

Determining the Flood Flow Characteristics of Submerged Bridge Superstructure

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ABSTRACT

Bridges are a critical component of the nation's transportation network. Highway bridge superstructures over large waterways may become partially or completely submerged during a flood event. During flood periods, the presence of bridges may cause backwater and this is considered as obstruction. In addition, flood flows add possible forces such as drag force and uplift force on the bridge structure thus causing damages to the bridge superstructure and lead to failure. General practices in highway engineering make it necessary to give more attention to aspects of hydraulic design which determine the security of a structure against action of water where the bridges are placed. A study based on theoretical and experimental procedures using a prototype of bridges in laboratory was conducted to investigate and analysis the backwater occurred to the bridge superstructure and forces on submerged bridge. The results show that the higher the inundation depth of the bridge superstructure is, the higher backwater height occurred at the upstream of the bridge. While for drag force, it is found out that is directly proportional to the Froude Number and inundation depth. Lift force increases as inundation depth increase, but it decreases as the Froude Number increases.