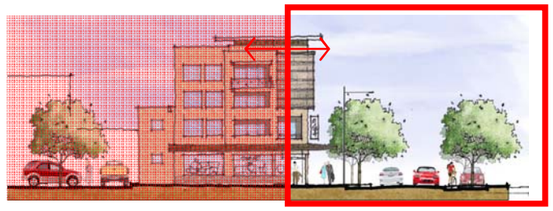
Issues Affecting the Street



There are many issues affecting how a road environment functions. These can be artificially separated into those that occur within the road reserve, and those that occur within adjoining land uses. Some overlap still occurs however, and in some cases issues in each are directly related - such as access management and property access.

Key elements within the road reserve include:

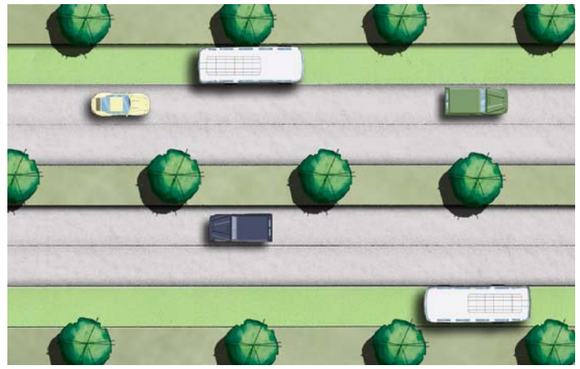
- Travel Lanes
- Cycle Lanes
- Pedestrians and Footpaths
- Pedestrians and Crossings
- Berms
- Landscaping
- Intersections
- Bus Lanes and Priority measures
- On-Street Parking
- Access Management
- Traffic Calming
- Grade Separation
- Road Safety and Directional Signage
- Bus Stops
- Street Furniture
- Street Lighting
- Paving Materials
- Sightlines and Safety
- Low Impact Design

TRAVEL LANES

Travel lanes refer to the general lanes used by vehicles and (in shared situations) with cycles. Shared environments that include pedestrians as well as vehicles can be suitable in very low speed zones on local-level roads but are not suitable in an arterial network context. Travel lanes should not have an operational width of less than 3m; whereas widths in excess of 3.5m can encourage excessive travel speeds and should be used only where necessary to accommodate larger vehicles (freight trucks or buses), or shared cycle / travel lanes.

Key issues relating to travel lanes include:

- Economic benefits can be associated with efficiency of travel movements (when congestion benefits exceed the costs of providing additional lanes);
- Congestion effects can be reduced;
- More lanes in response to high volumes often lead to eventually even higher vehicle traffic volumes. These translate to busier roads and associated impacts of vehicle noise and air pollution from vehicle emissions, accidents, congestion;
- The provision of multiple turning lanes at intersections can significantly widen them making very intense, difficult environments for pedestrians (especially as many crossings are at intersection signals);
- General lateral crossing opportunities diminish with increased road width / traffic intensity. This can sever communities;
- Additional lane width should accompany higher volume routes, and vice versa;



CYCLISTS

Adequate provision for cyclists is now accepted as a key component of sound transport planning. Not only can effective, high amenity cycle networks (both on and off-road) help to reduce unnecessary trips made by private vehicles (which in turn reduces congestion), they are important contributors to healthier lifestyles. Enabling the greatest possible convenient use of cycles across the Isthmus is therefore a central element of sustainable transport.

Key issues relating to cycle lanes include:

- Special consideration of cycle amenity should be had along routes used by children to access schools or community facilities;
- Cyclists can share with vehicular travel / bus lanes or pedestrian footpaths. Where a dedicated cycle lane is provided, it should aim to be 1.5m in width and be clearly demarcated. Where shared with a travel or bus lane, the lane should be either 4.5m (side by side), or 3.2m (bus forced to make a proper overtake manoeuvre). Where shared with a footpath, there should be a minimum of 3.0m width, and clearly demarcated pedestrian / cycle areas. Preference to whether the cycle lane should be either on-road or off-road, or on a suitable adjacent local network, should be made on the basis of relative traffic intensity and sensitivity;
- Busy roads can discourage cycling e.g. noise, air pollution from vehicle emissions, traffic dangers from lack of buffers and separation etc. Freight vehicles in particular can intimidate;
- Poor surface quality, bevelling and obstructions in existing travel lanes and intersections increase the likelihood of accidents;
- The speed environment is critical and lower design speeds may be justified in key areas of cyclist use.

PEDESTRIANS AND FOOTPATHS

Pedestrian footpaths in accordance with the Council's minimum arterial footpath standards will be provided along all arterials. This is necessary to enable basic non-vehicular based movement to and between properties.

Key issues relating to pedestrian footpaths include:

- Pedestrianisation adds to the vibrancy and quality of the public realm, through enabling face to face contact and interaction. However to maximise pedestrian movement, the built environment must provide high standards of interest, safety, and convenience. This means delivering direct, logical, safe, and interesting edge conditions along arterials;
- A large part of pedestrian amenity is related to the way in which land uses relate to and connect with the street (see Section 3 of this guideline);
- Walked trips reduce congestion and car parking requirements;
- Busy roads can discourage pedestrian use - walking next to multiple high intensity traffic lanes can expose people to noise, fumes, intimidation by the sheer intensity of movement occurring, and physical 'wind shear' associated with the close passage of rapidly moving large vehicles. These can indeed become more of a pedestrian barrier than very wide roads and long crossings. Careful consideration of buffers and amenity are required;
- Changes in footpath grade and pavement material, driveway location, and the unsatisfactory provision for good quality pedestrian movement during road works (where barriers may be needed in addition to just a physical space) require special consideration;
- Landscaping and street trees should be a key consideration.

PEDESTRIANS AND CROSSINGS

Pedestrian crossings are essential components of arterial road management. Casual crossing opportunities are increasingly rare and dangerous given the consistent volumes experienced along the network and the lack of sufficient gap acceptance for pedestrians to cross. The spacing of crossing points relates to travel efficiency as well as maintaining a viable pedestrian movement system (see above).

Key issues include:

- Zebra crossings may be appropriate in low speed environments but can lead to accidents caused by pedestrians assuming automatic safety and walking blindly in front of on-coming traffic. Signal controlled crossings offer more reliable safety but phasing becomes important to maintain acceptable levels of service;
- Pedestrian crossings should incorporate landscaping to improve streetscape amenity;
- The use of refuges should be considered in busy or along wide roads;
- Roundabouts improve vehicle efficiency but make pedestrian crossing difficult. Signal controlled intersections should be given preference in environments where pedestrian crossings would improve movement opportunities;
- Crossings at intersections are generally more appropriate than dedicated signals purely for pedestrian crossing purposes although intersection spacing relative to pedestrian desire lines becomes important - one crossing opportunity should be ideally provided at least every 400m of road length; and at least every 200m in residential areas and town centre environments.

BERMS

Berms are traditionally used for many purposes. Most notably, they help to separate pedestrians and land uses from moving traffic, but also are important elements of providing for streetscape amenity and visual interest in conjunction with landscaping. In many town centres situations, the berm has over time eventually become entirely paved to support pedestrian volumes.

Key issues include:

- Berms need to be recognised as a key component of the road. In low speed zones or low intensity environments a minimal or no berm may be justified (especially where on-street parking is present to still provide a buffer) but in all other instances one should be maintained;
- They can become (in conjunction with street trees) important habitat corridors, connecting major open spaces;
- They are often traditionally associated with piped and underground services;
- They act as a pervious surface to allow for the collection, short term detention and treatment of surface runoff from driveways and footpaths opposed to direct discharge of stormwater into piped systems. This can be built on to incorporate comprehensive low-impact stormwater treatment devices e.g. swales, tree pits and rain gardens;
- Provides a grassed area for animal care, important in residential areas;
- Can restrict the width of carriageway for either pedestrian or vehicle users;
- Requires on-going Council / private landowner maintenance.

LANDSCAPING

Landscaping is a critical tool to embody local character, identity, sense of place, and visual amenity into the road environment. It also helps to demark gateways to special areas, and can help to provoke driver attentiveness through changes to the road. This in particular can be effective around schools, community facilities, and town centres.

Key issues include:

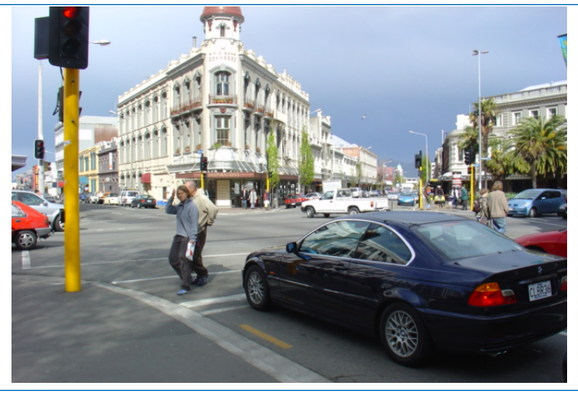
- It can create an effective psychological buffer between the carriageway and the footpath although considerations of canopy width in relation to pedestrians and large vehicles is important to maintain satisfactory tree health;
- Street trees in urban areas can be very constrained. Careful species selection is important. In areas of intensification, there can be instances where the road reserve offers the only opportunity for tall, mature tree retention - important for habitat;
- Street trees absorb CO2 released from vehicle emissions and on a city-wide scale may be considered to contribute to a carbon sink;
- Can creates a favourable natural microclimate i.e. shade in summer and protection or sunlight access in winter. A downside of this though can be that leaves and other debris can block drains;
- Poorly planned landscaping can restrict / reduce sightlines for road and footpath users. This can result in a decrease of safety e.g. vehicles less aware of pedestrians. Planting of bushes and well vegetated trees also has ability to create entrapment spots (hiding areas) which can increase the likelihood of crime;
- Long-term spatial planning may be necessary so that semi-mature trees do not need to be relocated for future projects.

INTERSECTIONS

Intersections play a large part in arterial road design. Intersection management alone is a significant planning exercise. Generally the use of signals should be favoured over roundabouts as they include a wider number of vehicle modes. In instances where more than four roads intersect, the best solution may be local network redesign to reduce the intensity of these intersections.

Other key issues include:

- Bus advance techniques should be considered although this can force a widening of the road reserve around the intersection;
- The use of left-turn slip lanes requires more land than a conventional left-turn lane and increases pedestrian crossing times but can help to reduce queue lengths. Consideration of pedestrian needs becomes more important here however as vehicles can turn at speed with attention focussed to the right (merging traffic) rather than on the footpath;
- In multi-lane roads intersections can become very wide, needing multiple straight, left-turn, and right-turn lanes. Where five or more lanes per direction are anticipated at an intersection, serious consideration of local network solutions to relieve right or left turning traffic demand should be had to retain appropriate scale at the intersection for pedestrians and other modes;
- They provide a formal location for pedestrians and cyclists to cross carriageways safely. Where a well connected network exists, these opportunities can be regular and very convenient;
- Too many intersections can have an effect on traffic flow efficiency. Access management and left in / left out only 'T' intersections for very low order local roads may be appropriate. Other forms of access management such as slip lanes may also have a role.



BUS LANES + PRIORITY MEASURES

Dedicated bus lanes are important in providing a competitive passenger transport system that commuters / other users will see favourably compared to travel by car. They ensure that reliable trip times can be relatively fast with minimal congestion inefficiency (when combined with appropriate intersection priority).

Key issues associated with bus lanes include:

- When bus lanes are only needed for commuter peak movements, the use of the bus lane for clearway parking can allow an efficient re-use of the carriageway although relies on an effective enforcement regime to keep vehicles out of the lane at peak;
- The provision of bus lanes must not act as a negative incentive to other preferred modes i.e. bus lanes that have the effect of lowering the attractiveness of a route to pedestrians or cyclists must be avoided;
- Bus lanes along the edge of a road offer convenience for passengers but can create difficulties for land use activities that share peak operating times with that of the lane (a good example is outdoor dining). This can have implications for their design in town centres and similar sensitive areas. Bus lanes traversing the centre of a road can be a solution to this problem but need high–quality, safe passenger stops without travel lane conflict and suitable provision for bus set downs that do not block the bus lanes. Due to their impacts on access and road width they may not be available in all circumstances;
- Left-turn vehicle slip lanes can help keep bus advance lanes clear rather than blocking them via vehicle queues.

ON-STREET PARKING

On street parking has particular relevance to town centres and areas of heritage residential uses where no off-street parking exists. The on-street parking lane can often be one of the first elements to be removed in widening projects (typically to produce an additional travel lane or at least a peak period clearway).

Key issues include:

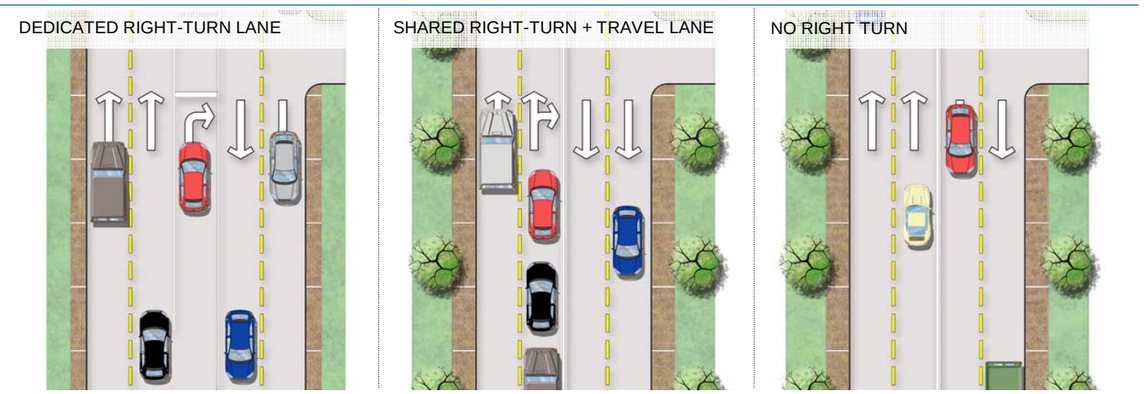
- → On-street parking is a critical contributor to the viability of street-based local retailing. If removed from town centres, it must be replaced in a highly legible, proximate location;
- → On-street parking lanes can provide street landscaping opportunities (between bays) to soften the road environment and help make the carriageway appear narrower thereby reducing vehicle speeds. It can also help to justify a reduced berm width;
- → Retains movement energy and focus on the street rather than off-street parking lots;
- → It acts as an effective buffer for pedestrians;
- → It can create issues for cyclists on a dedicated cycle lane as their reduced visibility (relative to a car) may see drivers opening vehicle doors into their path;
- → Parallel parking can be one of the most effective methods available of slowing the movement of traffic and helping pedestrian movements and crossings in sensitive environments such as town centres or schools;
- → Angle parking should generally be avoided unless supported by supportive road design, as it creates the most dangerous situation for passing cyclists as well as still impeding vehicle flow;
- → Demarcating or placing landscaping in parking lanes can help to make the main carriageway seem narrower, helping to reduce vehicle speeds.

ACCESS MANAGEMENT

Access management is increasingly used to help manage the conflict between efficient through movement and property access. The most obvious conflict is when vehicles seeking to turn right block a travel lane waiting for a suitable break in on-coming traffic. Agitation from drivers behind can also precipitate a hazardous manoeuvre and possible accidents.

Key issues with access management include:

- → The provision of street trees, median landscape treatments and central bus lanes can restrict the ability for vehicles to access property;
- → Restriction of right turns to access properties on the opposite side of the road may negatively impact on the commercial viability of businesses or other uses;
- → The consolidation of multiple turning movements can improve safety and service levels;
- → The role of local networks to provide alternative access becomes a critical consideration;
- → The management of property redevelopment and consolidated access points between properties is also important;
- → Flush medians that provide for right hand turns without impeding travel lanes can be abused by drivers seeking to queue jump or overtake, and can also create conflicts between vehicles entering from both directions. Also inappropriate traffic management can result in accident migration and create an unsafe pedestrian crossing environment;
- → Boulevard-type slip lanes can also preserve local access where many individual vehicle crossings or driveways exist however this can also require substantial widening of the road reserve;
- → The use of a raised central median to prevent right turns can require meaningful width if trees and landscaping are to be planted within it.



TRAFFIC CALMING

Speed management and traffic calming relate to the direct manipulation of the road to effect driver reaction - primarily slowing but also as a prompt to focus attention ahead of possible hazards. There are obvious implications for travel efficiency although the flipside can be that in lower speed environments the actual road capacity can increase (as vehicles require less separation space between them and results in less stop / starts).

Key issues include:

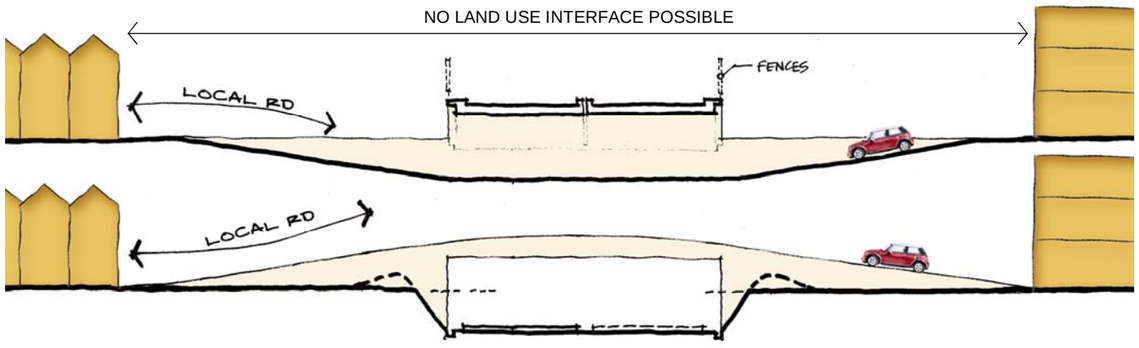
- → It can promote pedestrian safety and use through slowing vehicle intensity;
- → Narrower carriageways and tighter turns may prevent road use by heavy vehicles and freight without careful design;
- → Landscaping should be incorporated wherever possible;
- → It is important to clearly demarcate which mode 'owns' which space, however the overuse of material and texture variation can confuse users.
- → It can help promote recreational uses and a socially interactive environment within the street instead of an unused, solidly fenced off high-intensity traffic corridor;
- → Can discourage the use of other transport modes such as public transport and cycling e.g. safety issues when cyclists are forced into paths of motorists at points where the road is narrowed to slow vehicle speeds, or when steep speed humps act as a deterrent to buses
- → Calming should be actively used as gateway treatments / prompts near town centres, schools, and other community facilities.
- → Calming tools can create nuisance for adjacent uses, such as the braking and acceleration noises that can occur at speed humps;

GRADE SEPARATION

Grade separation is commonly associated with bridges over railway lines or with the state highway network. However as volumes increase on the arterial network pressure may increase for them to have a wider application. The liveable arterials strategy is predicated on the view that grade separation beyond that associated with rail / state highways / regionally critical routes and existing level differences is not consistent with liveability objectives.

Key issues include:

- → Railway grade separations allow for the safe separation of transportation modes at the junction of roadways and rail lines;
- → Less interruptions at junctions allow higher overall travel speeds;
- → Needs a large amount of space to accommodate required grades for horizontal and vertical clearances to achieve safe through movements. This prevents land uses adjacent to the roadway from establishing;
- → Change in elevation results in walls or embankments which creates a visual and functional barrier for communities;
- → Road infrastructure dominates the surrounding areas;
- → Grade separation at major arterials actively reduces connectivity and the choice of routes;
- → The integration of arterials with their local networks is of prime importance to avoid intersection width issues (resulting from traffic volumes) that begin to make arguments supporting grade separation possible;
- → Development patterns take the form of a 'donut' - with the least activity occurring at the centre (grade separated intersection), and most occurring at its periphery.



ROAD SAFETY + DIRECTIONAL SIGNS

Road-related signage is critical for operational safety, legibility, and efficiency. However it can also contribute to clutter. When road design speeds increase, so too does the necessary size of signage that can be clearly read by drivers in less time. This can result in signage that marginalises pedestrians and non-vehicular based users.

Key issues associated with signage include:

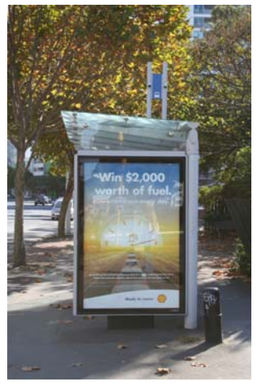
- → Inappropriately scaled or located signage can contribute to visual clutter (cumulatively) in the road environment and be a physical impediment for pedestrians particularly those with mobility difficulties;
- → Road signage associated with major intersections needs to be considered in terms of pedestrian amenity, sightlines, and nuisance effects (such as shadowing etc.);
- → The use of gantry-type signage is generally unsuitable for the arterial network although sometimes is operationally required;
- → The audience of signage should be considered in its design and a clear 'language' of signs should be used that lets all users know which signs are intended for cyclists, pedestrians, and vehicles;
- → Commercial signage may require more effective management along arterial roads;
- → The use of physical 'gateways' and subtle signage may also be suitable; such as uniform road treatments in the vicinity of schools or town centres, and in the management of built form outcomes to assist land-marking and way-finding.

BUS STOPS

Bus stops with shelters are essential elements of the passenger transport system, allowing users to wait, ingress, and egress from buses conveniently and safely. The design and operation of bus stops can have many implications for the arterial itself.

Key issues include:

- → Bus stops located within a travel lane can block that travel lane and encourage dangerous manoeuvres by drivers seeking to avoid delay. However this does improve the ease of access for buses exiting the stop;
- → Associated facilities such as a shelter, timetables and real time signage improve the quality of PT provision for passengers but need to be designed to integrate with local land uses and to assure adequate sightlines / safety are provided;
- → Bus stops in recessed set down areas can optimally locate within an on-street parking lane where road reserve width and overall road function is rarely undermined. When there is no parking lane the bus lane may be recessed into the berm, reducing opportunities for pedestrian footpath width that allows for a clustering of people;
- → There can be difficulties for buses re-entering a travel lane from a recessed set down that can cumulatively affect travel times;
- → Although on-street parking bays are often removed to form a bus lane at the road edge, it could be possible by way of widening to still retain on-street parking.



STREET FURNITURE

Street furniture is necessary to fully enable use of the road environment. Amenities for pedestrians and cyclists, and non-road related signage (such as for local community activities) are examples.

Key issues include:

- → Furniture can signal priority is given to pedestrians through the use of quality materials and clustering of furniture in areas of high pedestrian use;
- → Strengthens meeting points and areas where natural 'focal points' or junctions of pedestrian movement occur;
- → Can contribute positively to the streetscape quality and pedestrian amenity;
- → Can become distinctive elements of character and identity;
- → Needs to be coordinated relative to the intensity of travel lanes - seating should be provided to maximise amenity, not in locations where traffic noise precludes a conversation;
- → Can contribute to clutter in the road environment, obstruct road safety signage, and undermine sightlines;
- → Need to be coordinated with available berm width. Pinch points for pedestrian movement can lower amenity values;
- → The provision of street furniture for pedestrians should be based on actual walking route issues i.e. seating should be provided at least every 600m allowing the elderly or less-abled to conveniently rest. This distance could be reduced to 400m or less on sloping ground.

STREET LIGHTING

Street lighting enables safe use of the road environment 24 hours of the day for all users - although typically lighting will focus mostly towards the benefit of vehicular users on travel lanes.

Key issues include:

- → Good street lighting heightens passive surveillance opportunities through a well lit environment i.e. see and be seen;
- → If inappropriately located and designed they can have safety issues i.e. pedestrians, cyclists and vehicles may be partially blinded due to glare and scattering of light;
- → Can contribute to light pollution i.e. excess artificial light causing glare/light trespass into neighbouring properties;
- → Badly installed artificial lights can cast deeper shadows that enable criminal activity and can reduce the perception of safety;
- → Distinction should be made between lighting for vehicle navigation at night and crime prevention lighting;
- → It can help contribute to a sense of place and identity if genuinely integrated into local architectural styles;
- → Additional lighting should be provided in areas of increased pedestrian activity;
- → The provision of street lighting should be well integrated with the provision and management of street trees, which can block much of the light emitted;
- → The colour tones emitted by street lights could be subtly varied around schools, town centres etc., to help prompt users of the change in context.

PAVING MATERIALS

The use of paving materials within the road environment can contribute to the amount of stormwater runoff entering the piped system, the behaviour of road users, and even the story of Auckland City (many examples of kerb paving quarried from volcanic cones exist).

Key issues include:

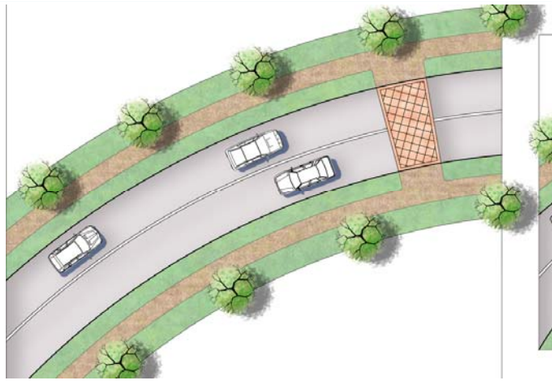
- → Differentiation of materials creates attractive footpaths and avoids monotonous visual blandness in the road environment;
- → It can reduce vehicle speeds by adding texture or colour to a typical asphalt road i.e. makes the road seem narrower, and increases driver awareness in the environment;
- → Along key pedestrian routes high quality paving materials and patterns give the perception of pedestrian priority over vehicles;
- → More sustainable technologies such as road paving made from waste such as vehicle tyres and glass could help reduce landfill issues into the future given the extent of roads within the Isthmus;
- → The noise created along roads is heavily influenced by road paving type, increasing or diminishing nuisance for adjacent land use occupants;
- → Changes in surface may be unsuitable for the disabled, elderly and those with visual or sensory perception difficulties.
- → Change in surface texture along highly used routes may be confusing to drivers, pedestrians and cyclists.

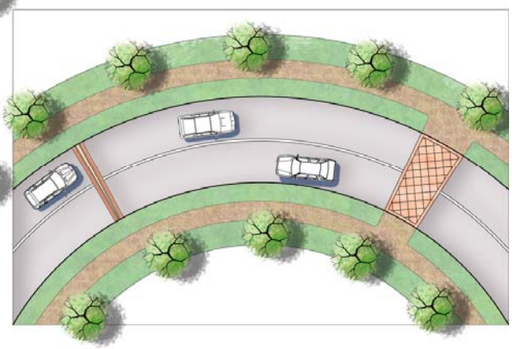
SIGHTLINES + SAFETY

Sightlines refer to the ability to adequately see potential hazards and react. They can be largely a function of vehicle speed - the faster a vehicle travels, the greater the distance in front the driver needs to be able to perceive and react to.

Key issues include:

- → Sightlines allow for the maintenance of safe entry and exit of vehicles to private land uses from the carriageway;
- → Enables all road users e.g. drivers of cars, trucks, buses, pedestrians and cyclists to see each other as they approach from a distance enabling them to react safely;
- → Maintenance of excessive sightlines through the provision of long straight roads and sweeping curves can encourage drivers to increase speeds (subject also to intersection spacing) which has safety implications for other road and footpath users. It can also encourage the phenomenon of driver automation - where drivers are only partially concentrating on the road ahead of them. This occurs partly due to controlled, and sterilised contexts which do not require drivers to actively and regularly concentrate, perceive, and respond;
- → Elements within the road environment that provoke driver response such as street trees and road changes can be targeted as being 'unsafe' for their possible interference with vehicular sightlines and the continuance of uniformity. Subject to design speed and road design, they can help slow traffic to more appropriate speeds and in fact *improve* safety levels for all users. Counter-intuitively, over-prescribing road design elements for road safety reasons can lead to driver behaviour that reduces safety.



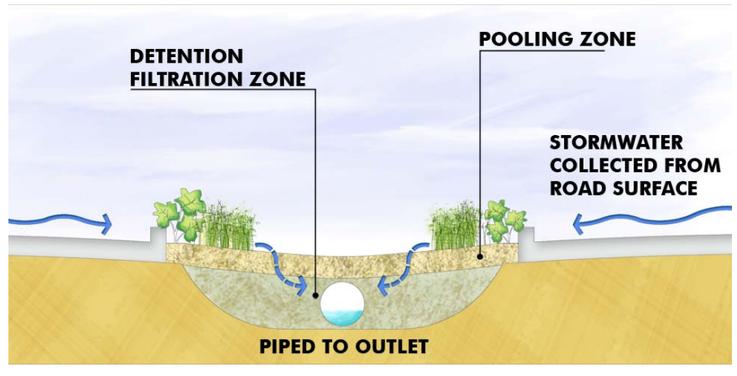


LOW IMPACT DESIGN

Low impact design is an increasingly used set of techniques that aim to in effect improve the ecological performance of the built environment. Of greatest application to the City's arterial network are those tools which focus on storm water and impermeable surface, although all actions that effect a reduction in energy use are also legitimate low-impact considerations.

Key issues include:

- → It can provide for stormwater detention and treatment thereby improving the quality and reducing the quantity of stormwater runoff from the road environment
- → Can act as an attractive amenity buffer between the vehicular carriageway and residential uses;
- → Use of permeable paving and other low-impact design treatments may be unsuitable for areas used by heavy vehicles;
- → Requires on going maintenance;
- → Swales may be more spatially suited to confined arterial corridors given their long, linear characteristics;
- → Swales could form a central median to assist with access management but are possibly better suited for a kerb-side location for ease of maintenance access.



OVER DIMENSION NEEDS

Adequate provision for over-dimension vehicles is an on-going and necessary function of the arterial network. This allows guaranteed access for vehicles moving large objects (often construction related and also including the movement of re-located houses) to and through the City.

Key issues include:

- → Providing for over dimension routes has implications on the placement and type of street trees / street landscaping - particularly in central medians;
- → Intersections and the design of traffic signals (when they are designed to hang above a travel lane) relative to sightlines and signal visibility can require careful design;
- → The basic over-dimension envelope measures 6.5m vertically and 11.5m horizontally;
- → The weight of such vehicles can have implications on the material used in the road surface and on the type of traffic calming treatments that may be used for parts of routes (e.g. raised intersection tables etc.).