

Identify Possible Solutions and Develop Criteria to Review Geometric Designs to avoid Safety Issues created by Surface Water in Expressways

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Abstract

Proper drainage and smooth functioning can be considered as an important aspect in design of an expressway. Inadequate drainage facilities can lead to problems such as significant weakening of road pavement structure and adverse safety conditions due to aquaplaning. As Sri Lanka is a growing hub of economy in South Asia, construction of expressways has become prominent and safety of road users in adverse weather conditions need to be adequately taken into consideration in design stage of expressways. Objective of this research study is to identify current issues in existing expressways, propose solutions and define guidelines & recommendations that to be followed in geometric designs in related to the surface drainage by Sri Lankan highway/bridge designers.

Road segments where sag curve and super elevation developments are much likely to have problems regarding surface drainage. By observing newly constructed expressways in Sri Lanka such as STDP, it is evident that both sag curve and super elevation developments exists simultaneously are much vulnerable for aquaplaning.

Policy on Geometric Design of Highways-AASHTO and Geometric Design Standards of Roads-Road Development Authority of Sri Lanka emphasis cross fall, minimum gradient and rate of vertical curvature (K) values to be taken by proper consideration of surface drainage. But many researches have shown that despite of above factors, several parameters such as water film thickness, flow path length, flow path slope and rainfall intensity subjected to stipulated return period play a major role in preventing aquaplaning. In this research actual film thickness, rainfall intensity and flow path length will be measured through a field study in above mentioned critical locations in expressways.

Finally, a parametric study will be carried out considering above aspects as well as by reviewing geometric designs of existing expressway and guidelines will be provided to prevent aquaplaning of expressways in Sri Lanka.

Keywords: Surface Water, Water Film Thickness, Aquaplaning, Geometric Designs, Sri Lankan Expressways.

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