INFORMATION REPORT

REPORT TITLE: PEDESTRIAN REFUGES – SAFETY REPORT
ITEM NUMBER: 6
DATE OF MEETING: 12 SEPTEMBER 2007
AUTHOR: CHARLES MOUNTAIN
JOB TITLE: MANAGER TRANSPORT AND TRAFFIC
RESPONSIBLE OFFICER: CRAIG DANIEL
JOB TITLE: GENERAL MANAGER URBAN SERVICES
COMMUNITY GOAL: 4.3 Ensure a sustainable, safe and integrated transport system is developed for the community considering a balance between intra-city and inter-city demands.
REPRESENTORS: NIL
ATTACHMENTS:

PURPOSE

To provide information to the City of Unley Road Safety Committee on the use and safety of pedestrian refuges

RECOMMENDATION

MOVED: SECONDED:

That:

1. The report be received.

BACKGROUND

At the meeting held on 8 August 2007, the City of Unley Road Safety Committee (CURSC) considered a report on proposed locations of pedestrian refuges on Arterial Roads with the City of Unley.

The safety of such devices and their suitability for use on arterial roads was discussed and as a result the CURSC resolved the following:

“That

1. The report be received

2. The Administration to prepare a report on the safety of pedestrian refuges on both major roads and minor roads.
DISCUSSION

Pedestrian Refuges

The Australian Standard AS1742.10 states that:

“Pedestrian refuges are used where there is a need to provide a place of safety for a concentration of pedestrians where it is difficult to cross the full width of a roadway in one stage and a more expensive facility cannot be justified.”

Pedestrian refuges are generally constructed on wide and/or heavily trafficked roads where it is desirable to provide a designated staged crossing. Typically, they consist of two raised medians with an at-grade opening and painted tapered median on both approaches. The raised medians incorporate red and white handrails to increase delineation and assist pedestrians while waiting.

As part of the design, appropriate warning signs on the approach to the refuge are provided, together with restricted parking on both approaches to ensure that lines of sight are not obscured by parked vehicles.

The provision of the median refuge with appropriate pavement markings and signage creates the visual cues for approaching motorists regarding the potential presence of pedestrians in this location.

The Austroads Guide to Traffic Engineering Practice Part 13, Pedestrians, states that pedestrian refuges are generally used where it is difficult for pedestrians to safely cross the full width of the road in one stage. They are particularly suited to locations where pedestrian movements are distributed over a length of road, as is typically the case with strip shopping precincts.

Refuges should desirably be a minimum of 1.8 metres in width so they can permit a person standing with a pram, or bicycle to stand within the refuge. However this cannot always be achieved without local road narrowing or realignment of the adjacent footpaths.

The Guide also states that an absolute minimum width of 1.2m metres can be used in constrained situations, for example where there is limited carriageway width. This allows for the safe provision of a “KEEP LEFT:” sign together with handrails and affords more protection for pedestrians than no island at all.

A 1.2 metre wide refuge has been installed some time ago on Fullarton Road, between Florence Street and Restormal Avenue in the vicinity of Stow Court. Fullarton Road, like Goodwood Road is a four lane road with a 60km/h speed limit. This refuge is used regularly by residents of Stow Court and operates satisfactorily.

Suitability on Arterial Roads

At low traffic volumes, pedestrians can normally wait for gaps in the traffic stream and cross the road in relative safety without unreasonable delay. However, as
traffic volumes increase, coupled with limited breaks in the traffic flow, the opportunities to cross safely decrease, particularly during morning and afternoon peak periods. This can be particularly the case when there are few upstream impediments to create sufficiently large breaks in the traffic flow for pedestrian to cross.

The gap and time taken to cross also varies depending upon the age and level of physical mobility that the pedestrian possesses.

The Department for Transport Energy and Infrastructure’s (DTEI) website on pedestrian facilities states that pedestrian refuges are appropriate:

- where there are four or more traffic lanes to be crossed, but can also be installed on two lane roads
- where two-way traffic volumes are so high that they make crossing the road difficult or dangerous
- where there are concentrations of pedestrians crossing
- where elderly pedestrians are known to cross the road

DTEI also notes that for a refuge to be installed there needs to be sufficient roadway width to accommodate it without reducing the number of passing traffic lanes together with adequate street lighting in accordance with the relevant Australian Standard to ensure night time visibility of crossing pedestrians and the refuge itself.

The Main Roads Western Australia’s website, “Pedestrian Crossing without Signals” refers to the positive safety benefits of pedestrian refuge islands due to the ability to stage pedestrian crossings, coupled with the fact that pedestrians only have to look in one direction at a time. The provision of handrails, which is an integral part of the refuge design, is considered a benefit as it increases the level of conspicuity of the crossing and pedestrians using it. The rails also provide a resting point for pedestrians while waiting to cross the remaining section of the road.

The Road Traffic Authority (Melbourne) does not however consider pedestrian refuges appropriate for categories of roads. For example, freeways or divided arterial roads are not considered suitable because these typically have higher uninterrupted traffic flows, coupled with higher speeds. For these roads, signalised crossing point or grade separated facilities are more appropriate.

However for undivided arterial roads, such as Goodwood Road, the Authority considers that a pedestrian refuge may be suitable, provided that the criteria for the provision of the refuge are satisfied.

**Suitability on Minor Roads**

The Road Traffic Authority (Melbourne) recommends that pedestrian refuges are appropriate for undivided collector roads, (such as Duthy Street) and may also be appropriate for undivided arterial roads.

They are generally not required on local roads because of the generally lower traffic volumes and reduced roadway widths, however in some situations, such as
near an aged care facility, the provision of a pedestrian refuge on a local road may
be appropriate.

Research

The Australian Transport Safety Bureau 1984 publication examined the
effectiveness of a number of traffic projects, including the installation of pedestrian
refuges at 26 locations. The data showed that prior to the installation of the
refuges, there were only a small number of crashes where a pedestrian was
injured at these locations. Following their installation, there was little change in the
rate of crashes directly involving pedestrians, however there was a 38% decrease
in overall crash rate, particularly with rear end type collisions. There was an
overall decrease in the number of accidents at these sites. The reductions related
to rear end collisions, elimination of head on collisions and a substantial reduction
in sideswipes. In particular the provision of refuges resulted in a significant
reduction in the number of rear end collisions, which may have been due to the
reduction in stops by motorists trying to avoid pedestrians.

The Centre for Automotive Safety and Research (part of the University of
Adelaide) referred to an earlier report prepared by Professor A J McLean prepared
a report for the Department for Transport, Energy and Infrastructure on pedestrian
refuges.

Moore and McLean cited early work in New South Wales which showed that the
provision of narrow medians reduced vehicle to vehicle crashes but had no effect
on crashes. However their own work carried out in Adelaide over a 20 year period
noted that pedestrian accidents decreased as a percentage of all accidents during
this time. This was attributed to the increase in signalised intersections and the
increase in the provision of raised medians.

Their report noted while accident studies indicate a potential for improvements in
pedestrian safety through the provision of crossing facilities, safety benefits
associated with particular installations are likely to be difficult to demonstrate. This
is because as pedestrian accidents are relatively rare, the author concluded that
there are insufficient numbers for sound statistical analysis. The study states that
ideally, the basis for comparisons and evaluations of pedestrian facilities should be
accident risk rather than accident frequencies but there are many problems in
estimating risk which in McLean’s view adds to the difficulty in reaching firm
conclusions about the safety benefits of particular pedestrian facilities.

A study undertaken by Monash University undertook an evaluation of different
types of pedestrian treatments and the results. The study referred to a study of
mid-block sections of arterial road in Adelaide, (Scriven 1986) showed that raised
wide medians had the lowest annual rate of pedestrian accidents followed by flush
1.8m wide painted medians and 1.2m wide raised median. A later study (Claessen
and Jones (1994) found that where a narrow painted median was replaced with a
wider raised median the rate of pedestrian accidents fell by 23%.

The study concluded that it was not possible to accurately state that the reduction
was due to the raised median, the increased width or a combination of both.
The 1994 Evaluation of Pedestrian Road Safety Facilities for the Road Safety Bureau and Road Safety Authority showed that pedestrian refuges, on average, reduce crashes of the type where a vehicle hits a pedestrian by approximately 50%. This compares with pedestrian actuated signals which result in a 70% reduction. The evaluation found that the installation of a pedestrian actuated crossing at a location provides pedestrians a low crash risk opportunity to cross the roadway at that point, provided both pedestrians and motorists comply with the signals.

The report also noted that in order to encourage compliance with the signals, it was important for such sites to be reasonably responsive to pedestrian demands. While this can generally be achieved outside of peak periods, through de-linking adjacent signalised sites, this can have a disruptive impact on traffic flow on arterial roads.

A report entitled “Pedestrian Refuge Island Safety Audit” (R. Bacquie, D. Eagan and L. Ing) prepared for the City of Toronto investigated the design issues and safety implications. In Toronto, the use of pedestrian refuges is widespread, in particular where there is sufficient pedestrian crossing demand and pedestrians show a pattern of difficulty in crossing but where higher forms of traffic control are not appropriate, given spacing or volume criteria.

For pedestrians to safely cross a 4 lane road at normal walking speed would require a 12-14 second gap in the traffic; the gap for elderly, pedestrians is commonly higher. Their analysis shows that the use of a pedestrian refuge typically reduces pedestrian delays for crossing.

Random surveys of pedestrians using the pedestrian refuge islands (as this particular refers them to) were conducted for the purpose of obtaining general public perception of the islands. Almost all of the pedestrians surveyed considered that the islands were convenient and improved their level of safety.

Collision history of 10 pedestrian refuges was undertaken within the City of Toronto. The results showed that there were 44% respectively of vehicle/refuge and vehicle/pedestrian collisions. All of the vehicle/refuge collisions occurred at night indicating a lack of night visibility. Where pedestrians were involved, most involved pedestrians stepping out without the road being clear or there being insufficient gaps in the traffic flow. Importantly, there were no instances of pedestrians being struck while being on the island.

Human Factor Considerations

The Study refers to the potential for a pedestrian –vehicle collision being affected by:

- The pedestrian’s ability to recognize the potential interaction with a vehicle and respond appropriately
- The driver’s ability to recognize and react to the potential interaction with the pedestrian, the refuge and adjacent vehicles

The Study states that the design of a roadway can aid pedestrians, simplifying the judgement required in assessing gaps in traffic. The provision of a pedestrian refuge assists by allowing a pedestrian to focus on assessing gaps in the traffic in
Road Environment

For pedestrians to safely use pedestrian refuge islands a normal walking speed (1.2m/second) a gap in traffic of 6 seconds is necessary to cross a road, such as Goodwood Road. Of the site investigated, vehicle volumes ranged from 25,000 to 35,000 vehicles per day. The average volumes recorded on Goodwood Road are approximately 35,000 vehicles per day.

The Toronto Study revealed that most pedestrians did not feel comfortable stepping onto the roadway with approaching vehicles closer than 60 metres (the safe stopping distance from 60km/h). Therefore adequate sight distance for both motorists and pedestrians is vital. Parking restrictions are therefore necessary to maintain safe stopping sight distance.

In consideration of the above, the following design considerations are recommended for the implementation of pedestrian refuge islands:

• Install pedestrian refuges on roads with AADT of 45,000 or less
• Ensure clear lines of sight between pedestrian and motorist
• Restrict parking and control nearby access
• Ensure adequacy of sight lines due to road geometry or street furniture

The Study also recommended that in order to minimize the effects of undesirable road alignments in proximity to pedestrian refuge islands, it should be accommodated within the existing alignment without local widening.

Summary

The Study concluded that the pedestrian refuge island add to the convenience for pedestrians crossing arterial roads. They have the potential for enhancing safety and reducing collisions if implemented under the appropriate conditions.

In South Australia the installation of traffic and pedestrian control devices, such as pedestrian refuges must be installed in accordance with the “Code of Technical Requirements for the Installation of Traffic Control Devices”, a document prepared for the South Australian Government by DTEI for use by all road authorities.