

Ref: 10341

21 March 2012

Mackays to Peka Peka Expressway Alliance  
PO Box 8044  
Wellington 6143

**Attention: Philip Chatterley/Peter Bradshaw (cc Andy Quinn)**

Dear Philip and Peter

**Re: SH1: Mackays to Peka Peka (M2PP), Kapiti Coast Expressway – Road Safety Review: SH1/Otaihanga Road Intersection**

The safety audit team (SAT) for this project has been asked to carry out a further road safety review of the proposal to construct a roundabout at the existing SH1/Otaihanga Road intersection. An initial review was carried out earlier this year (see letter with comments dated 20 January 2012) following which modifications were made to the initial design. This letter/report replaces the previous safety review.

The drawings for this intersection improvement were provided at a briefing meeting at the M2PP Alliance offices in Wellington on Wednesday 7 March 2012 and are numbered CV-SP-136 (rev B) dated 24.02.12 and CV-GP-138 and 139 (both undated rev B). A site visit was undertaken in the afternoon of 7 March 2012.

Prior to the initial review, the SAT had 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 most matters in the initial notes (August 2011) and the subsequent safety review (January 2012) appear to have been taken into account in the current design being reviewed. Matters that were raised in the previous review and not acted on at this stage of design, as they are appropriate for more developed design, are nevertheless repeated in this review so that this is a complete stand-alone document.

If the roundabout is to be constructed prior to the expressway, the SAT is unable to comment at this time whether capacity issues associated with the design may have safety implications.

## REVIEW FINDINGS

1. Design geometry: The design would appear to meet the requirements of Austroads GTRD 4B in terms of the entry path radii through the limit line achieving the desired deflection and hence entry speeds no greater than 50 km/h. However, this needs to be confirmed by the designers.
2. Approach speeds: With regard to the high speed (80 km/h) operating environment, treatment to slow vehicles prior to the roundabout will be important. The SAT endorses the use of the long splitter/median islands shown on the southbound and northbound approaches, but there will still need to be other measures such as kerbing, high impact warning signage, speed activated signs and transverse road markings considered at the detail design stage to encourage slower speeds on the approaches. Particular attention will be needed for the southbound approach from Waikanae as there is limited forward sight distance around the horizontal curve (see **Photo 1**).



**Photo 1**

3. Splitter islands: The above mentioned splitter/median islands on the southbound and northbound approaches appear to be very narrow (less than 1m wide). A width of 1.4m is recommended so that the islands are clearly visible and so that a 750mm diameter RG-17 sign can be erected on the nose of the island with 300mm clearance either side.

4. Conspicuousness: As the roundabout will be elevated with regard to the Otaihanga Road approach in particular (see **Photo 2**), the central island will need to be made clearly visible. 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.



**Photo 2**

5. Otaihanga Road approach: To enable the limit line at the roundabout to be seen by approaching drivers, the crest curve should finish at the limit line with an instantaneous change of grade to tie in with the roundabout carriageway crossfall at that point rather than continuing the crest curve past the limit line. In addition, the geometry of the crest curve should be improved from the K value of 23 proposed to a K value of 27, having regard to the likely approach speed of 60 km/h.
6. Cycle/footpaths: On the scheme plan separate paths are shown for the extent of the works, though only on one side of each leg. Of particular concern to the SAT, is the need to provide a suitable off-road facility and safe crossing points on all legs for cyclists who want to avoid using the roundabout carriageway when making right turns which can be difficult and unsafe for cyclists on two-lane roundabouts. In addition, the SAT was advised that the width of the paths is proposed to be 1.5m. They should preferably be at least 2.0m to allow any cyclists and pedestrians to safely pass each other. Furthermore, the design will require safe tie in with existing facilities/shoulders.
7. Property Access: There are a number of properties in proximity to the proposed roundabout that will require safe vehicular access. The SAT was verbally advised that consideration is being given to a separate one-way south to north service lane to serve those properties to the eastern side of the roundabout and which would enable all approach and departure directions to be achieved via the roundabout. The SAT generally endorses this approach but suggests that a safer option would be to design a two-way service lane with sole entry/exit via a fourth leg to the roundabout designed as a driveway so that it does not appear to be a public road. This would avoid the risk of nose to tail crashes and unsafe lane changing on the southbound



departure leg generated by a vehicle slowing to turn left into the service lane whilst other vehicles are accelerating away from the roundabout. Sight distance for vehicles turning left out of the northern end of a one-way access could also be restricted by the bend in SH1 to the north.

8. Roadmarking: Whilst the following are matters for detail design, the SAT notes:
- 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.
  - Shoulder markings should be terminated approximately 30m prior to the roundabout per MOTSAM so that any cyclists electing to remain on the carriageway (refer also item 6) are forced to take ownership of the traffic lane rather than continuing within the shoulder and ending up being “squeezed” by vehicles at the entrance to the roundabout.
  - Correct Alberta markings will need to be applied.
  - The layout needs to be designed to tie in with the existing flush median to the south of the roundabout (see **Photo 3**).



**Photo 3**

9. Power poles: Having regard to the safe system approach to design to minimise trauma in the event of a crash, it is assumed that power poles that present hazards close to the carriageway will be relocated.

Yours sincerely

**Jos Vroegop**

**Steve Reddish**

**Jon England**