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# **TRAFFIC MANAGEMENT IN ORANGE NSW AUSTRALIA**

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## INTRODUCTION

This paper has been written for the purpose of putting into "hard copy" some of the aspects I propose to cover in my discussion on Traffic Calming at the APWA Congress in Pennsylvania USA. The intention of this paper is not to put forward any new "state of the art" traffic control devices but rather to discuss some of the pros and cons of devices that we have used in our City, from a practitioner's point of view.

Orange is a city of approximately 36,000 people in mid-state New South Wales. The City is a service town for approximately 100,000 people from the surrounding small villages and rural community and offers shopping, commercial and medical facilities. Orange's hottest month is January, with a mean daily maximum temperature of 28.1°C and a minimum of 13.2°C. The coldest month is July, with a mean daily maximum of 10.9°C and a minimum of 0.6°C.

Orange City Council has a strong commitment to improving traffic flow around our city from the point of view of both access and safety. Through professional staff input and regular meetings of our Traffic Committee the majority of locations in Orange can now be accessed easily and with a reasonable level of safety afforded to drivers, pedestrians and other road users.

## TRAFFIC ADMINISTRATION

Every Local Government Authority in NSW must, as a statutory responsibility, set up a Traffic Committee to implement regulatory traffic control measures. The structure of this Traffic Committee is determined by legislation and must include representatives from the Local Police, State Member of Parliament, Roads and Traffic Authority, Council and the community.

The City of Orange Traffic Committee also adopts a long-term strategic planning role for traffic management throughout the city as well as reviewing individual site-specific traffic problems. Following their monthly meeting recommendations from the Traffic Committee are put to Council for adoption and ratification into law.



The majority of issues dealt with by the Traffic Committee involve the consideration of existing traffic situations. However the Traffic Committee also makes comment on new developments and subdivisions where traffic is seen to present an issue. (Figure 1 shows a typical residential subdivision)

Figure 1 "Typical residential subdivision"

To assist the traffic committee in its decision making Council's Technical Services Division generally researches and proposes a variety of solutions to each traffic management issue prior to meetings. These solutions usually consider cost and the likely effectiveness of each proposal. Through the provision of this information the Traffic Committee has the tools to make an informed decision.

## Local Area Traffic Management Schemes (LATMS)

Many of the Traffic Committee's long-term plans are now starting to come to fruition. Unfortunately to present them all in detail, would require many volumes of information. However, a brief description of some LATMS is provided for interest and as an introduction to specific traffic calming devices presented later.

Of the many Local Area Traffic Management Schemes in place throughout the City, some are limited to specific streets and consider individual traffic control devices while others are far more comprehensive and cover complete neighbourhoods.

### Central Business District LATM

The Central Business District (CBD) of Orange City is set out in a grid pattern as shown in Figure 3. This street configuration, combined with a high vehicle ownership, lead to a situation where north-south moving vehicles often became grid-locked, having to give way to the predominantly east-west moving traffic in Byng Street, Summer Street and Kite Street.

In the mid 1980's Council adopted an objective of installing roundabouts at intersections in Byng Street and Kite Street adjacent to the CBD to improve traffic flow by developing a Ring Road System. In 1992 Council also undertook to improve the traffic flow in Summer Street (Mitchell Highway) with an upgrade consisting of the conversion of angle parking bays to paved parallel parking which facilitated four lanes of traffic through the CBD and the full paving and landscaping of the remaining road reserve.



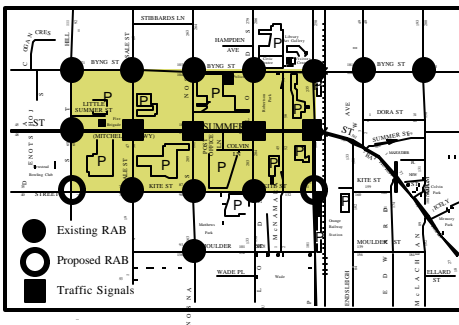
Figure 2 "Summer Street streetscape"

This work also facilitated the widening of footpaths to improve the amenity for pedestrians. At the time this new streetscape promoted Orange as a premiere regional centre that was considered a role model for others to follow.

By 1994 Council had all of the Ring Road roundabouts installed with the exception of Kite and Hill Streets, Byng and Sale Streets and Peisley and Kite Streets. At this time Council reiterated its objective to ensure a smooth flow of vehicular traffic to all sections of the Central Business District and to ensure a reduction in vehicular congestion in the centre of the City.

In doing this, a number of proposed actions were adopted, and these are listed below:

- To develop a Ring Road System around the CBD using Kite Street, Hill Street, Byng Street and Peisley Street.
- To line mark the road surface to provide two travelling lanes in each direction, and a parking lane on both sides of the road pavement.
- To construct a network of roundabouts on the proposed Ring Road System with the construction of high quality roundabouts at the intersection of Kite and Hill Streets, Byng and Sale Streets, Peisley and Kite Streets, and the completion of a roundabout at the intersection of Sale and Kite Streets.
- To address the question of roadside parking to ensure smooth traffic flow, with this assessment taking into account traffic flow, and parking needs of the City.
- To provide at specific locations, as demanded by circumstances, individual traffic control devices such as medians and pedestrian refuges, on the Ring Road System to reduce areas of traffic conflict.



The provision of roundabouts has proven extremely successful in promoting the free flow of traffic throughout the CBD. As can be seen in Figure 3 only two roundabouts remain to be constructed to complete the proposed Ring Road System. As a result of changing priorities since 1994 additional roundabouts have also been constructed to further enhance traffic flow in this general area.

Figure 3 "Ring Road System of using roundabouts"

### Council's Proposed Distributor Road

For many years Council has considered strategies to relocate heavy vehicles from the CBD, as a result of which a proposed Distributor (Ring Road) around the City was designated on planning maps in 1982. Limiting heavy vehicle movements in the CBD is seen to offer many benefits including improved traffic flow, increased safety, reduced noise and improved amenity for other road users. The last item of improved amenity encompasses a number of factors given that many heavy vehicle movements through the CBD are stock floats with accompanying odours and discharges.

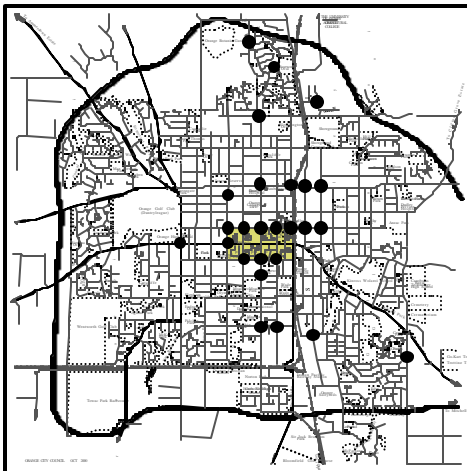


Figure 4 "Proposed Distributor Road"

Over the years Council has acquired much of the land along the route of the proposed distributor road as rural properties have been subdivided. To this point in time only very short sections of the road have been constructed. The major stumbling block in the construction of this distributor road is cost.

Council has made numerous representations for funding to the state government without success. The state government response has often used the excuse that while Council has touted that the southern portion of the route should be constructed first there has been no clear consensus on the matter. To put this to rest Council, in 2000, unanimously voted that the northern portion of the distributor road was the priority. This supposed change of heart from the southern route to the northern route has evoked a significant NIMBY (Not In My Back Yard) response from residents who have assumed that it was unlikely the road would ever be constructed adjacent to their properties.

To date no additional state government funding has been forthcoming.

In contrast to Orange City, the City of Wagga Wagga (population 50,000) recently constructed a by-pass around the urban area of their city. The subsequent reduction in the number of vehicles through the CBD has allowed the residents of Wagga Wagga to reclaim their main street.



Figure 5 “Main Street Wagga Wagga”



Figure 6 “Streetscape Wagga Wagga”

Utilising the principles of “Sharing the Main Street” and community consultation, Wagga Wagga has been able to implement a CBD traffic management scheme which appears to be user friendly for both motorists and pedestrians. This new streetscape incorporates features such as Wombat Crossings (explained later), alfresco dining areas and street art.

### Glenroi Traffic Calming Study

In 1995 a study was conducted by Consultants Guthridge Haskin & Davey with the aim of identifying a strategy to reduce traffic related problems on residential streets in the suburb of Glenroi. This study originated from community feedback on the deteriorating traffic and pedestrian conditions in Glenroi which has a high population of both children and aged persons. Community consultation in the development of the Glenroi LATM was in the form of a survey to all residents, interviews and public meetings. Speed surveys confirmed residents’ main concern that many vehicles were exceeding the posted speed limit. Since the completion of this study the majority of recommendations proposed have been put in place with very positive results.

Two points of interest are worth mentioning from the Glenroi Traffic Calming Study. Firstly, as part of the consultation process, 1250 questionnaires were distributed to the residents in Glenroi, which yielded only 151 survey responses. This disappointing response was possibly due to the particular socioeconomic profile of residents in this suburb and while in this instance results were regarded as meaningful, the utilisation of other survey methods could be considered.

The second issue of note occurred on two parallel streets during the implementation of traffic calming devices. Glenroi Avenue was seen as having higher traffic volumes and speeds hence the construction of speed humps on this street was seen as a priority. Following their construction a noticeable reduction in traffic speed and volume was seen in Glenroi Avenue with a corresponding increase in traffic speed and volume in the parallel Maxwell Avenue. The construction of traffic calming devices in alternate streets would have reduced this effect.

### TRAFFIC CALMING DEVICES USED IN ORANGE

Following are a number of traffic calming devices that Council has used to improve amenity around our City. The comments presented on the effectiveness of these devices are predominantly my views and those of my colleagues at Council (who have been involved in their design and construction). In the majority of cases Council has not had the resources to do in-depth analysis of their effectiveness so results are subjective and based on the premise that, since their implementation, complaints have reduced therefore they have satisfactorily addressed the issue at hand.

### Roundabouts (RAB)

The introduction of roundabouts has probably had the biggest impact on traffic calming within the city. Since the success of our first roundabout in 1980 we now have 26 roundabouts of various sizes and types. The extensive use of roundabouts throughout the city is predominantly because they have proven themselves to be very effective. In addition to the previously mentioned roundabouts surrounding the CBD a number were also constructed as a result of Federal government funding on intersections with bad accident histories.

The key to an effective roundabout is in the provision of adequate deflection paths. Adherence to this key design aspect, more than any other, has resulted in the success of roundabouts within the City. Where accident data is available about intersections both before and after the construction of roundabouts, a clear trend is evident showing a reduction in both accidents and their severity. This is primarily due to lower vehicle speeds, reduced conflict points and an acute angle of impact in a collision.

Table 1 shows some of the key advantages and disadvantages that we have experienced with roundabouts in the city.

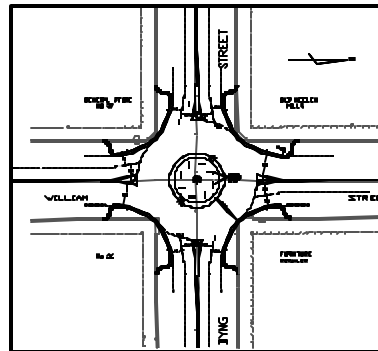
Table 1

Roundabout Type	Advantage	Disadvantage
Large Intersection Roundabout 2 lane non-mountable	<ul style="list-style-type: none"> <li>• Reduction in tow-away intersection accidents</li> <li>• Reduction in severity of accidents.</li> <li>• Reduction in vehicle speed</li> <li>• Provides free flow of traffic from each</li> </ul>	<ul style="list-style-type: none"> <li>• Expensive compared to many other treatments</li> <li>• Potential squeeze point for cyclists</li> <li>• Some parking loss can occur from kerb blister</li> </ul>

	<ul style="list-style-type: none"> <li>entry road</li> <li>Can be used in a variety of non standard intersections</li> <li>Pedestrians can be accommodated at intersections</li> <li>An opportunity exists for extensive landscaping</li> <li>Increase traffic flow at intersections</li> <li>Geometry can often be modified to retain existing structures such as trees</li> </ul>	<ul style="list-style-type: none"> <li>Landscaping can cause problems for elderly in traversing RAB as greater gap acceptance required</li> <li>Some minor accidents occur when vehicles cross lane dividing lines to reduce deflection and maintain speed</li> <li>Effects of ice formation on roundabout is worsened by adverse cross-fall</li> </ul>
Heavy Vehicle Mountable Roundabouts one lane	<ul style="list-style-type: none"> <li>Can be constructed relatively economically</li> <li>Suitable for narrow streets</li> <li>Can accommodate heavy vehicles</li> <li>Reduces speed, accidents and injuries compared to "give way" posted intersection</li> <li>Low profile gives unobstructed view of on coming traffic</li> </ul>	<ul style="list-style-type: none"> <li>Not as effective as non-mountable roundabouts as 4*4 vehicles and small trucks can mount them at speed</li> <li>Vertical edges can cause tyre damage to poorly controlled light vehicles. (can be designed out)</li> <li>Painted splitter islands require regular maintenance</li> </ul>

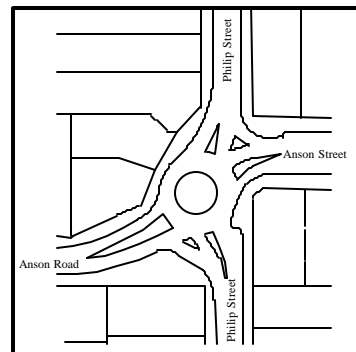
Illustrated below are a number of the City's roundabouts along with brief comments on issues that we have experienced.

**Byng Street / William Street Roundabout**



This RAB shows the standard treatment we use to develop deflection through a square intersection. Note the incorporation of landscaping in blisters and RAB centre circle. For a fully landscaped roundabout such as this a 30m road reserve is desirable.

**Anson Street / Philip Street Roundabout**



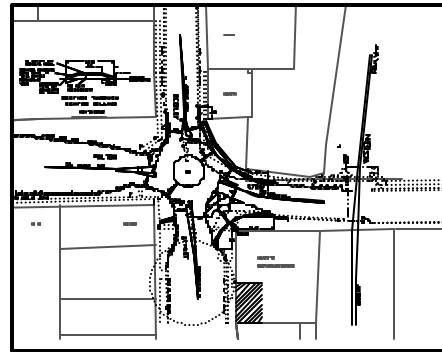
Aerial view of a RAB on an offset intersection. Note provision of slip lanes.

### Hill Street / Summer Street Roundabout



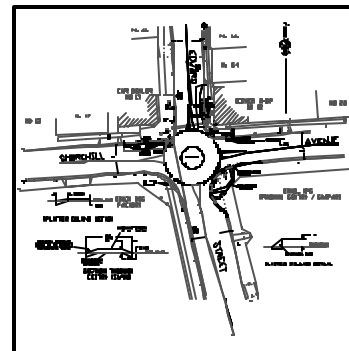
Orange City Council is referred to as the "Colour City" because of the autumn colours of our deciduous trees and our many parks and gardens. In keeping with this theme we carry out extensive landscaping of our roundabouts. These photos taken in spring illustrate the opportunity to landscape the roundabout centre circle and kerb blisters

### Dalton Street / Peisley Street Roundabout



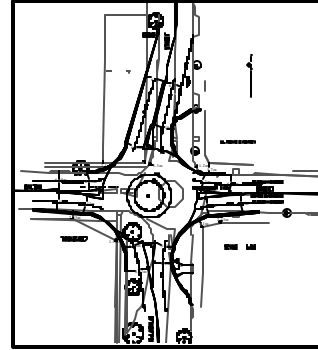
Treatment of an offset intersection with provision of slip lanes. This intersection requires significant self regulation by motorists to avoid stacking of vehicles from the railway line back into the RAB. The centre circle of this roundabout was constructed incorporating a vertical steel face approx 50mm high. This "Sharp" edge initially invoked some comment by the users of light vehicles who damaged tyres when poorly navigating the RAB.

### Churchill Ave / Edward Street Roundabout



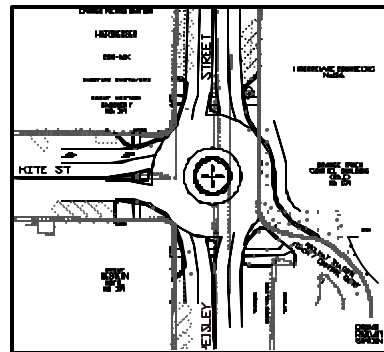
This is a typical example of a small RAB with a truck mountable centre island. As with all our smaller RABs we incorporate kerb blisters to develop deflection at intersections. Of note at this location is the transition between the different widths of the through road.

**Dalton Street / McLachlan Street Roundabout**



Prior to the construction of the current landscaped RAB this intersection was controlled by a small diameter mountable RAB with limited deflection which had a significant history of minor accidents. To develop suitable vehicle deflection Council purchased some neighbouring land and offset the RAB to the intersection. Provision was also made for pedestrian refuges and a driveway entrance to shops. While only relatively new this RAB is proving very successful. Through a minor redesign prior to construction an \$82,000 relocation of a Telstra pit was also avoided.

**Proposed Kite Street / Peisley Street Roundabout**



Orange City Council has found roundabouts to be very flexible in their application. In this instance a roundabout is proposed for the Peisley Street / Kite Street intersection which incorporates a driveway entry to the existing Railway Station.

**Dalton Street / Anson Street Roundabout**



**Byng Street/ Anson Street Roundabout**



Many of our roundabouts are constructed to fit in with existing features. In this instance the design has incorporated existing street trees and varying width median islands.

This roundabout required a redesign when it was proposed to remove the existing tree. After further consideration the tree was retained and the roundabout constructed.

## Roundabouts in Wagga Wagga NSW



Wagga Wagga is a city in NSW slightly larger than Orange which has also made extensive use of roundabouts. These examples show how Wagga Wagga has utilised artistic structures to enhance a number of their Roundabouts

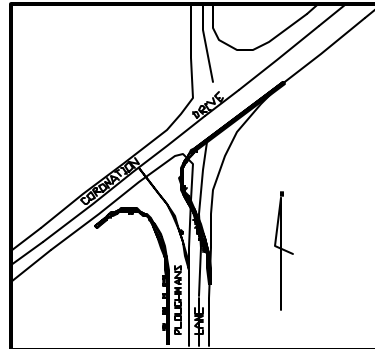
## Road Closures

On a few occasions Council has resorted to road closures to reduce the number of conflict points at intersections and to slow vehicle speeds and traffic numbers in residential streets. We have seen this approach having a dramatic, positive effect in the area targeted but with some transfer of problems to adjoining streets and intersections. However road closures do have their place and in many instances can be constructed relatively economically.

## Intersection Realignment

Another treatment we have used successfully is the realignment of intersections. This approach significantly slows traffic and reduces conflict points at intersections.

### Cargo Road/Ploughman Lane Intersection Realignment



Intersection realigned to form two "T" intersections. This Split "T" intersection significantly reduces the number of conflict points compared to a cross intersection and has worked well at this location.

## Thresholds and Platforms

Council has made extensive use of various threshold and platform devices throughout the City with varying degrees of success. For the most part Council uses thresholds as "gateway" treatments into neighbourhoods. These gateways often incorporate narrowing or vertically displaced platforms or a combination of both.

Council's experience indicates that gateway thresholds work well in short streets or where they are reinforced by other treatments such as platforms at regular intervals. Without horizontal or vertical displacement, isolated mid-block thresholds particularly on longer streets tend to be ignored by motorists and as such are of limited benefit.

Platforms on the other hand have tended to slow traffic even in mid-block situations. When they are used frequently along a section of road Council has noticed significant reductions in speed. Experience indicates that some care needs to be taken in both the design and construction of platforms to satisfy all road users. In particular the height of platforms is critical to public transport operators. Secondly, the grade of the ramp leading to a platform needs to be constructed at a grade consistent with the design traffic speed.

### Kurim Avenue Gateway Threshold



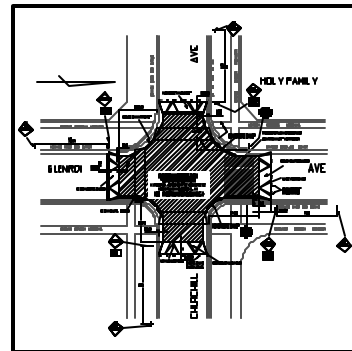
### Bill Marshall Drive Platform



We have found this form of threshold effective in reducing speed at intersections. However, without the incorporation of a raised platform they have proven to be of limited success in mid-block situations. Although not clearly evident on photos, exposed edges of islands are painted a contrasting white to limit liability exposure should vandals remove signs.

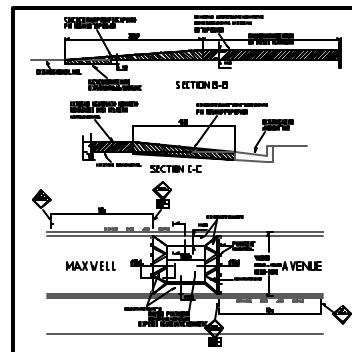
This platform was incorporated approximately halfway along a 600m long street with entry thresholds. This platform is not raised and appears to have almost no traffic calming effect, particularly with locals who know it can be traversed at speed.

### Churchill Avenue / Glenroi Avenue Platform



This raised intersection platform has been constructed in asphalt and incorporates a pedestrian crossing. This platform is one of many along Glenroi Ave which have proved to be particularly successful in reducing traffic speed and volume. Given the relatively steep ramp to the platform and its dark colour, line-marking was required to ensure clear visibility at night.

### Maxwell Avenue Platform



While this raised platform has performed well in reducing traffic speeds, its edges tapering to the gutter to facilitate drainage still allow higher vehicles such as 4\*4s to "hug" the kerb and mount it at speed.

**Pedestrian Crossings and Refuges**

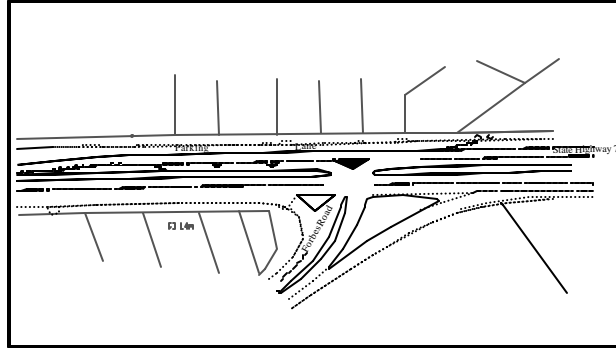
Council has placed particular emphasis on pedestrian safety over recent years, particularly at locations used by children and the elderly. While this safety has been achieved utilising a number of different devices to suit particular circumstances, the most effective approaches give a refuge area for pedestrians through the use of kerb blisters and central islands.

<p><b>Moulder Street</b></p>  <p>This crossing is located in an area where the elderly cross to an adjacent store. The incorporation of a bridge from the kerb to the island is designed to limit the opportunity for falls. The bridge can be lifted for easy cleaning.</p>	<p><b>Woodward Street</b></p>  <p>This crossing incorporates a large central island to facilitate use by bicycles. Bollards had to be incorporated into this ramp to deter cars from parking on parkland.</p>
<p><b>Hill Street Wombat Crossing</b></p>  <p>Council has constructed a number of Wombat crossings adjacent to schools. These Crossings generally incorporate a platform or pedestrian refuge with a marked foot crossing in a 40km/h travel zone.</p>	<p><b>Kite Street Crossing Wombat Crossing</b></p>  <p>This crossing is located outside a school in a 40km/h zone. Bollards are used to afford protection to pedestrians. This crossing is also controlled by school crossing guards on school mornings and afternoons. Comment from local businesses indicate that minor rear end accidents are common at this location.</p>
<p><b>Byng Street Pedestrian Refuge</b></p>  <p>This refuge is sited opposite a supermarket entrance; however, the majority of pedestrians tend to cross anywhere, mainly standing on the island as a refuge.</p>	<p><b>Woodward Street Crossing</b></p>  <p>This crossing was placed for use by students at the adjacent school. Unfortunately two service stations selling confectionary enticed children to cross in a haphazard manner. To ensure safety a central Island incorporating a fence was constructed.</p>

### Seagull Intersections

Council has made significant use of Seagull Intersections where secondary roads intersect with major arterial roads. These Seagull intersections provide protection to both traffic making a right hand turn from the minor road and the major road. From our observations this protection has both reduced accidents and increased the capacity of intersections. This increase in capacity appears to be due to the greater confidence of drivers who only have to consider one lane of slower turning traffic on the far side of the median.

#### Woodward Street /Forbes Road Seagull Intersection



This Seagull utilises a painted island to allow easy access by trucks with a large turning radius. Other Seagull intersections within the city incorporate raised concrete islands. This section of road also experienced the added benefit of slowing though traffic when the two travelling lanes were incorporated into one to retain kerb-side parking.

### Median Turning lanes

Median turning lanes are relatively new to Orange. Initially they were received with some trepidation by the public but are now gaining some support.

#### Woodward Street, Median Turning Lane



The inclusion of this median turning lane and the channelling of traffic into single lanes saw a notable reduction in traffic speed. However, one side effect of concentrating traffic into single lanes was an increase in the rate of deterioration of the road. The second photograph shows a typical cycle lane along the road shoulder.

### COUNCIL'S ROAD SAFETY OFFICER (RSO)

In addition to physical structures used for traffic calming Orange City Council also jointly employs a RSO as part of a road safety program. This Orange and Cabonne Road Safety Program is jointly funded by Orange City Council, Cabonne Shire Council and the Roads & Traffic Authority. The program is designed to address local road safety issues that state run road safety programs fail to address. Emphasis is on involving the community in finding local solutions to road safety problems.

The program also attempts to address the problem that local government tends to focus on engineering solutions to road safety problems rather than addressing the underlying behavioural causes of crashes. While engineering solutions to road safety problems can be effective in reducing crashes, this effectiveness can be enhanced with the addition of an educational program. For example the use of Council's new cycle lanes was increased by an educational program.

The primary road safety challenges that face the Orange and Cabonne communities are speeding, fatigue and drink driving.

In the Orange area, failing to remain on the road or in the correct lane results in three quarters of all fatalities. Single vehicle crashes on bends and on straight sections of road account for 12 of the 25 fatalities that occurred on our roads in the period of 1995-99. An additional 7 fatalities resulted from head-on collisions during the same period. Half of all these fatalities are due to excessive speed.

As a result of these crashes a program focusing on driving according to the conditions is currently in progress. Phase One of the program addresses the issues of crashes on gravel roads and crashes on bends. This program involves the production and distribution of a leaflet, newspaper advertising and the use of temporary signs to alert drivers to the risks of driving on gravel roads. Key messages are "local drivers are dying on local roads" and "speeding is a major cause of crashes".

The road safety program also runs the Safer Routes To School Program in the Orange and Cabonne Areas, this program focuses on involving schools and parents in ensuring that young students get to and from school safely.

An on-going drink drive program addresses the problem that 10% of crashes are a result of drivers consuming alcohol. This program provides breath testing machines at drinking venues and promotes the use of designated drivers.

#### **50KM/H URBAN SPEED LIMIT**

Orange currently has a 60km/h urban speed limit. Over recent years however the Roads and Traffic Authority has been offering incentives for Council to reduce this limit to 50km/h indicating that statistics prove that the lower speed limit both reduces accidents and their severity. The major incentive offered includes the full subsidisation of costs to replacing existing signage.

Many Councils in NSW have taken up this offer believing that in the not too distant future legislation will be put in place requiring urban speed limits to be 50km/h or less. Orange City Council has discussed this matter at length on a number of occasions weighing up issues of inconvenience verses public safety. The most recent decision by Council on the matter saw the 60km/h speed limit remain on the casting vote by the Mayor.

#### **REFERENCES AND BIBLIOGRAPHY**

Council makes use of a number of design guides when developing various traffic management solutions. Two guides of note include:

Federal Office of Road Safety, *Towards Traffic Calming: A Practitioners' Manual of Implemented Local Area Traffic Management and Blackspot Devices*, Canberra

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AUSTROADS (1993), *Guide to Traffic Engineering Practice, Part 6 – Roundabouts*, Sydney

AUSTROADS (1998), *Guide to Traffic Engineering Practice, Part 8 – Traffic Control Devices*, Sydney

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