. They will normally be the lowest order of road to be traversed by scheduled public transport in performing a line haul function. They may also serve to provide access to public transport at stops. These corridors may provide for cycle and pedestrian connections between local areas and the regional cycle system (if such exists). These connections would preferably be bicycle lanes on the shoulder or outer lane of sub-arterial roads rather than on the roadway with general traffic. These roads can provide consolidated access to commercial and retail developments and as a result can also cater for pedestrian movements, especially in the vicinity of such developments. The provision of consolidated access allows for turning movements to be focussed at specific, controlled locations rather than at high frequency along the roadway, thus minimising interruptions to through traffic.

In rural areas, sub-arterial roads in particular provide connections between adjacent suburbs and/or between arterials. Access may also occur, and be necessary, but these will be more widely spaced due to the larger lots.

(c) Major collector road

The objective of collector roads is to provide for the connection between the local area (local streets) and the traffic carrying roads. The form of linkage provided should predicate against the usage of collector roads within a particular area by longer distance traffic unless the trip is relevant to the area. In residential areas particularly, amenity and safety should be the most important consideration, as these roads are also intended to provide direct access to grouped properties, commercial premises, schools or community facilities.

These roads will carry public transport operating in a sweeper role, and these are likely to be school bus routes. It is necessary to ensure that the connectivity to achieve an efficient bus route does not encourage penetration by through traffic. Typically, scheduled bus routes would begin a service on collector roads, as a sweeper service, and then move to higher order links in the bus network to run as limited stop or express services.

As these roads serve as access to adjacent grouped properties, whether in residential or

commercial/industrial areas, pedestrian movements need to be accommodated off the roadway. Traffic volumes should be balanced to accommodate local cycle movements on the road, and road design should create a safe environment for these vulnerable road users.

(d) Local street

The objective of local access streets is to provide access to properties. In residential areas, these should be in a form to encourage a liveable and safe street environment where the motor vehicle is secondary to the pedestrian and cyclist. Through traffic should be discouraged on these streets and a lower speed environment is desirable for safety. Given the low traffic volume and potentially lower speed environment, it is appropriate for cyclists and pedestrians to share the road space. Similarly, specific facilities for pedestrians (crossings or concrete footpaths) are generally not required due to low traffic volumes and speeds. However, depending on the degree of abutting land use activity or pathway network planning, concrete pathways would provide for safety and a continuation of the pathway network.

The role of collector and local streets is complicated further as all freight, and motorised and non-motorised passenger networks can ultimately operate on these roadways, often without specific treatments.

(3) Hierarchy Level 3 - Management

Ideally, all roadways within the same category of Level 2 would be treated in the same manner. This may be achievable in a new development but existing situations or other constraints often dictate that a variety of treatments need to be available. These situations may arise for a number of reasons, not the least of which is the mixture of access and traffic functions already prevalent on many roadways.

Level 3 manages these issues through splitting the Level 2 categories into sub categories, which relate to more particular attributes of the roadway. Each sub category has objectives that are more specific than the category objectives for Level 2. The management sub categories are described broadly as follows (listed under each Level 2 category):

Arterial road

- Highway - serves longer distance movements as well as regionally and nationally significant movements. (A motorway is a highway that provides for a very high standard of travel by restricting non-motorised traffic and using only grade separated intersections.).
- Arterial - caters for longer distance movements, for example, connections between major centres.
- Arterial Main Street - caters for through traffic and, due to past land use decisions, serves adjacent retail/commercial land uses. This sub category is included in order to acknowledge its existence, and to provide for special cases, but it is not an option recommended for the future due to the difficulties of managing the conflicting access and mobility functions.

Sub-arterial road

- Traffic distributor - connects traffic generated in specific areas to the arterial roads and provides access to major developments.
- Controlled distributor - serves a similar function to traffic distributors but needs to be controlled for a particular reason, for example, it may provide frequent access for existing individual residential properties.
- Sub-arterial main street - connects traffic generated in specific areas to the arterial roads and, due to past land use decisions, serves adjacent retail/commercial land uses. This sub category is included in order to acknowledge its existence, and to provide for special cases, but it is not an option recommended for the future due to the difficulties of managing the conflicting access and mobility functions.

Major collector road

- Major collector - provides a connection between the other streets in a specific area and the traffic carrying roads, and provides access to large sites with restricted or controlled access (for example, schools, shops and multi-unit residential developments).

Local street

- Provides a connection between the other streets in a specific area and the low traffic carrying streets, i.e. less than 3,000 vpd. As it has low traffic volumes, a lower speed or a shorter length, it is better suited to providing access to individual properties. It also provides pedestrian and recreation use service with a local traffic or pedestrian priority.

It should be noted that the arterial main street and sub arterial main street sub categories have been excluded from rural areas on the basis that these are characterised by adjacent land use/activities that are associated with urban development.

(a) Performance criteria

The preceding sections and SC6.4.3.13 Attachment B.1 and SC6.4.3.13 B.2 identify individual road hierarchy categories and their functional objectives. For the hierarchy to be an effective planning tool, means of achieving these objectives need to be identified. This has been done by specifying desirable performance criteria for each classification in Level 3 of the road hierarchy framework. It is apparent that for some management categories, a distinction needs to be drawn, with respect to performance criteria, between roadways in an urban or rural environment. Accordingly, the thresholds of the performance criteria differ between the urban and rural areas for Level 4 of the road hierarchy.
The desirable performance criteria are subdivided into three groups and described below.

(i) Functional Characteristics specify the functions or functional aspects of a roadway element.

(A) dominant linkage – what type of areas should the roadway provide service to/from;

(B) traffic carrying function – whilst volumes are not intended to define the category into which the roadway falls, this criterion provides some guidance as to the maximum volumes anticipated. These maximum volumes may not be met in non-urban areas due to the low density of development;

(C) residential, commercial, industrial access – what degree of access to each of the land use types is appropriate;

(D) desirable traffic speed environment – the desirable speed anticipated. This is not intended to define the maximum speed limit, which should be done in accordance with the MUTCD;

(E) heavy vehicle movement – whether the roadway is appropriate for heavy vehicles, other than for local access. Note that heavy vehicle volume will be important in defining road pavement and design form;

(F) dangerous goods movement – whether the roadway is appropriate for the passage of dangerous goods vehicles, other than for local access;

(G) public transport facilities – what role should the roadway serve for public transport (consistent with any public transport network planning);

(H) cycle facilities – what type of cycle facilities should be provided in the roadway corridor (consistent with any bikeway network planning). Cycle facilities would only be provided where sufficient demand is proven; and

(I) paved footpath – what type of paved footpaths (not for crossing the roadway) should be provided along the roadway. These should only be provided to satisfy a proven demand.

Note—the term paved footpath refers to a paved concrete footpath as per council standard.

The desirable performance criteria for these functional characteristics have been set to ensure the network operates effectively, efficiently and safely for its users.

(ii) Frictional Characteristics relate to the way roadside activity affects traffic use.

(A) access control – constraints imposed on direct access to adjacent development sites;

(B) parking provision – what provision for parking within the road reserve is appropriate;

(C) bus stopping provision – what provision for bus stops within the road reserve should be made

Note—indented bays also refer to bays which are clear of the through lanes as per council standard.

(D) pedestrian crossings – what type of facilities should be provided to allow pedestrians and cyclists to cross the roadway, for example, signalised crossings, zebra crossings or pedestrian refuge islands;

Note—crossings must meet council standards and MUTCD guidelines.

(E) typical intersection spacing – the typical distance between successive intersections along that roadway;

Note—generally, 300 m intersection spacing is not favourable for a corridor signal coordination plan.

(F) preferred intersection treatments – what form of intersection control is appropriate where the roadway intersects another of equal or higher classification; and

(G) number of traffic lanes – what function of road hierarchy and ultimate traffic demand should be considered.

Note—a road cross section is identified in terms of a type of kerb and channel, divided or undivided carriageways, parking, bike lanes and verge in Level 4 of the hierarchy (see SC6.4.3.13 Attachment D.1 and SC6.4.3.13 D.2).

The desirable performance criteria for these frictional characteristics are set with the intent of improving the efficiency of traffic flow and thus reducing its environmental consequences, in balance with access needs.

(iii) Impact characteristics relate to the relationship between a roadway element and amenity for adjacent land use:

(A) abutting land use types – in general, what type of land use would be appropriate or compatible with the roadway function; and

(B) land use impact amelioration – in general, what type of measures are appropriate on this roadway to reduce the immediate social and environmental impacts of traffic. Such treatments include barriers (fences, walls), buffers (vegetation), setbacks (distance to property lines and/or building fascias), streetscaping and environmental street design.

To achieve the desired traffic levels and conditions, a combination of actions will often be necessary to reduce traffic flows on some elements of the network and to increase traffic flows on other elements of the network. In order to minimise the use of lower order roads, such as local residential streets, it will be necessary to manage arterial roads in a way that makes their use more attractive than the lower order roads. Lower order roads must then be managed in a way that discourages traffic through environmental street design, such as street closures, street element length and design speed. If reactivity treatments are applied in existing areas, they must be undertaken on an area-wide basis to ensure that problems are not simply shifted from one street to another.

The desirable performance criteria for these impact characteristics are set with the intent of reducing negative social and environmental impacts of traffic flow on adjacent land uses.

The impact characteristics are important in making the adjacent land use areas more liveable and to address issues associated with the social interaction between transport and land use. Level 3 management principles for urban and rural roads are reflected in the design principles in Level 4 of the road hierarchy.

(b) Linear integrated transport plans (LITP)

There may be cases where a roadway does not readily fit into any category within the road hierarchy, due to incompatibility with the performance criteria. Under these cases, it is recommended that an LITP be developed specifically for the roadway under consideration. For example, with a key public transport

corridor such as Ross River Road and Charters Towers Road, there is a need to satisfy both the traffic carrying roadway objectives, as well as the access and amenity to adjacent properties objectives. Each LITP will need to assess the roadway under consideration on an individual basis, and will therefore have to satisfy individually tailored criteria. Figure SC6.4.3.13.3 below describes a general methodology for developing an LITP.

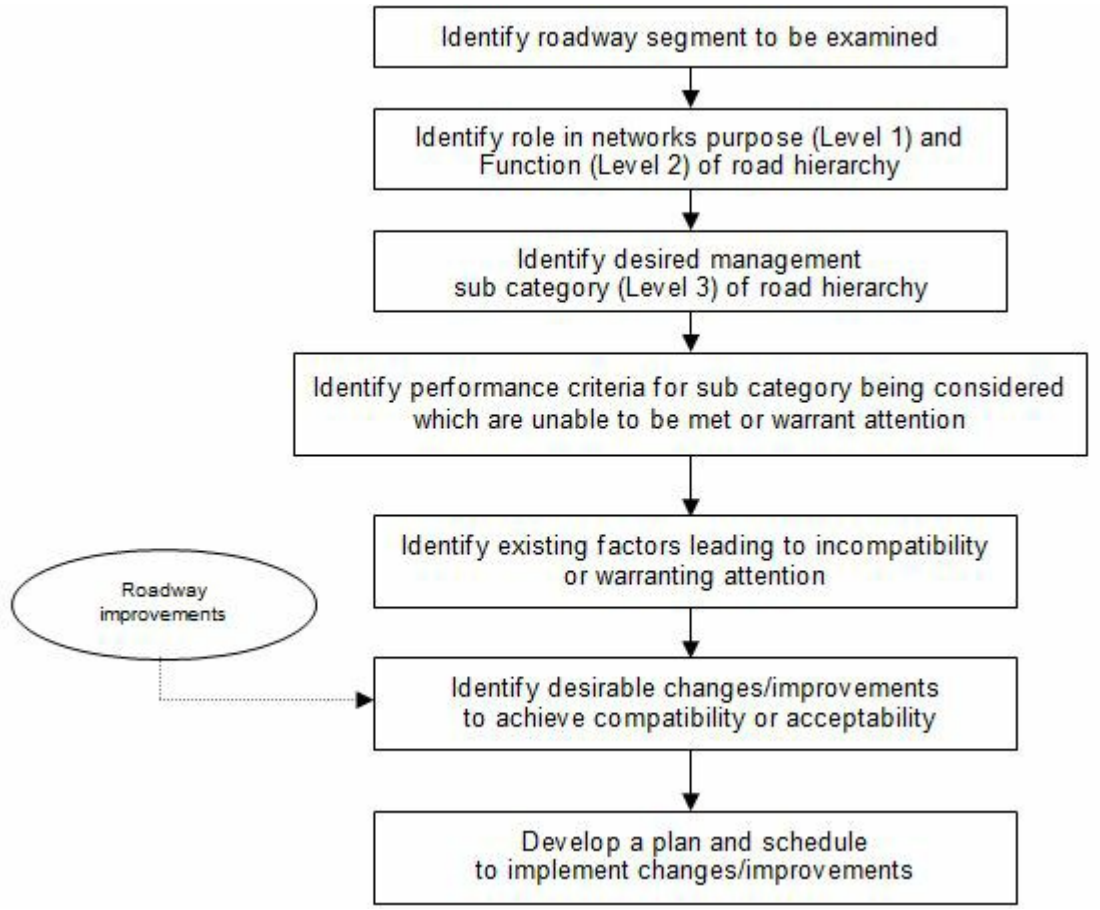


Figure SC6.4.3.13.3 Linear integrated transport planning (LITP) process

(4) Hierarchy Level 4 - Design

The fourth level of the road hierarchy framework relates to specific design criteria that are applicable to each sub category in Level 3. Level 4 aims to provide the tools with which to specify the form required of individual road hierarchy elements in order that they achieve their functional objectives. The roadway design should meet safety objectives as well as capacity and amenity objectives, where relevant. In conjunction with Level 3 objectives, it should also dictate the type of facility and design form for pedestrians, cyclists and public transport.

For each roadway, there are design elements that combine to produce a cross section or form for the roadway. SC6.4.3.13 Attachment D.1 and SC6.4.3.13 Attachment D.2 provide a set of desirable performance criteria for urban and rural areas and SC6.4.4.8 Standard drawings also includes a set of road cross sections. The design elements identified are those applicable to the road cross section away from intersections (i.e. mid-block cross section). Intersection requirements will dictate other specifications. For example, widening at intersections and future planning are an important part of defining these overall requirements. These design element details and the cross sections have been prepared for new roadways; council recognises that there will need to be variations to this to suit existing roadways (i.e. existing road forms and existing road reserve widths) in the process of network design.

It is important to note that the Level 4 specifications represent mandatory or desirable specifications. There will be other constraints (e.g. topography, role in the range of networks, existing land uses, road reserve, and physical elements), which mean that the specifications may be varied from time to time. Whilst this flexibility needs to exist, it is important to keep an appropriate balance between mandatory standards, desirable

objectives and constraints in order to develop an appropriate road form for each individual situation whilst still maintaining some consistency in the overall road network. The objectives and performance criteria should be maintained wherever possible.

In any case, all design criteria should be considered in line with relevant documents and proper guidelines, for example, other parts of the Development manual planning scheme policy, DTMR guidelines, AUSTROADS, MUTCD, Australian Standards, Queensland Streets, and Complete Streets for the local street level.

Note—posted speed limits are to be designated in accordance with the MUTCD-Part 4, and are required to be approved by council.

(a) **Arterial**

Administrative responsibility for roads is based on historical and political decisions as well as function within the hierarchy. Highways are administered by DTMR. The need to combine local activity planning with road planning could lead to greater local government involvement in the management of Arterial main streets. Arterials span these areas and responsibility may lie with either the state or local government.

Highway/motorway in urban/rural areas

These roads serve regionally and nationally significant movements and longer distance movements. To provide for a high standard of travel, speed environments of 100km/h or more are desirable, together with no frontage access. If frontage access does occur, then elimination of direct access from the abutting land use should be pursued.

These roads should also provide the primary freight routes and dangerous goods routes, and carry coach traffic between centres and regular public transport (RPT) bus traffic under a line haul mode. Any pedestrian and cycle facilities in urban areas should be located separately from the carriageways and protected accordingly. Crossing provisions should be grade separated. Grade separated intersections are desirable for all facilities in this category, although this will essentially be driven by volume demand or safety issues rather than hierarchy.

The road reserve width will often be dictated by the need for adjacent service roads, buffer zones and ancillary uses in the road corridor (e.g. cycle facilities, bus lanes). Divided carriageways are desirable to optimise safety and driver comfort. However, a two lane undivided cross section may be appropriate for low traffic volumes on a rural highway, provided there are sufficient overtaking opportunities. Whilst cycle facilities, pedestrian paths and bus lanes may be provided in the overall corridor, these facilities should desirably be separated from the through roadway and therefore represent an additional carriageway within the overall corridor. In rural areas, it is recognised that the demand for these adjacent facilities will generally be low.

Abutting land use types should be non-sensitive to vehicular traffic and generally not have frontage or direct access to the roadway. Uses associated with traffic such as highway service centres with amenities may be deemed appropriate in some locations based upon a needs assessment. In such cases, these would be provided with high quality direct access. Design standards for highways will primarily be set according to a high design speed and to maximise road user safety. In particular, the provision of wider shoulders is important in high speed locations.

In urban areas, grade separated intersections on urban roadways should be spaced at least 2 km apart. Intersections at grade on existing highways should be spaced no less than 1 km apart and are generally found to be between 1 km and 2 km apart.

In rural areas, if some land use provides for frontage access due to historic events, then any works undertaken to reduce this frontage access will enhance the traffic carrying capability of the highway in terms of both volume and speed. Whilst volumes may be low, the high traffic speeds mean that safety issues are important at access locations and reductions in the frequency of accesses will reduce the crash rate. Provision of pedestrian and cycle facilities will generally be related to demand and the need for a link associated with network planning. Grade separated intersections should be spaced between 4 km and 8 km, with a maximum spacing of 12 km.

Arterial in urban/rural

Arterials cater for external or intra-regional traffic and traffic between suburbs or major centres. These facilities should preferably have no direct access for all land uses. However, they often do have direct accesses due to past land use decisions, so longer term access limitations and land use amalgamation should be pursued so that the traffic carrying role can be progressively enhanced.

The design standards are set to achieve a balance between safety and efficiency. In this case, spacing of intersections will often control the design speed and hence other design elements. There will be many existing situations where the road design is constrained by elements such as the road reserve, property access and road width. In such situations, an individual design form will need to be developed to suit the constraints, whilst still achieving the arterial road objectives.

The policy is to pursue no direct access from individual properties to arterial roads. Examples of alternative treatments include:

(i) side street entry to corner blocks; and/or

(ii) combining driveways; and/or

(iii) creating rear lane access; and/or

(iv) creating easements to service multiple properties.

To facilitate efficient traffic movement, a higher speed environment is desirable. Limits of 80 km/h for new arterial roads and 70 km/h for existing arterial roads and where physical constraints exist in urban areas, and up to 100 km/h in rural areas are recommended. Speeds in excess of the above stated speed are generally not appropriate with intersections at grade and high traffic volumes.

These roads may provide the primary freight routes and often provide secondary freight routes. Selected routes may be appropriate for dangerous goods movement. They accommodate inter urban and inter centre coach traffic and RPT bus traffic under a line haul mode with priority treatment. Any bus stops should be separate from the through traffic lanes.

Pedestrians should preferably be located separately from the carriageways, and pedestrian crossings provided at signalised points. Cycle facilities can be provided in exclusive bike lanes or on the road shoulder on roads with a speed limit less than 80 km/h, provided AUSTROADS guidelines are met. In locations where the speed limit is higher than 80 km/h, and where a high percentage of school cyclists are likely, or where there is a cycle accident history or identified potential, consideration should be given to locating these facilities separate from the carriageway.

A number of traffic lanes have to be acquired, with a minimum of a four to six lane carriageway for ultimate traffic growth, and provision made for a proper width to cater for kerb and channel, medians, bus stops and bike lanes. For the interim, a two lane undivided cross section may be appropriate for a low traffic volume environment whilst achieving affordability, sufficient overtaking opportunities, vehicle breakdown, stopping or turning vehicles and bicycles. However, divided carriageways are desirable to optimise safety and driver comfort.

The abutting land use should preferably be less noise sensitive, or alternatively should include building and site designs that minimise impacts from adjacent traffic flows.

In urban areas, intersections are generally configured at grade for this sub-category. Signalised or roundabout control is generally appropriate although high volumes may necessitate grade separation. Intersections should be spaced a minimum of 500 m apart.

In rural areas, direct access can be tolerated due to low volumes and limited frequency. However, appropriate safety levels must be achieved and the aim should be to remove such accesses over time. Intersections are generally configured at grade for this sub-category. Priority control is generally appropriate and intersections should be spaced a minimum of 1km apart due to the higher speed environments. However, a proper intersection type has to be assessed and determined using traffic

analysis.

Arterial main street in urban areas
This category is directed at existing situations in urban areas, including villages, where a group of commercial land uses exists, generally on both sides of an arterial road. In these situations a decision needs to be made, dependent on the value of these uses, whether the traffic carrying and access functions should coexist, or whether a bypass or parallel route upgrade is warranted. If it is decided that these functions should coexist, whether in the short or long term, measures will need to be developed as part of an LITP to address this mix.

These design standards are primarily aimed at safety and ensuring pedestrian mobility in conjunction with parking and vehicle access. Traffic volumes may be so high that amenity to roadside activities is limited. However, as these are arterial roads, traffic volumes should not be moderated except by bypassing where feasible.

Speeds on these facilities should be kept sufficiently low to provide for safe pedestrian crossing at controlled points and to maintain environmental amenity for adjacent land uses, but still allow for efficient traffic movement. These roads should provide for pedestrian movement on both sides with crossing at controlled points, and with bicycle lanes on the road to avoid mixing with denser pedestrian traffic.

Limiting the frequency of property access is important for the traffic carrying capacity and also for the amenity levels associated with significant pedestrian traffic in the ‘main street precinct’. Streetscaping would assist in ameliorating visual and audible land use impacts.

A number of traffic lanes will have to be acquired to enable four lane or six lane carriageways (if a corridor is likely to take a key public transport route associated with the adjacent land use, e.g. potential exclusive PT lane) for ultimate traffic growth and provision made for proper width to cater for kerb and channel, medians, indented bus bays to reduce delay to through traffic and bike lanes. Opportunities should be sought to bypass freight movements. This category is generally inappropriate as a dangerous goods route.

Intersections may be closely spaced along these facilities due to past planning and land use decisions. Desirably, to avoid queue interaction, intersections should be spaced a minimum of 150 m apart.

This sub category is included in order to acknowledge its existence, and to provide for special cases, but it is not an option recommended for the future due to the difficulties of managing the conflicting access and mobility functions. Within the rural road hierarchy, "Arterial Main Street" is not considered appropriate.

(b) **Sub arterial road design standards**

(i) **Traffic distributor in urban/rural**
These traffic carrying roads are the key supplement to the arterial road network. They should connect between arterials and specific areas and should be more convenient than using the internal streets. Consequently, a higher level of efficiency and safety should be provided. Volumes are carrying preferably up to 25,000 vpd for amenity, as abutting land uses should be non-sensitive.

To make these roadways more attractive than internal streets, a higher speed environment is desirable. Speed environments of between 70 km/h~80 km/h in urban and up to 100 km/h in rural areas are recommended. The policy is to pursue no direct access to individual properties. Examples of treatments include:

(A) side street entry to corner blocks;

(B) combining driveways;

(C) creating rear lane access;

(D) creating easements to service multiple properties.

In the preferred design form, access should be restricted and be managed through treatments such as amalgamated entry points or side streets as discussed above. This would be the treatment pursued as part of any new development. Access for major developments, multi-unit dwellings, schools, child care centres, and/or commercial uses may be provided along these routes, provided it is controlled through channelisation or signals.

These roads may serve as secondary freight routes. Nominated routes may be appropriate for dangerous goods movement. They could accommodate RPT traffic under a sweeper mode. Any bus stops should be located separately from the through traffic lanes.

In most circumstances, specific provision for control of pedestrian movements should be provided and roadside parking will be discouraged. Usually, the prime concern will be the movement of traffic, so traffic management techniques could be applied (such as access minimised by consolidation of development accesses or side road access to sites). Noise and visual amenity impacts on surrounding uses should be managed through site considerations and/or road treatents.

Cycle facilities can be provided in exclusive bike lanes or on the road shoulder on roads with a speed limit less than 80 km/h, provided AUSTROADS guidelines are met. In locations where the speed limit is higher than 80 km/h, where a high percentage of school cyclists are likely or where there is a cycle accident history or identified potential, consideration should be given to locating these facilities separate from the carriageway.

A number of traffic lanes have to be acquired, with a four lane carriageway for ultimate traffic growth, and provision made for a proper width to cater for kerb and channel, medians, bus stops and bike lanes. For the interim, a two-lane undivided cross section may be appropriate for a low traffic volume environment whilst achieving affordability, sufficient overtaking opportunities, vehicle breakdown, stopping or turning vehicles and bicycles. However, divided carriageways are desirable to optimise safety and driver comfort.

In urban areas, paved footpaths are required on one or both sides depending on the demand of pathway usage to abutting land use and traffic facilities (e.g. bus stops) with pedestrian crossings at controlled points. Intersections at grade are appropriate for this management type. Signalised or roundabout control is generally appropriate although priority controlled intersections may be acceptable; this will be determined by a traffic analysis study. Intersections are typically spaced 250~400 m apart.

In non-urban areas, although access is restricted in the preferred design form, individual lot accesses are acceptable, particularly if the access points are widely spaced and properties are well set back. Pathways are only required where the road serves an identified pedestrian linkage, with pedestrian crossings at controlled points. Roundabouts or priority control are generally appropriate, although this will be determined by a traffic analysis study.

(ii) **Controlled distributor in urban/rural**

The hierarchical objective of this sub-category is to maintain the traffic carrying function as a primary role but also to allow frontage and parking (with appropriate conditions) to achieve an environment whereby "overlooking" can enhance personal safety. The controlled distributor should be used where adjacent frontage development exists, or is planned. It can be expected to be used where residences are within reasonable walking and cycling distance of regularly accessed community destinations, e.g. schools, shops.

A number of traffic lanes have to be acquired, with a four lane carriageway for ultimate traffic growth and provision made for a proper width to cater for kerb and channel, medians, bus stops and bike lanes. For the interim, a two lane undivided cross section may be appropriate for a low traffic volume environment whilst achieving affordability, sufficient overtaking opportunities, vehicle

breakdown, stopping and turning vehicles and bicycles. However, divided carriageways are desirable to optimise safety and driver comfort.

To satisfy the competing demands of traffic carrying efficiency and property access/on street parking, it is important to separate parked cars and turning vehicles from the through traffic lanes. This will require carriageway widths greater than a traffic distributor. The verge widths need to include landscaping, pathways and separation. This will be an important factor in subdivision planning when determining the lot layout and road reserve needs.

These design standards are primarily aimed at safety and ensuring pedestrian mobility in conjunction with parking and vehicle access.

In the conventional sub-arterial design case it is desirable to have no direct access to individual properties; however, consolidated access along the controlled distributor would be acceptable if the appropriate form of traffic control can be provided at these points.

This category of road is a response to relatively unique situations and often evolves as a result of previous planning decisions. By definition, these are roads where an aspect such as speed or vehicle composition up to 20,000 vpd is controlled. Such control may be:

(A) limiting speed to 60 km/h where frequent direct residential or commercial frontage exists;

(B) limiting volumes to avoid excessive pressure on abutting land uses;

(C) limiting heavy vehicle usage to protect the amenity of abutting uses;

(D) limiting speed and/or usage of particular vehicle types where alignment constraints exist.

On roads where frequent access to adjacent land uses exists and cannot be removed or consolidated, measures should seek to achieve safe access while retaining the convenience and efficiency of the route for through traffic. This may include a lower speed environment, but it should not be so low as to cause rat running elsewhere, for example, 60 km/hr in urban areas and 60~80 km/h in rural areas. Other measures could include the protection of adjacent parking by indented bays, bicycle paths, and landscaping. A longer term aim should be to reduce access if opportunities arise.

Access for individual lots should be controlled using one or more of the following measures:

- central median (no right turns) ;
- turning lane separate from through traffic lane;
- large lot frontage;
- lot layout to avoid on street visitor parking (large lots) ;
- adjacent properties having adjacent driveways.

When a road is designated as a controlled distributor, an LITP should be prepared to identify the need to control any aspect(s) of this road, and the most appropriate form(s) of control.

(iii) **Sub arterial main street in urban areas**

This category is directed at situations where a group of commercial land uses exists, generally on both sides of a sub arterial road. On these stretches of road a decision needs to be made, dependent on the value of these uses, whether the traffic carrying and access functions should coexist, or whether a bypass or parallel route upgrade is warranted.

If the traffic carrying and access functions need to, or should coexist, whether in the shorter or longer term, management measures will need to be developed as part of an LITP to address the coexistence of these two functions.

In contrast to the arterial sub-category, the traffic environment on sub arterial roads may be restricted to improve the amenity for pedestrians and users of the adjacent developments. Measures may be taken to reduce some traffic use of the road, for example, during peak periods,

and opportunities should be sought to bypass freight movements.

This category is generally appropriate as a bus route, and indented bays should be provided to reduce delay to through traffic. This category is generally inappropriate as a dangerous goods route.

Speeds should be kept low to improve amenity to pedestrians and abutting land uses, and should be no greater than 60 km/h. Volumes should be no greater than 15,000 vpd in order to maintain amenity to abutting land uses. These roads required a balance between accessibility and mobility, using environmental street design or streetscaping.

In special cases, a number of traffic lanes will have to be acquired to enable four lane or six lane carriageways for ultimate traffic growth (if a corridor is likely to take a key public transport route associated with the adjacent land use, e.g. potential exclusive PT lane), and provision made for a proper width to cater for kerb and channel, medians, bus stops and bike lanes. For the interim, a two lane undivided cross section may be appropriate for a low traffic volume environment, whilst achieving affordability, sufficient overtaking opportunities, vehicle breakdown, stopping and turning vehicles and bicycles. However, divided carriageways are desirable to optimise safety and driver comfort.

This category should provide for pedestrian movement on both sides with crossings at controlled points, and with bicycle lanes on the road to avoid mixing with denser pedestrian traffic. Intersections should be controlled by way of signalisation or roundabouts, although priority intersections may be appropriate. Spacing of intersections is site specific, based on past planning and land use decisions, although a minimum spacing of 150 m is desirable to avoid queue interaction. Within the non-urban road hierarchy the ‘Sub-Arterial Main Street’ is not considered appropriate.

(c) **Major collector road**

Major collector roads provide a connection between the local streets and the traffic carrying roads and mark a shift in the environment between roads and streets. The design standards place a greater emphasis on travel time efficiency and strict guidelines for safety and environmental amenity should be adhered to on these roads.

Traffic flow levels commonly accepted range from 3,000 vpd up to 12,000 vpd. Access to multi-unit residential developments, schools or shopping centres may well be via major collectors. Individual residential lot access to these roads should be restricted, and generally a speed environment of 60 km/h to provide for safety and amenity while ensuring travel times are reasonable. Heavy vehicle and dangerous goods movement should be restricted in residential areas, with the exception of service vehicle movement. Buses will generally operate in a sweeper role and indented bays may be required to maintain safety at some locations.

Pathways and bicycle lanes should be provided on one or both sides of the road. However, in non-urban areas, pathways are generally not required unless network planning deems it appropriate. Some controlled pedestrian crossing points may be required in urban areas, particularly where traffic volumes are higher. Kerbside parking could be provided for in urban areas.

Intersections are typically spaced 80 m to 100 m in urban areas and up to a maximum 200 m in non-urban areas. Intersection control would generally be either by roundabout or priority control. These roads should have two or four lane carriageways, depending on the degree of frictional and impact characteristics criteria that apply.

Environmental street design may be required in urban areas to moderate speeds and minimise through traffic penetration. Streetscaping would also assist in ameliorating visual and noise impacts to abutting land uses.

(d) **Local streets**

Level 3 sub categories mainly relate to managing and providing treatments for residential streets in the road hierarchy. However, consideration must also be given to non residential local streets, e.g. in industrial and commercial areas. It should be noted that this document will not deal specifically with "streets" (as per Level 1), but the following principles may be appropriate for general application across various council standards and requirements.

The primary transport function of a local street is to provide direct property access. An access place is typically a cul-de-sac with no through traffic and its catchment is its abutting lots. Depending on network design, these streets may also provide a minimal amount of indirect access, for properties on access places that may branch off.

The management of these streets is less restrictive due to low traffic volumes, property access and parking. Volumes should be limited to below 3,000 vpd and the speed environment to 30~50 km/h in urban areas to ensure amenity for abutting land uses, it is noted that posted speeds will be at 50 km/hr, and to a maximum 60 km/h in rural areas to ensure reasonable travel times.

Heavy vehicles and dangerous goods movement should be restricted in residential areas, with the exception of service vehicles. In a minor collector as a minimum level, bus routes may be available in a sweeper role but access streets would generally not cater for bus services. However, access streets in rural areas may cater for bus services (subject to demand), especially to serve school children, due to the greater walking distances. Kerbside bus stops are generally appropriate, although indented bays may be required to maintain safety at some locations.

The provision of pathways is generally not necessary, although this may be appropriate in some instances as a requirement of network planning. No specific pedestrian crossing provision is required. No special cycle facilities are needed as these users should be able to share the road space due to the low traffic volumes and speeds.

No specific parking provision is required on these streets.

Intersection spacing is a minimum of 40~60 m in urban areas and 100 m in rural areas. Some intersections may be controlled by roundabouts; otherwise, priority control should be sufficient. These streets should have a two lane cross section, or one lane where necessary, with reasonable travel efficiency.

Environmental street design may be required in urban areas to moderate speeds and minimise through traffic penetration. Streetscaping would also assist in ameliorating visual impacts on abutting land uses.

If significant development occurs in the future in rural areas, then it may be appropriate to reclassify these streets as ‘major collector’ if the catchment size or density increases significantly. Accordingly, allocations should be made in the network planning.

In urban areas, the primary design objective is to maximise safety and amenity for adjacent properties and adjacent activities/users (i.e. pedestrians, cyclists, car parking, children playing). The most important design standard in this regard is the maximum design speed. Travel time efficiency will be compromised over safety and amenity aspects by appropriate subdivision design. Such design includes consideration of the maximum volume (by catchment size), the design speed (by street length) and the travel time efficiency (by connectivity of streets). It is this category of roadway whereby design standards are well defined because of the clear principles set out in such documents as *Queensland Streets* and *Complete Streets.*

In rural areas, the primary design objective is to minimise the cost of roadway provision whilst still maintaining acceptable performance levels (as a result of the very low volume use). Travel time efficiency will be compromised over safety and amenity aspects. There may be an issue with dust nuisance, which may be one of the factors considered when determining whether the road should be sealed or not. The

low traffic volumes anticipated on some minor collector streets requires the need for a single lane cross section alternative, as well as the two lane form. There may also be a demand for the provision of horse trails within the road verge, and in this case a widened verge may be required to cater for these.

(e) **Non residential local street**

Similar roles apply to collector streets in commercial (including CBD) and industrial areas. Generally, higher traffic volumes can be tolerated on such streets than accepted in residential areas. Fewer lots would be served in commercial and industrial areas by these streets than low density residential areas, due to the high trip generation of the land uses. Significantly higher heavy vehicle proportions and tolerances for environmental factors such as noise would be acceptable on such streets in industrial areas.

Key performance criteria for collector streets in industrial areas are as follows:

(i) traffic volumes not greater than 3,000~6,000 vpd depending on the environmental cell type;

(ii) speed environment of 50~60 km/h;

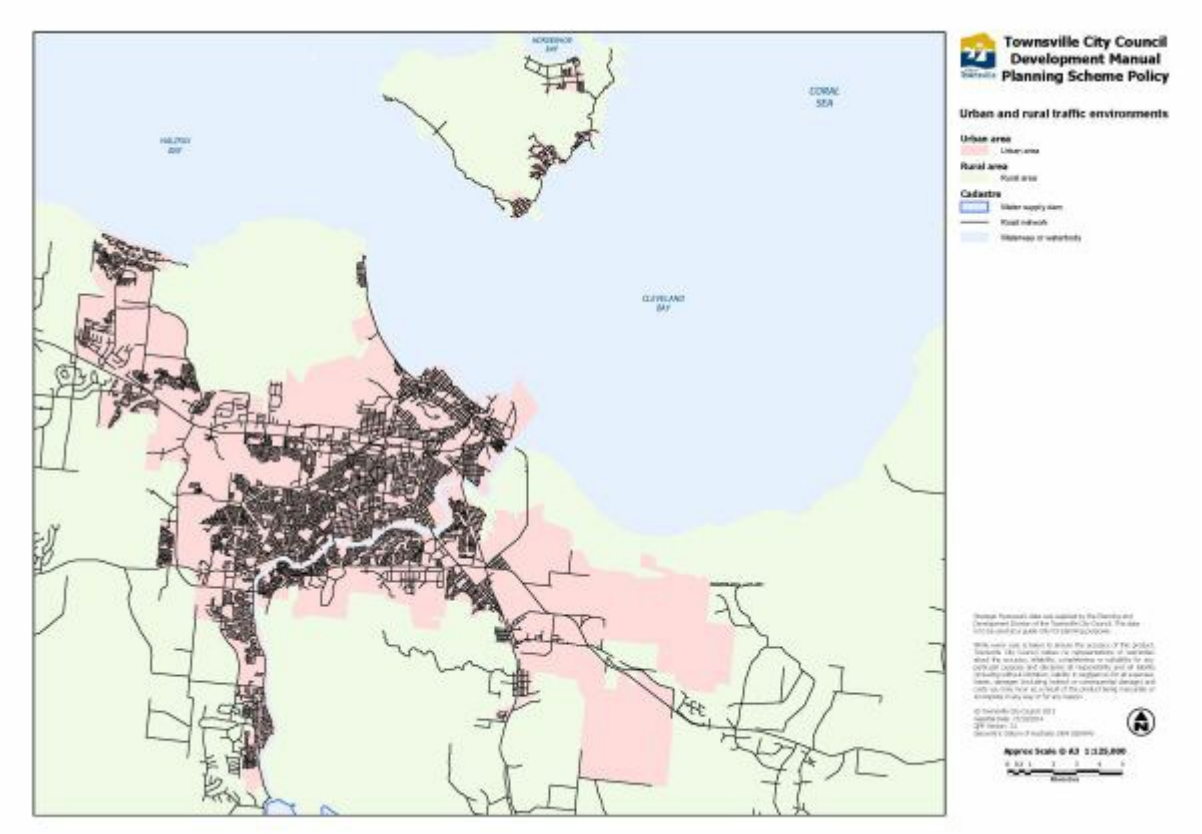
(iii) provision of parking lanes on both sides of the street;

(iv) provision of bike lane on the carriageway;

(v) provision of paved pathway on either or both sides of the street; and

(vi) sufficient heavy vehicle turning radius at access points or in cul-de-sacs.

SC6.4.3.13 Attachment A Urban and rural traffic environments map



Click here to view PDF high resolution map.

SC6.4.3.13 Attachment B1 Road hierarchy elements and their objectives in urban areas

LEVEL 1: PURPOSE							
Roads							**Streets**
• to carry through traffic							• to provide local property access; and • to collect local traffic
LEVEL 2: FUNCTION							
Arterial roads			**Sub-arterial roads**			**Major collector roads**	**Local streets**
• through traffic movements across town; • longer distance strategic traffic movements; • primary connection between suburbs and employment, economic, education or entertainment centres; • line haul public transport task; • primary freight and dangerous goods routes; and • regional cycle movements.			• through traffic between arterial roads; • connections between local areas and arterial roads; • access to public transport; • through movement of public transport; • regional – local cycle movements; and • pedestrian movements.			• balance between carry traffic and access within the specific area; • direct access to grouped properties; • access to public transport; • pedestrian movements; and • local cycle movements.	• direct access to properties; • pedestrian movements; and • local cycle movements.
LEVEL 3: MANAGEMENT							
Highway/ Motorway	**Arterial**	**Arterial main street***	**Traffic distributor**	**Controlled distributor***	**Sub-arterial main street***	**Major collector**	**Local street**
The aim of management policies for these categories will be to facilitate:							
• longer distance traffic movements between towns; and • regionally and nationally significant movements.	• longer distance traffic movements between suburbs and other centres.	• longer distance traffic movements; • access to commercial properties; • car parking; • pedestrian movements. *Treatment may involve preservation of aspects of local amenity in balance with traffic operation*	• connection of local areas to arterial roads; • through movements between arterial roads; and • access to major developments	• connection of local areas to arterial roads; • access to properties (certain existing cases) • car parking; and • pedestrian movements. *Treatment may control some aspects of traffic operations to ameliorate impacts*	• connection of local areas to arterial roads; • access to commercial properties; • car parking; and • pedestrian movements. *Treatment may involve preservation of aspects of local amenity in balance with traffic operations.*	• connection of local streets to arterial roads; • access to grouped/ commercial properties and community facilities; • car parking; and • pedestrian movements *Treatment may involve preservation of aspects of local amenity in balance with traffic operations.*	• connection of local streets with traffic carrying roads; and • access to individual adjacent properties • connection to other local streets.
LEVEL 4: DESIGN							
According to relevant guidelines and codes including SC6.4 Development manual planning scheme policy, DTMR guidelines, AUSTROADS, *MUTCD*, *Queensland Streets*, Australian Standards and *Complete Streets* for the local streets level.							

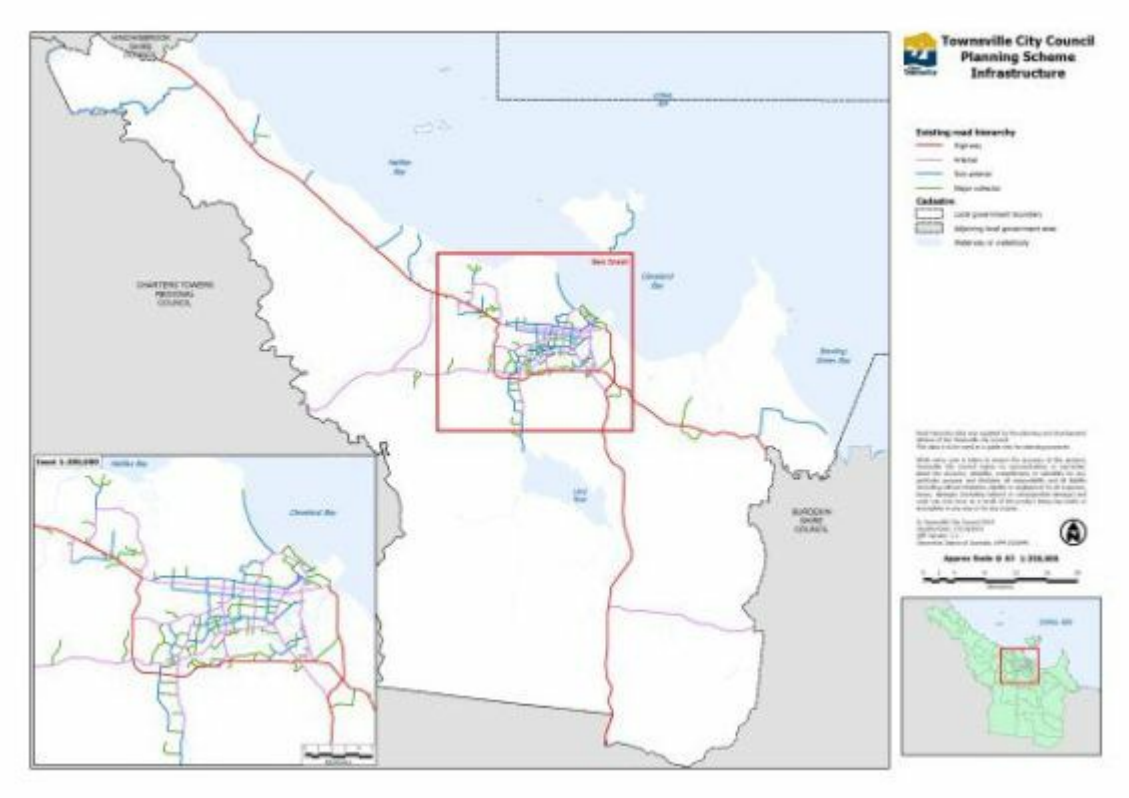
Note—* Only permitted in existing cases or special cases. Therefore treatment may involve preservation of existing land use but discouraging further access points to the adjacent land development.

SC6.4.3.13 Attachment B2 Road hierarchy elements and their objectives in rural areas

LEVEL 1: PURPOSE					
Roads					**Streets**
• to carry through traffic					• to provide local property access; and • to collect local traffic
LEVEL 2: FUNCTION					
Arterial roads		**Sub-arterial roads**		**Major collector roads**	**Local streets**
• through traffic movements between towns; • longer distance strategic traffic movements; • primary connection between town and employment, economic, education or entertainment centres; • line haul public transport task; • primary freight and dangerous goods routes; and • regional cycle movements.		• through traffic between arterial roads; • connections between local areas and arterial roads; • access to public transport; • through movement of public transport; and • regional – local cycle movements.		• connections between local streets and arterial/sub-arterial roads; • carry traffic having a trip end within the specific area; • direct access to grouped properties; • access to public transport; and • local cycle movements.	• direct access to properties; • pedestrian movements; and • local cycle movements.
LEVEL 3: MANAGEMENT					
Highway/ Motorway	**Arterial**	**Traffic distributor**	**Controlled distributor***	**Major collector**	**Local street**
The aim of management policies for these categories will be to facilitate:					
• longer distance traffic movements between towns; and • regionally and nationally significant movements.	• longer distance traffic movements between town and other centres.	• connection of local areas to arterial roads; • through movements between arterial roads.	• connection of local areas to arterial roads; • through movements between arterial roads; • access to properties (certain existing cases) or industrial/commercial properties; • car parking; and • pedestrian movements. *Treatment may involve preservation of aspects of local amenity in balance with traffic operation*	• connection of local streets with traffic carrying roads; and • access to individual adjacent properties.	• access to individual adjacent properties; and • connection to other local streets.
LEVEL 4: DESIGN					
According to relevant guidelines and codes including the SC6.4 Development manual planning scheme policy, DTMR guidelines, AUSTROADS, *MUTCD*, Queensland Streets and Australian Standards.					

Note—* Only permitted in existing cases or special cases. Therefore treatment may involve preservation of existing land use but discouraging further access points to the adjacent land development.

SC6.4.3.13 Attachment C1 Townsville road hierarchy map (existing)



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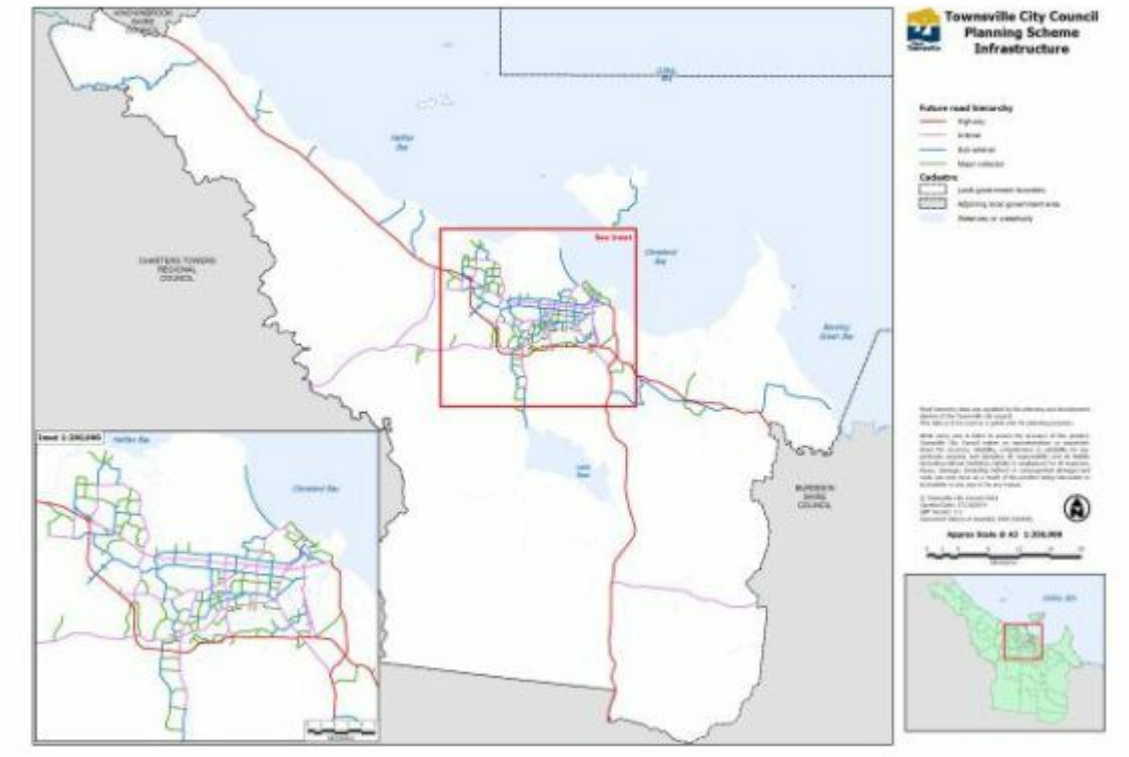
SC6.4.3.13 Attachment C2 Townsville road hierarchy map (future)



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SC6.4.3.13 Attachment D1 Road hierarchy desirable performance criteria in urban areas

Criterion	Roads							Streets
	Arterial roads			Sub arterial roads			Major collector roads	Local streets
	Highway/ motorway	Arterial	Arterial main street*	Traffic distributor	Controlled distributor*	Sub arterial main street*	Major collector	
Functional Characteristics								
Dominant linkage	Regional	City, Suburbs, Major centres	City, Suburbs, Major centres	Specific area	Specific area	Specific area/ main sites	Main Sites/ Environmental cell	Refer to SC6.4.4 Design specification and standard drawingds
Traffic carrying function	Volumes not restricted	Volumes not restricted	Volumes not restricted	preferably <25,000vpd	preferably <20,000vpd	preferably <15,000vpd	<12,000vpd	
Residential access function	Nil	Nil	Nil, consolidated/ no new access	Nil	Nil desirable, site specific-subject to negotiation with council/ no new access	Nil desirable, site specific-subject to negotiation with council/ no new access	Limited-subject to negotiation with council	
Commercial access function	Nil	Nil	Site specific	site specific-subject to negotiation with council	site specific-subject to negotiation with council	site specific-subject to negotiation with council	site specific-subject to negotiation with council	
Industrial access function	Nil	Nil	Nil	Nil	Nil	Nil	site specific-subject to negotiation with council	
Desirable traffic speed environment	>=100km/h	70-80km/h	60km/h	60-80km/h	60km/h	60km/h	50~60km/h	
Heavy traffic movement	Primary freight routes	Primary/ secondary freight routes	Should bypass except for access	Secondary routes	Should bypass except for destination or return only	Should bypass except for destination or return only	Destination or return only	
Dangerous goods movement	Primary routes	Selected routes only	Inappropriate except for access	Selected routes only	Selected routes only	Inappropriate except for destination or return only	Inappropriate except for destination or return only	
Public transport facilities	Line haul, priority treatments use high frequency, limited stops, peak express, local and feeder	Line haul, priority treatments	Bus route, bus lanes where required	Bus route	Bus route, bus lanes where required	Bus route, bus lanes where required	Bus route	

Cycle facilities	Trunk Routes, off carriageway	Trunk Routes, off carriageway or cycle lanes on road	Trunk/ District routes, cycle lanes on road	Trunk/ District routes, cycle lanes on road	Trunk/ District routes, cycle lanes on road	Trunk/ District routes, cycle lanes on road	District/ Neighbourhood routes, cycle lanes on road
Paved footpath *As per council standard*	Only where linkage required, separate from road	Only where linkage required	Both sides	One or both sides	One or both sides	Both sides	One or both sides
Frictional Characteristics							
Preferred access control	No access	No access	Selective access control	Combined sites only tolerated	Selective access control tolerated	Selective access control tolerated	Combined site access preferred
Parking provision	No parking on roadway	No parking on roadway	Selective routes or corridors	No parking on roadway	Selective routes or corridors	Selective routes or corridors	Provide for kerbside parking
Bus stop provision	None on road	None on road	Indented bays	Indented bays	Indented bays	Indented bays	Indented bays
Pedestrian crossing Locations	Grade separated	Signalised	Controlled points	Controlled points	Controlled points	Controlled points	Some controlled points
Typ. Intersection spacing	1-2km highway >=2km motorway	500-1000m	500m desirable, 150m minimum	200~500m	200~500m	150-500m	80-200m
Preferred intersection treatments	Grade separated	signal/ roundabout	Signal/ roundabout/ priority	Signal/ roundabout/ priority	Signal/ roundabout/ priority	Signal/ roundabout/ priority	Signal/ roundabout/ priority
Number of traffic lanes	Volume driven, desirably divided	4~6 lanes, desirably divided	4~6 lanes, desirably divided	4 lanes, desirably divided	4 lanes, desirably divided	4 lanes or 6 lanes where PT needed, desirably divided	2~4 lanes, could be divided
Impact Characteristics							
Abutting land use types	Non sensitive	Non sensitive, vehicle associated	Retail/ commercial	Non sensitive to traffic	Preferably non sensitive to traffic	Retail/commercial	As specified under zoning
Land use impact amelioration	Barriers/ buffers/ Setbacks	Buffers/ streetscape/ setbacks	Streetscape	Streetscape/ Setbacks	Streetscape	Environmental street design/ streetscape	Environmental street design/ streetscape

Note— Only applied in existing cases or special cases.

a bus stop provision is required to be integrated with the paved footpath system

traffic study will determine. e.g. TIA (Traffic Impact Assessment)

SC6.4.3.13 Attachment D2 Road hierarchy desirable performance criteria in rural areas

Criterion	Roads					Streets
	Arterial Roads		Sub Arterial Roads		Collector Roads	Local Streets
	Highway/ Motorway	Arterial	Traffic Distributor	Controlled Distributor*	Major Collector	
Functional Characteristics						
Dominant linkage	Regional	Intra-regional, suburbs	Specific area	Specific area	Local area	Refer to SC6.4.4 Design specification and standard drawings
Traffic carrying function	Volumes not restricted	Volumes not restricted	Volumes not restricted	preferably <15,000~25,000vpd	preferably <10,000~15,000vpd	
Residential access function	Nil	Nil	Nil	Nil desirable, consolidated/ no new access	Consolidated	
Commercial access function	Nil	Nil	Consolidated	Consolidated	Desirably consolidated, site specific	
Industrial access function	Nil	Nil	Nil	Nil desirable, consolidated/no new access	Desirably consolidated, site specific	
Desirable traffic speed environment	>=100km/h	80-100km/h	80-100km/h	60~80km/h	60km/h	
Heavy traffic movement	Primary freight routes	Primary/secondary freight routes	Secondary routes	Should bypass except for access	Access only	
Dangerous goods movement	Primary routes	Primary/secondary routes	Nominated routes only	Nominated routes only	Inappropriate except for access	
Public transport facilities	Line haul, priority treatments	Line haul, priority treatments	Bus route	Bus route	Bus route	
Cycle facilities	Regional, off carriageway	Regional, on or off carriageway	Regional/local, on or off carriageway	Regional/local, on or off carriageway	Local on or off carriageway	
Pedestrian movement facilities	Separate from road where linkage required	Separate from road where linkage required	Separate from road where linkage required	Separate from road where linkage required	Separate from road where linkage required	
Frictional Characteristics						
Preferred access control	No access	No access	Selective access control	Selective access control	Combined site access preferred	
Parking provision	Nil	Nil	Nil	Nil	No specific provision	
Bus stopping provision	None on road	Dedicated bays where appropriate	Dedicated bays where appropriate	Dedicated bays where appropriate	Dedicated bays where appropriate	
Pedestrian crossing Locations	Grade separated	Controlled points	Controlled points	Controlled points	May require controlled points	
Typ. Intersection spacing	4-8km (maximum 12km)	>1km	>300m	>300m	>200m	

Preferred intersection treatments**	Grade separated/ priority	Roundabout/ priority	Roundabout/ priority	Roundabout/ priority	Roundabout/ priority	
Number of traffic lanes	Volume driven	Reservation for 4~6 lanes	Reservation for 4 lanes	Reservation for 4 lanes	Reservation for 2~4 lanes	
Impact Characteristics						
Abutting land use types	Non sensitive, vehicle associated	Non sensitive, vehicle associated	Non sensitive to traffic	Preferably non sensitive to traffic	As specified under zoning	
Land use impact amelioration	Setbacks	Setbacks	Setbacks	Setbacks	Setbacks	

Note— Only applied in existing cases.

A bus stop provision is required to be integrated with the paved footpath system

Traffic study will determine, e.g. TIA (Traffic Impact Assessment)