

Efficiency of Utilizing Folded Against Curved Corrugated Precast Concrete Panels in Composite Decks

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Civil Engineering Research Magazine – CERM - Faculty of Engineering – Al-Azhar University 2006.

ABSTRACT:

Use of precast concrete panels in the construction of bridge decks results in significant economies by avoiding the time-consuming efforts of fitting, placing and eventual removal of formwork. Moreover, additional advantages are gained due to the composite action between the concrete panels and the cast in situ concrete. The whole slab acts as one unit to resist the full design load provided that sufficient shear connectors are used between the two layers. Flat precast concrete panel is the conventional types of panels currently used in bridge deck construction due to its ease and speed of construction. Recently, corrugated precast concrete panels, either folded or curved, have been introduced to be used as an integral part of composite construction. The corrugated configuration provides extra strength for both the precast panel as well as the composite deck. The aim of this paper is to investigate the difference in behavior between folded and curved corrugated concrete panels in composite decks. This study was carried out for both reinforced and prestressed panels. Modeling of composite decks is achieved by using the finite element method through the general purposes computer program (ANSYS). The analysis has been performed for construction, service as well as ultimate stages. The results of the analytical model were verified with the previous available experimental results. The analytical results of this investigation reveal the importance of using folded corrugated panel rather than curved one in composite decks. Folded corrugation helps in overcoming a lot of deficiencies that appears in curved corrugation especially when used in prestressed precast panels.