

Ref: 10341

20 January 2012

Mackays to Peka Peka Expressway Alliance
PO Box 8044
Wellington 6143

Attention: Noel Nancekivell, Design Manager

Dear Noel

**Re: SH1: Mackays to Peka Peka, Kapiti Coast Expressway – Road Safety Review:
SH1/Otaihanga Road intersection**

The safety audit team (SAT) for this project has been asked to carry out an initial road safety review of the proposal to construct a roundabout at the existing SH1/Otaihanga Road intersection.

The drawings for this intersection improvement were forwarded via e-mail from the Mackays to Peka Peka Expressway Alliance and are numbered CV-GP-136, 138, 139, 450-456, dated 21.12.11.

The SAT has previously provided notes, dated 14 August 2011, on the concept designs for the various improvements proposed for the existing SH1 following construction of the M2PP section of the Kapiti Coast expressway. These notes included comments on a proposed roundabout design for the SH1/Otaihanga Road intersection and were as follows:

SK 032 and SK 033 – Otaihanga Rd

1. Separate left turn bypass shown for both roundabout options is unsafe for cyclists at merge area and merge area can be problem anyway – better if all movements through roundabout.
2. The Otaihanga Rd/SH1 intersection is on a crest viewed from Otaihanga Road and on curve on SH1 – intersection will need careful design.
3. Small roundabout on SK 033 has no deflection southbound. Will need a lot more treatment to slow vehicles prior to the roundabout (even if the speed limit is lowered) plus appropriate design of the roundabout itself per Austroads GTRD 4B. (NOTE: do not introduce a chicane type alignment leading up to the roundabout as this hides visibility to it and also vehicles can lose control prior to the roundabout.)
4. Consider shifting roundabout on SK 032 further north so that the Otaihanga Road leg of the roundabout is equidistant from the other legs to increase the separation between the western and northern legs of the roundabout.
5. Cycle lanes should not be taken through or up to the roundabout – refer MOTSAM Fig. 3.17 (Aug 2010) – there should possibly be an off-road facility for cyclists and the roundabout approaches designed so that cyclists “take ownership” of the traffic lane to facilitate safe turns on the roundabout.

The SAT acknowledges that the above matters appear to have generally been taken into account in the current design being reviewed.

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If the roundabout is to be constructed prior to the expressway (as appears likely given the recent fatal crashes which have occurred on SH1 to the north of Otaihanga Road), the SAT is unable to comment at this time whether capacity issues associated with the design may have safety implications.

REVIEW FINDINGS

1. Design: There was insufficient information and detail to determine if the southbound approach from Waikanae is designed per Austroads GTRD 4B in terms of the entry path radius through the limit line achieving the desired deflection, so that, ideally, the entry speeds are no higher than 10km/h greater than the circulating speeds. Otherwise this can lead to heavy braking at the entry point and/or crashes on the circulating carriageways. This needs to be verified.
2. Central island diameter: For the 80 km/h speed environment, the recommended minimum diameter for a central island of a two lane roundabout is 48m. The design under review has a central island diameter of 40m. It is acknowledged that this meets the absolute minimum criterion in Austroads GTRD 4B, but the SAT is of the view that from a safety perspective, the design should meet the desirable, rather than absolute, minimum standard.
3. Approach speeds: With regard to the high speed operating environment, treatment to slow vehicles prior to the roundabout (even if the speed limit is lowered) will be important, as noted in the earlier comments related to this intersection. Measures such as longer splitter islands, kerbing, high impact warning signage, speed activated signs, rumble strips should be considered at the detail design stage, but do not alter the approach alignments by introducing reverse curves as these can both restrict visibility of the roundabout and lead to loss of control crashes.
4. Conspicuousness: As the roundabout is elevated, the central island will need to be made clearly visible on all approaches. This is a critical safety issue. The island will need to be made conspicuous by way of mounding, planting and lighting, with appropriate levels of delineation provided.
5. Roundabout level: Following on from 4 above, consideration should be given to lowering the level of the roundabout to reduce the gradients on the approaches (see **Photos 1 and 2**) and so improve the conspicuousness of the roundabout.
6. Otaihanga Road approach: The crest curve with a K value of 14 at the end of the 6.5% uphill approach gradient means that the limit line markings (at ch 200) will not be seen in advance. The SAT considers that the situation could be improved by providing an even grade to the limit line and then rolled over allowing the limit line to be seen in advance. Lowering of the roundabout per item 5 above would further improve the situation.
7. Cycle/footpaths: On the scheme plan separate paths are shown for the extent of the works, though only on one side of each leg. It is not known whether these paths are to be shared cycle/pedestrian paths or just for pedestrians or for cyclists. In any event, detail design will

require safe tie in with existing facilities/shoulders and safe crossing points on SH1. The design will also need to take account of cyclists who elect to remain on the carriageway.

8. Path protection: The ground profile on the south-western corner of the roundabout drops away and thus the users of the adjacent path may require protection from the adjacent drop off, this will need to be considered during the detailed design.
9. Property Access: There is a property access (252 State Highway 1, Paraparaumu) located on the eastern side of SH1 on the southbound departure leg from the roundabout. Careful consideration should be given to how motorists intending to travel north from this access will manoeuvre immediately downstream of the roundabout.
10. Roadmarking: Whilst the following are matters for detail design, the SAT notes:
 - a. The two lanes to one lane merges on the SH1 departure legs are shown with marked tapers on the scheme plan drawing whilst the standard arrangement is to not have these taper markings so that motorists do not try to assert priority when merging.
 - b. The one lane weaving sections on the roundabout are achieved by hatching out part of the circulating carriageway. The limit lines for both SH1 approaches are then shown adjacent to the edge lines of the hatched areas. This can be both misleading for motorists and potentially unsafe. The splitter islands should be extended to the limit line or the weaving sections marked as two lanes.
 - c. Correct Alberta markings will need to be applied.



Photo 1



Photo 2

Yours sincerely

Jos Vroegop

Steve Reddish

Jon England

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