

Bicycle rest stops in mountainous terrain to improve road safety for cyclists

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Abstract

To improve safety for on-road cyclists in mountainous terrain, a concept for a bicycle rest stop has been developed. The intent of the rest stop is to provide a safe space for cyclists to temporarily stop (to conduct repairs or rest) on roads where the left side of the road has numerous steep drop-offs, narrow lane widths and no shoulder. Design considerations include location, constructability, maintenance and costs. It is hoped that this concept design can be trialled in the near future to determine the effectiveness of such a treatment on improving road safety for cyclists.

Background

A winding mountainous road in the Gold Coast hinterland, popular with cyclists, presented an opportunity to develop an innovative engineering solution. Through a road safety audit, it was identified that the steep grade, narrow lanes, no shoulders and frequent unprotected drop-offs posed a risk to slow-moving cyclists. In particular, if cyclists needed to stop to rest, make repairs or wait for other cyclists there was limited safe space to do as the left lane was adjacent to numerous steep drop-offs. Figure 1 provides examples of road cross sections where this treatment may be appropriate while Figure 2 depicts the high level of cycle activity in the area by both recreational and training cyclists.



Figure 1. Example of limited road space for cyclist stopping



Figure 2. Strava Heat Map

Investigation

During concept design development, a variety of issues were investigated to ensure that it was a reasonable and practicable solution. This treatment may be effective to improve safety in other mountainous roads where cycling is popular and road widening is not a feasible option.

Location

Selection of appropriate sites require consideration of road cross-section types, vehicle volumes, cyclist volumes and speeds. A rest stop style treatment is suitable on routes that are frequented by high numbers of cyclists and have narrow lanes, no shoulders and unprotected drop-offs (generally mountainous terrain with steep winding roads).

Infrastructure

The design of the rest area had to incorporate infrastructure elements that reflected the needs of the user (i.e. cyclist) and was compatible with the terrain while not introducing additional hazards into the road environment. Hold rails were recommended to allow cyclists to prop comfortably while also serving a dual purpose in providing protection from drop-offs. Surface treatments had to be durable to ensure limited maintenance while providing adequate drainage and slip resistance in wet weather. Amenity was also considered to ensure that visually the rest stop did not detract from the natural environment.

Constructability and Costs

The constructability of the concept is challenging due to the nature of the road type (i.e. narrow and winding) which introduces risk and inconvenience during installation and maintenance. Ideally the rest stop would be prefabricated to allow installation within a short timeframe with limited requirements for traffic management. However, footings would have to be site-specific designs given that each site would have different geometry and varying sub-soil conditions. Ease of maintenance is also essential to again limit the road safety risk of working roadside in these environments.

Next Steps

It is intended that a concept design will be finalized to sufficiently prepare a project proposal for a trial of the treatment. Further refinement of the design will be required to include safety in design considerations, fabrication costs and compliance with existing design standards. The scope of the trial treatment investigation will need to consider duration of the trial, appropriateness of a location

and methodologies for determining quantitative and qualitative measures of effectiveness and perceptions by cyclists and other road users.

References

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