



INDOT Research

TECHNICAL Summary

Technology Transfer and Project Implementation Information

TRB Subject Code: 33-4 Rigid Pavement Construction
Publication No.: FHWA/IN/JTRP-2003/26, SPR-2779

June 2004
Final Report

Using Precast Concrete Panels for Pavement Construction in Indiana

Introduction

The increasing number of automobiles pushes many highways far beyond their designed capacity, and results in the deterioration of pavement at a faster rate. To cope with this increased deterioration, highways are often closed for construction of new pavements, overlays, or removal and replacement

applications. To minimize the effects of such traffic delays during construction and to expedite the pavement construction, the purpose of this study is to assess the feasibility of using Precast Concrete Pavement (PCP) in Indiana.

Findings

A comprehensive review was conducted on various state-of-the-art methods in PCP construction. The review first found the precast prestressed concrete panels method is used in Texas; Super-Slab method in New York. Full Depth Repair method in Michigan; Stitch-in-Time method in Colorado; Four-by-Four Slab Replacement method in California are repairing methods. These methods were evaluated in terms of their design concepts, field installation procedures, merits, pitfalls, costs, and applications.

Texas' PPCP and New York's Super-Slab are developed for longer and continuous paving and the other three are for shorter and spot repairing. Therefore, the PPCP and the Super-Slab were selected for further in-depth study. They were compared with conventional cast-in-place concrete pavement. Although the PPCP and Super-Slab methods have a higher construction cost and the industry is not familiar with this new method, PPCP and Super-Slab methods possess the advantages of using precast concrete. The speedness of the laying precast panels not only results in less traffic congestion

and delays, but can lower the user costs significantly. In addition, the precasting is under better controlled environment. It leads to a more durable concrete and requires less maintenance.

Comparing Texas' Precast Prestressed Concrete Panels (PPCP) method with New York's Precast Super-Slab (Super-Slab) method, precast Super-Slab is approximate half size of precast concrete panel. With its precision of Supergrader, Super-Slab has better subbase preparation for warped slabs. Nevertheless, due to the application of pre-tension and post-tension on PPCP's concrete, PPCP can have thinner slabs and a more durable concrete in the long run. Moreover, PPCP method is derived from near 20 years laboratory and roadway experiments on cast-in-place post-tensioned method in Texas. The theories are sound and empirically proved. This method holds no patents. The detailed information and experimental data are well documented and accessible. It can be reasonably predicted that the unit cost of PCP will be lowered if the constructed lane length is getting longer and the method can be repeatedly used.

Implementation

The study concludes that it is feasible to use PCP in INDOT's pavement construction. Among the various PCP methods identified in this study, PPCP methods possess many comparative advantages. It is recommended that the PPCP method be experimented on an INDOT demonstration project. This is a demonstration project in Indiana for setting the stage for future

full-scale implementation. To minimize effects of traffic congestion in this phase, the implementation site for this demonstration project is recommended to be on a non-priority roadway. Meanwhile, the implementation is suggested to be on short stretch of primary route at bridge/overpass, patch project or intersection replacement.

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