Improving pedestrian access across State Highway 88

Christine Mockett, 3rd year BEngTech (Civil), 2020

PROBLEM

State Highway 88 (SH88) from Dunedin to Port Chalmers, as seen in figure 1, is a busy route used by vehicles and large trucks. Posted at 80km/hr, it is a narrow winding road that is dangerous to cross on foot.

Construction of a shared path from Dunedin to St Leonards was complete in 2012, and the remaining shared path from St Leonards to Port Chalmers is currently under construction.

This project is based around the safety aspects of crossing SH88 from the residential area of St Leonards to access the shared path.

The current construction plans are to install two pedestrian crossings across the state highway with refuge islands to allow pedestrians to cross in sections.



Figure 1 — SH88 Dunedin to Port Chalmers route, Google Maps (2020)

The task involved is to find an alternative solution that is safer for pedestrians suitable in the marine environment while being practical and cost effective with little maintenance involved.

SURVEY

An online survey was conducted to determine the level of concern of safety when crossing SH88, and whether the crossing points should be improved. With 161 participants and the majority being regular users of the shared path, the overall response was that crossing SH88 was unsafe.

The graph to the right, figure 4, represents what participants would prefer to use to cross SH88. A footbridge was the most popular option. This option was preferred over three times more than the next highest, the zebra crossing with refuge islands in the middle.

REFERENCES

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Supervisor: David Charters, DCL Consulting

SOLUTION

Looking at pros and cons of different crossings and taking the survey results into account, a footbridge was the preferred option to an alternative safe crossing route over SH88.

A site assessment found that the most suitable location for a footbridge was in St Leonards, where there is St Leonards Park on one side of SH88 and a rocky outcrop on the other side of SH88, as seen in figure 2 and figure 3. This location utilized the natural land features, reducing the costs of constructing a bridge.



Figure 2 — Arial view and topography map of St Leonards Park next to SH88, DCC (2020)



Q9 - What type of crossing would you like to be able to use to cross SH88 to access the share path from residential areas, such as St Leonards or Sawyers Bay?





RESULTS

A truss design was used for this foot bridge. This allowed the design to be lightweight and aesthetically pleasing. Square Hollow Sections (SHS) were used as the top and bottom chords, and Circular Hollow Sections (CHS) for the diagonal members. This allowed the bridge to have adequate strength under dead and live loads whilst keeping the design aesthetics pleasing.

Calculations were done from first principles, using NZS 3404:1997 and SNZ HB 8630:2004, to determine the section sizes required with a minimum wall thickness. A 150SHS5.0 was adequate for the chords, and a 114CHS3.6 for the diagonal members, as seen in figure 5 and figure 6.



DIAGONALS = 114.3CHS3.6 TOP CHORDS = 150SHS5.0

Figure 5 — Cross section of one bay of the steel truss designed

The structure was designed to fit into the environment as much as possible. It was a light structure that would not obstruct the view of the harbour, and blend into the hillside with the steel being painted a dark shade of green.



Figure 6 — Cross section drawing of the main structure of the foot bridge designed. SH88 and the rail corridor can be seen beneath the bridge

Due to restrictions from NZTA and NZ standards, the height of the bridge had to be designed at 6.5m above the road surface. The access ramps could not be at a gradient greater than 8% and a landing pad of 1.5m was required every 9m. Due to the

construction of the shared



A Protective Coatings Specification was

steel members from corrosion due to the

developed in conjunction with Altex

Coatings to ensure protection of the

coastal marine environment.

Figure 7 — Plan view of the access ramp designed from off the rocky outcrop with the rail crossing on the right hand side

path between the road and the railway, a rail crossing was necessary, as seen in figure 7.

This design met all NZ Standard and NZTA requirements, and resolves the problem of crossing SH88 by providing safe access for everyone.



