

DESIGN/STRENGTHENING OF REINFORCED CONCRETE PIER HEADS

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Abstract

In a developing country like Sri Lanka, it is very important to develop infrastructure to facilitate investments. In this context special emphasis should be given to the road development sector. Therefore highway projects play a major role in infrastructure development.

Southern Transport Development Project is a major ongoing highway project in Sri Lanka. Package 2 of that project having 22 highway bridges and five of them are multi span structures. The intermediate supports of those structures are hammerhead piers which are having pier heads in the range of 4-5m cantilever lengths. After erection of post tensioned girders the deck slab and the diaphragms were cast in stages to make the deck slab continuous over the piers. During construction cracks of significant widths were appeared at both ends of the pier heads. In investigating the causes for cracking it was found that, 75% of main reinforcement and 65% of shear links were curtailed in the pier head over the stem area by the designer according to the instructions of the Engineer of the project. Therefore this research focuses on the curtailment of main reinforcement and shear links of a hammerhead pier. Further, the other aspect of this study is to discuss different strengthening solutions which can be applicable to this type of under-reinforced hammerhead pier.

In this regard, different cantilever lengths of three dimensional hammerhead pier models were analysed with shell elements in two different orientations using the structural analysis package SAP2000. The reinforcement and shear link requirement of the pier cross head over the stem area was calculated and the percentage of curtailment possible is presented in this report. Finally, different solutions for strengthening a hammerhead pier are also discussed.

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DECLARATION

I, W R Wickramasinghe, hereby declare that the content of this thesis is the original work carried out by me. Whenever others' work is included in this thesis, it is appropriately acknowledged as a reference.

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