

**SH2: Maunganui Road/
Girven Road intersection,
Tauranga**

ROAD SAFETY REVIEW

A REPORT PREPARED FOR
NZ TRANSPORT AGENCY

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1.0 INTRODUCTION

1.1 The Project

Steve Reddish of Traffic Planning Consultants Ltd (TPC) has been engaged by the New Zealand Transport Agency (NZTA), Tauranga, to undertake an independent road safety review of three options being considered for the upgrading of the intersection of SH2 (Maunganui Road) and Girven Road/Matapihi Road, Arataki, Tauranga.

The brief given to TPC has been to review the options with particular regard to vulnerable road users (pedestrians and cyclists), but to also comment on any other road safety issues.

The existing intersection is a two lane roundabout outside a central island diameter of approximately 25m and with two lane entries and exits on all approaches. The key driver for upgrading this intersection is capacity, both now and in the future, plus ensuring efficiency of access to/from the Port of Tauranga in particular.

Off-peak and peak hour site visits were undertaken on Monday 15th August 2011.

The options under consideration have been prepared by Beca, Tauranga and are:

- Option 2: Signalised roundabout (drawing 3933377-C-K005 rev E dated 08.08.11)
- Option 3: Flyover with signalised cross intersection underneath (drawing 3933377-C-K015 rev A dated 15.08.11)
- Option 7: Flyover with signalised roundabout underneath (drawing 3933377-C-K014 rev A dated 01.08.11)

Safety issues have been noted for each option in section 2 of this report and a rating given commensurate with a formal road safety audit for guidance as to the potential severity of the issue taking account of risk and seriousness of any crash that may occur. However, it should be noted that under a formal road safety audit scenario the team may well identify other issues and provide different ratings – what is documented in are the opinions of the sole safety reviewer.

1.2 The Site

Maunganui Road (SH2) is a four lane highway both north and south of the intersection and is subject to a 70 km/h speed limit. It is a key route to-from the Port of Tauranga and consequently carries a significant number of heavy commercial vehicles (HCVs). It is classed as Road of National Significance (RON).

Apart from its regional strategic importance, Maunganui Road is also important in terms of general accessibility for the local community. As there is limited access onto

Maunganui Road, Girven Road is an important link to SH2 for the Arataki area and the northern part of Papamoa. Consequently there is a high number of turning movements out of and into Girven Road at the Maunganui Road/Girven Road intersection.

During the PM peak period site visit, it was noted that as a result of the queues southbound on Maunganui Road, there was a significant amount of “rat running” through the local streets Concord Avenue-Farm Street and Spur Avenue-Links Avenue-Concord Avenue-Farm Street routes.

Matapihi Road serves a residential area that can only be accessed from the Maunganui Road/Girven Road intersection. Immediately west of the intersection is a rail crossing. When the crossing barriers are activated by a train, traffic queues back onto the roundabout which can lock up.

Adjacent to the intersection is the large Bayfair shopping centre in the northeast quadrant and the smaller Home Zone centre in the southwest quadrant. The latter has predominantly large format retail outlets.

Given the locations of the above retail centres, other community facilities and the residential areas both sides of SH2, there is a degree of community connectivity across SH2 on foot and bike, as well as by private vehicle, the demand for which is likely to increase.

Approximately 750m to the south of the Maunganui Road/Girven Road intersection is the junction of SH2 and SH29 which will also be the termination of the Tauranga Eastern Link (TEL). Adjacent to this intersection is the Bay Park stadium (capacity approximately 15,000) and events centre/arena (capacity approximately 3,000-5,000). The proximity of the stadium and events centre can also generate pedestrian movements through the Maunganui Road/Girven Road intersection.

Currently, the only connectivity provisions for pedestrians and cyclists at the Maunganui Road/Girven Road intersection are:

- A shared path on the north side of Matapihi Road which connects to
- A subway under SH2 (north of the intersection) that leads into the Bayfair shopping centre car park
- A footpath on the south side of Matapihi Road that connects to an at-grade crossing point over SH2 and the footpath on the east side of SH2 and thence to Girven Road (NB this crossing point is inherently unsafe given the need to cross a multi-lane road approximately 30m from the roundabout and the lack of visibility of left turning traffic from Girven Road when crossing from the east side. Also the footpath on Matapihi Road has no safeguard at the rail crossing.)

1.3 General

Consideration should initially be given to the form and function of the intersection from a strategic/regional perspective and integrate with the future form and level of service at the SH2/SH29 intersection at Te Maunga (Bay Park stadium complex).

From a road safety viewpoint, it is considered that the safest form of intersection at Maunganui Road/Girven Road that also achieves the key objectives of capacity and efficiency is:

- Grade separation of the main through route (ie SH2) and
- A roundabout for local traffic movements onto/off/across SH2 (NB roundabouts are the safest form of intersection control for traffic)

The next issue is how then to safely provide for other road users (pedestrians and cyclists). In a heavily trafficked environment, grade separation of pedestrians and cyclists offers the safest solution from a road safety perspective.

However, recognising that some pedestrians and cyclists prefer to cross roads at grade having regard to personal safety in subways, shortest distance, and gradients associated with grade separated structures, it is considered that some controlled provision for safe crossing at-grade should also be provided. Also, if the through traffic on SH2 is grade separated, there is the likelihood that more pedestrians and cyclists will feel able to cope with the lesser amount of traffic at-grade.

During the site visits, it was noted that pedestrians crossed both Girven Road and Matapihi Road at-grade. The crossing of Girven Road was near the roundabout and the crossing of Matapihi Road was at the railway tracks to/from the subway under SH2.

It was also noted that cyclists had a convoluted route to get from Girven Road to SH2 northbound: cross Girven Road into the Bayfair centre car park, through the car park to the subway, left onto Matapihi at the railway tracks and thence left onto SH2.

It will be important to identify the desire lines for both pedestrians and cyclists and cater for them in an effective and safe way so that neither attempt unsafe manoeuvres.

When considering controlled at-grade crossing solutions for pedestrians and cyclists, the following need to be borne in mind:

- Length of crossing and risk of not completing the crossing in the allotted time (especially the young and elderly)
- Delays to pedestrians and cyclists and risk of crossing against a red signal
- The risk of red light running by vehicles.

It is with all of the above in mind that the options have been safety reviewed.

2.0 REVIEW FINDINGS

2.1 General

At urban intersections, 24% of all injury crashes occur at traffic signals compared to 8% at roundabouts. This partly reflects the fact that there are more signalised intersections than roundabouts, but also takes account of the fact that crashes at roundabouts are generally less severe. Not stopping for a red light accounts for some 35% of all urban injury crashes at traffic signals.

The following findings all assume that, as a minimum, the existing subway will remain and possibly be upgraded.

2.2 Option 2 – Signalised “hamburger” roundabout

	Issue	Rating
General		
1	There are two weaving sections on the roundabout with 3 lanes – 3-lane roundabouts have a much higher crash rate than 1 or 2 lane roundabouts due to weaving (up to 89% more crashes).	Significant
2	General driver confusion with a complex or unfamiliar layout can generate unsafe manoeuvres leading to crashes.	Significant
3	Difficulty and complexity of marking and signing can lead to unsafe lane changing on the roundabout with resultant crashes.	Significant
4	Consecutive, closely spaced traffic signals have known safety problem with drivers acting on the 2 nd set of signals rather than the first, even with the use of louvers. This can generate red light running. Higher risk on high speed SH2 (70 km/h) approaches with higher severity crashes.	Serious
5	Sets of closely spaced traffic signals on the roundabout itself would be unexpected, especially by visitors to this tourist area, with high risk of red light running.	Significant
6	Various signals on the circulating roundabout would be in view from other limit lines with additional red light running risk.	Significant
7	Left exit from SH2 to turn right at the roundabout is counter-intuitive and can lead to late unsafe lane changing.	Minor
8	Confident cyclists wishing to remain on the carriageway to make right turns would be at high risk having regard to all of the above.	Serious
Pedestrian and cyclist facilities		
9	The long multi-lane crossing across SH2 has the risk of pedestrians crossing against a red signal or being slow and being hit.	Serious
10	When using the long multi-lane crossing across SH2 there is the risk of a pedestrian being hit by a red light runner (southbound) who has acted on the next downstream signal.	Serious

11	Fences will be needed to force pedestrians and cyclists to use the correct route – fences then become a hazard in their own right, can obscure sight distance to signals and stationary vehicles, and can restrict intervisibility between pedestrians and drivers.	Significant
12	Some desire lines are not catered for; for example, access to the footpath on the east side of SH2 south of the intersection for pedestrians walking to/from Bay Park stadium or for cyclists on Girven Road wanting to access SH2 northbound.	Serious

Overall: This option should be abandoned on road safety grounds.

2.3 Option 3 – Flyover with signalised intersection

	Issue	Rating
General		
1	The long section shows the flyover with a crest curve K value of 21 and also a horizontal curve of 320mR on the north side of the flyover. Given that the speed limit is 70 km/h, the design speed should be at least 80 km/h (ie a K value of at least 31). A 320mR horizontal curve is difficult to read and for northbound drivers will be over the crest curve. With regard to safe system principles, barrier separation will be needed with sufficient width of structure to also take account of forward sight distance requirements generated by the barriers and including breakdown shoulder.	Significant
2	Long distance (approx. 70m) from west side limit line to east side of the intersection with higher risk of a crash if enter on yellow signal.	Significant
3	A significant number of separate phases will be needed to cater for various spatially overlapping movements – this can lead to frustrations and red light running.	Minor
Pedestrian and cyclist facilities		
4	The long crossing across SH2 has the risk of slower pedestrians being stranded when the signals change.	Minor
5	The potential delays to pedestrians (re no. phases and consequential cycle time) can lead to attempts to cross against red signal which would be particularly dangerous over the multi-lane Girven Road situation.	Significant

Overall: Of the 3 options under consideration, this would appear to be the best option for all road users from a road safety perspective if there are to be any pedestrian/cyclist facilities at-grade, though care would be needed at the design development stage to address safety concerns. The impact of the rail crossing can be best managed through this option by ensuring all movements into Matapihi Road are arrow controlled.

2.4 Option 7 – Flyover with signalised roundabout

	Issue	Rating
General		
1	The long section shows the flyover with a crest curve K value of 21 and also a horizontal curve of 320mR on the north side of the flyover. Given that the speed limit is 70 km/h, the design speed should be at least 80 km/h (ie a K value of at least 31). A 320mR horizontal curve is difficult to read and for northbound drivers will be over the crest curve. With regard to safe system principles, barrier separation will be needed with sufficient width of structure to also take account of forward sight distance requirements generated by the barriers and including breakdown shoulder.	Significant
2	There are three weaving sections with 3 lanes on what is a relatively small diameter roundabout for this number of lanes – 3- lane roundabouts have a much higher crash rate than 1 or 2 lane roundabouts due to weaving (up to 89% more crashes).	Significant
3	Signals on a relatively small diameter (30m) roundabout have a high risk of drivers not expecting/anticipating/observing signals as they circulate around the roundabout and also have to concentrate on the spiral markings to get in the correct lane. This can be a high risk for visitors to this tourist area.	Significant
4	Signals on the roundabout are a short distance from and in the view of the prior approach – this can lead to drivers on the approaches acting on the roundabout signals rather than the approach signals even with the use of louvers.	Significant
5	There is no deflection northbound on SH2 to slow entering vehicles across the limit line if arriving on a green signal at 70 km/h.	Significant
6	Confident cyclists wishing to remain on the carriageway to make right turns would be at high risk having regard to all of the above.	Significant
Pedestrian and cyclist facilities		
7	Following on from 2 and 3 above, taking pedestrians across 3 lanes of circulating carriageway introduces risk associated with the failure of drivers to observe signals on the roundabout itself.	Serious
8	Fences will be needed to force pedestrians and cyclists to use the correct route – fences then become a hazard in their own right, can obscure sight distance to signals and stationary vehicles, and can restrict intervisibility between pedestrians and drivers.	Significant
9	Some desire lines are not catered for; for example, access to the footpath on the east side of SH2 south of the intersection for pedestrians walking to/from Bay Park stadium.	Serious

Overall: Without signals on the roundabout, this option serves traffic safety well, but would require pedestrian and cyclist crossings to be grade separated.

3.0 CONCLUSION & RECOMMENDATION

3.1 Conclusion

On the assumption that a flyover would not present any issues with respect to the form and function of the TEL termination at Te Maunga, from an overall road safety perspective, this safety reviewer considers that upgrading of this intersection is best served by way of a flyover for SH2 through traffic and a roundabout for local traffic movements. The roundabout design would need to take account of any potential issues of restricted sight lines due to flyover bridge abutments and/or pillars. All pedestrian and cyclist movements would need to be catered for by grade separated facilities. An adverse impact would be the potential for the roundabout to lock up when the rail crossing barriers are activated, but through traffic on SH2 would not be affected.

If it is accepted that some at-grade pedestrian/cyclist crossing facilities are required to provide choice and/or cater for lesser used routes that do not meet justification criteria for grade separation, then from a safety perspective the local traffic movements are best served by a standard signalised layout with appropriate pedestrian facilities. It is noted that the impact of the rail crossing can be best managed through this option by ensuring all movements into Matapihi Road are arrow controlled.

Of the options presented, it is considered that Option 2 would generate significant road safety concerns and should not be progressed. As noted above modified versions of Options 3 and 7 would present safer options for road users with Option 3 not being signalised, but having grade separated facilities for pedestrians and cyclists providing the safest option.

Whichever option is progressed, it is important to cater safely for all the movements that pedestrians and cyclists are likely to make.

3.2 Recommendations

1. Abandon Option 2.
2. Take Option 7 forward without signals on the roundabout, but with grade separated facilities for pedestrians and cyclists.
3. If at-grade facilities are required for some pedestrian and cyclist movements, take Option 3 forward, but with grade separated facilities for the main pedestrian/cyclist movements.
4. Ensure all pedestrian/cyclist movements are catered for.

4.0 REPORT STATEMENT

4.1 Disclaimer

The findings, opinions, and recommendations in this report are based on an examination of information made available and the specified road and environs. Readers are urged to seek specific advice on particular matters and not rely solely on the report. Whilst every effort has been made to ensure the accuracy of the report, it is made available strictly on the basis that anyone relying on it does so at their own risk without any liability to the road safety reviewer or Traffic Planning Consultants Ltd.

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Signed :Date: 18 August 2011

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