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RAILWAY/NORTH ST ROUNDABOUT STUDY



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Background

Roundabouts provide a safer and less expensive treatment compared to a signalised intersection. However, pedestrians are often faced with higher risk of accidents compared to motor vehicles at a roundabout in urban areas.

A roundabout intersecting Railway St and North St is situated in Gatton CBD. It is located approximately north west of the Lockyer Valley Regional Council (LVRC) administration office.

The roundabout consists of a central island measuring approximately 13 metres in diameter and comprises four traffic legs. The posted speed limit for each leg is 40km/h.

Issues were raised during the Gatton Revitalisation Meeting held on the 15th September 2015 on:

- a. Frequent traffic interruptions along Railway Street
- b. Investigate safer pedestrian crossing options

Scope of Study

The purpose of this report is to investigate options and report on the traffic and pedestrian safety of the current and alternative options

Exclusion

This study does not cover

- a. Geometric design and sight distance of the roundabout
- b. Street lighting at the roundabout
- c. Public consultation

Background Data

Department of Transport and Main Roads has provided crash data in the vicinity of the roundabout spanning from 2001. The data shows that there were 4 minor crashes at the roundabout, however none involved a pedestrian.

A traffic survey was conducted by TRACSIS at the intersection (Appendix 1). The purpose of this survey was to collect relevant traffic data such as:

- a. Pedestrian / traffic travel paths
- b. Number of pedestrians and vehicles utilising the intersection
- c. Traffic classification i.e. motorbike, car and trucks

There are no records as to when the roundabout was constructed however estimates put it at 1994.

Report

The existing roundabout has the following deficiencies:

- a. Missing holding lines on all four legs
- b. Missing hazard marker (D4-1-2) sign. These signs are optional depending on visibility

Disability carparking within the vicinity of the roundabout is not to the Australian Standard. Since the width of the existing disability carparking bays are approximately 2.5m wide when 3.2m wide is required (appendix 2). In addition, disability carparking bays must also be located adjacent to a footpath so the pedestrian path of travel does not cross any vehicular traffic path.

All four pedestrian crossings are in very close proximity to the roundabout therefore are not to AUSTRROAD standards (appendix 3). The crossing should normally be located further from the roundabout because it provides drivers with more time to observe and respond to the pedestrian and reduces the probability of vehicles queuing back into the roundabout and blocking its operation. In addition, the four pedestrian crossings prevent vehicles from stopping closer to the roundabout thus reducing driver's sight distance.

In order to determine whether pedestrian crossings are suitable for this roundabout, level of service (LOS) analysis was conducted using the TRACSIS traffic survey data (appendix 4).

Level of service (LOS) is an indicator of the difficulty of the pedestrian crossing task. It is based on the time a pedestrian needs to wait to cross the road or the average time between gaps in the traffic flow that would allow pedestrians to cross the traffic safely.

Average time between suitable gap(s)	LOS	Classification	Description
<10	A	Excellent	Pedestrians are able to cross almost immediately upon arrival at the crossing point
10-20	B	Very good	Most pedestrian are able to cross with little delay <ul style="list-style-type: none"> - Average pedestrian delay <10 seconds - 95 percentile worst case delay =40s
20-30	C	Satisfactory	Most pedestrians are able to cross within an acceptable period. <ul style="list-style-type: none"> - Average pedestrian delay <15s - 95 percentile worst case delay =60s
30-40	D	Some concern	Some pedestrians have to wait longer than desirable for a gap <ul style="list-style-type: none"> - Average pedestrian delay < 20 seconds - 95 percentile worst case delay = 80s
40-80	E	Major concern	Most pedestrians have to wait longer than desirable for a gap. <ul style="list-style-type: none"> - Average pedestrian delay < 40s - 95 percentile worst case delay = 160s
>80	F	Unsatisfactory	Most pedestrians have to wait longer than acceptable for a gap <ul style="list-style-type: none"> - Average pedestrian delay > 40s

Table 1: LOS description shown in Traffic and Road Use Management (TORUM) Volume 1 Part 6

Results from the analysis indicated that:

- a. LOS east pedestrian crossing – A
Pedestrian facility prioritisation score - 1
- b. LOS west pedestrian crossing – A
Pedestrian facility prioritisation score - 5
- c. LOS north pedestrian crossing – A
Pedestrian facility prioritisation score - 2
- d. LOS south pedestrian crossing – B
Pedestrian facility prioritisation score - 3



All four legs provide excellent crossing opportunities as the LOS scores range from A to B and the Pedestrian facility prioritisation score is lesser than 6. Please refer to TORUM Volume 1 Part 6 for more detail.

Options

This report will put forward three options

1. Make no changes

This is the easiest and most affordable option however the current roundabout and pedestrian crossings are not to AUSTRROAD and Australian standards.

The main deficiencies are:

- i. Current pedestrian crossings are located ver close to the roundabout
- ii. Disabled car parking bays within the vicinity of the roundabout are in violation of the disability carparking regulation

Other than the non-compliance issues noted above, it should be recognised that there is no data to support the notion that the roundabout arrangement at the intersection is unsafe.

2. Remove two pedestrian crossings (Refer Appendix 5)

Removal and relocating two of the pedestrian crossing perpendicular on Railway Street was proposed due to the following reason:

- i. Higher daily traffic on Railway Street in comparison to North Street thus removal of two pedestrian crossings will significantly improve traffic throughput.
- ii. Significant number of pedestrian utilising the pedestrian crossings perpendicular to Railway Street thus relocating them away from the roundabout reduces the chances of collision.

The following modifications are required for this option

- i. Removal of pedestrian crossings across Railway Street
- ii. Removal of pedestrian crossings signs located cbse to the existing crossings
- iii. Removal of Tactile Ground Surface Indicator (TGSI) on these crossings and restore the footpath surface to match existing
- iv. Installation of 8 new bollards to match existing or fencing.

- v. Installation of 4 new pram crossing to standard with suitable TGSI
- vi. Removal of two disability carparks
 - a. parallel disability carpark north of the roundabout
 - b. 90 degree disability carpark south of the roundabout
- vii. Reallocate parking bays and use this empty space as pedestrian refuge and pedestrian refuge island
- viii. Relocating affected disability carparking bays at east of North Street.
Allowance for 3 disabled carparks to disability standards
- ix. Shift bus zones further southward and relocate bus zone signs
- x. The option will reduce approximately 10 parking spots.

This option would improve the flow of traffic along Railway St and bring the existing roundabout road signs and linemarking to code. However the two pedestrian crossings perpendicular to North Street would still not be to AUSTRROAD standards due to their proximity to the hold lines.

Total cost of work: \$105,055.60 + GST

3. Removal of all pedestrian crossings (Appendix 5)

Removal and relocating all the pedestrian crossings along Railway and North Street are the costliest, but it would meet the current regulations.

The following modifications are required for this option

- i. Removal of all pedestrian crossings
- ii. Removal of all pedestrian crossings signs located close to the existing crossings
- iii. Removal of Tactile Ground Surface Indicator (TGSI) on these crossings and reinstate the footpath to match existing
- iv. Installation of 16 new bollards to match existing or install fencing
- v. Installation of 10 new pram crossing to standards with suitable TGSI
- vi. Removal of three disability carparks
 - a. parallel disability carpark north of the roundabout
 - b. 90 degree disability carpark south of the roundabout
 - c. 90 degree disability carpark east of the roundabout
- vii. Reallocate parking bays and use this empty space as pedestrian refuge and pedestrian refuge island
- viii. Relocating affected disability carparking bays at east of North Street.
Allowance for 3 disabled carparks

- ix. Shift taxi zones north west of the roundabout further westward
- x. Shift bus zones further southward on Railway Street and relocate bus zone signs
- xi. The option would remove approximately 12 parking spot.

Total cost of work: \$188,444.10 + GST

There are some risks associated with the implementation of either Option 2 or Option 3 and these risks are:

- a. Pedestrian will need to walk further to cross the road
- b. Existing pedestrian lights may need to be relocated
- c. Road user may need to adjust to the new layout

Recommendation

Option C is recommended for the following reasons:

- a. Remove existing pedestrian crossings and install new pedestrian refuges as LOS does not justify these crossings
- b. Installation of bollards or fences preventing pedestrian utilising existing pedestrian crossing
- c. Reinstating current road furniture and services

Option	Advantages	Disadvantages/Risks
Option 1 : Do Nothing	<ul style="list-style-type: none"> - Most affordable option - Pedestrians and traffic are used to current layout - No backlash from road user 	<ul style="list-style-type: none"> - All pedestrian crossings are not to code - Disability carparks are not to code - Higher chance of accident at the roundabout
Option 2 : Relocate 2 Crossings	<ul style="list-style-type: none"> - Disability carparks within the roundabout vicinity will be to code - Two pedestrian refuges will be to code - Higher throughput of traffic at Railway Street - Lower chances of traffic pedestrian conflict 	<ul style="list-style-type: none"> - More expensive than Option 1 - Chances of backlash from road user - Two pedestrian crossings are not to code - Relocating of pedestrian lightings are required - May delay traffic during construction - Community consultation and education is required - Removal of approximately 10 carparks
Option 3 : Relocate all Crossings	<ul style="list-style-type: none"> - Disability carparks within the roundabout vicinity will be to code - All pedestrian refuge will be to code - Higher throughput of traffic at Railway and North Street - Lower chances of traffic pedestrian conflict 	<ul style="list-style-type: none"> - More expensive than Option 2 - Chances of backlash from road user - Relocating of pedestrian lightings are required - May delay traffic during construction - Community consultation and education is required - Removal of approximately 12 carparks

References

Austrroads Guide to Road Design Part 4B: Roundabout, D, Guide to Road Design Part 4B: Roundabouts

Manual of Uniform Traffic Control Devices 2003, Part 2: Traffic Control Devices for General Use, MUTCD 2009, Queensland Government

Pedestrian Crossing Prioritisation Workbook, Transport and Main Roads

Standards Australia 2009, Part 2: Traffic Control Devices for General Use, AS1742.2 2009, Standards Australia

Standards Australia 2009, Parking Facilities Part 1: Off-Street Parking, AS2890.1-2004, Standards Australia

Standards Australia 1993, Parking Facilities Part 5: On-Street Parking, AS2890.5-1993, Standards Australia

Standards Australia 2009, Parking Facilities Part 6: Off- Street Parking for People with Disabilities, AS2890.6-2009, Standards Australia

Appendix 1 – Intersection Traffic Counts



Q1590 Railway St & North St(1st Nov).xls



Q1590 Railway St & North St(2nd Nov).xl



Q1590 Railway St & North St(13th Oct).xl



Q1590 Railway St & North St(14th Oct).xl



Q1590 Railway St & North St(15th Oct).xl



Q1590 Railway St & North St(16th Oct).xl



Q1590 Railway St & North St(17th Oct).xl



Q1590 Railway St & North St(18th Oct).xl



Q1590 Railway St & North St(19th Oct).xl



Q1590 Railway St & North St(20th Oct).xl



Q1590 Railway St & North St(21st Oct).xl



Q1590 Railway St & North St(22nd Oct).x



Q1590 Railway St & North St(23rd Oct).xl



Q1590 Railway St & North St(31st Oct).xl

Appendix 2 – Extract from AS2890.5 Parking Facilities

4.5.2 Parking space design requirements Parking spaces for use by people with disabilities shall comply with the following:

- (a) *Pavement requirements* A parking space shall consist of an unobstructed area having a firm plane surface, all at the one level, with a fall not exceeding 1:40 in either the direction of parking or at 90 degrees to it, or 1:33 if the surface has a bituminous seal.
- (b) *Space width—angle parking* For angle parking the parking space width shall be not less than 3.2 m. This width shall be regarded as an absolute minimum, as it will often be difficult for a disabled person to cope with wheelchair transfer if the adjacent angle parking space is occupied. Wherever practicable, it is desirable for a space of up to 3.8 m wide to be provided.
- (c) *Space width—parallel parking* Parallel parking spaces shall not be marked as disabled spaces, nor included in the count of spaces available for people with disabilities unless—
 - (i) a 3.2 m wide space can be provided, e.g. by indenting the space into the footpath area; and
 - (ii) kerb ramps as shown in Figure 4.2(a) are also provided.
- (d) *Provision of accessible path of travel* A continuous, accessible path of travel in accordance with AS 1428.1 shall be provided between each parking space and the adjacent footpath, and thence to the final destination so that the path does not cross any vehicular traffic path at an uncontrolled location.
- (e) *Signs* Parking spaces shall be identified by a parking control sign incorporating the international symbol of access for people with disabilities (see AS 1742.11).

Appendix 3 – Austroads Part 4B: Roundabouts

5.2 Pedestrians

Whilst there may be a perception in some sections of the community that roundabouts are problematic for pedestrians, there is no evidence to suggest that roundabouts are less safe for pedestrians than other forms of intersection control.

Vision-impaired people rely on vehicle noise to obtain cues of whether it is safe to step onto the road. Roundabouts can be especially problematic for vision-impaired people as traffic can be moving in different directions which can be confusing. Their needs should therefore be considered and it may be necessary to provide separate crossing ramps further down the approaches where vehicles only approach from two directions.

Pedestrian kerb ramps are provided at roundabouts one or two car lengths in advance of the holding line so that pedestrians crossing the road are not impeded by cars waiting on the approach. Design features that could be expected to improve the level of service and safety for pedestrians at roundabouts include:

Appendix 4 – Level of Service Calculation Sheet



Pedestrian Crossing Analysis (East Crossir
Pedestrian Crossing Analysis (North Cross
Pedestrian Crossing Analysis (South Cross
Pedestrian Crossing Analysis (West Cross

Appendix 5 – Drawings of Options



Option 2 version
1.pdf



Option 3 Version
1.pdf