



INDOT Research

TECHNICAL *Summary*

Technology Transfer and Project Implementation Information

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Design of Durable Concrete Railroad Crossings

Introduction

A grade railroad crossing is the physical crossing of two different modes of transportation. The crossing creates a discontinuity in both the highway and the railroad line at the point of intersection, and in many cases the approaches must be altered. The crossing must transmit the highway traffic wheel loads and the rail loads through the crossing to the foundation structure. Rideability and durability are two concerns

associated with a concrete railroad crossing. Conventional timber or rubber crossings deteriorate and become rough and even dangerous. Concrete surfaces can provide excellent long term performance, however many have failed. The goal of this project was to optimize the performance and life span of concrete crossings.

Findings

Modulus of rupture was significantly increased with the addition of polyolefin fibers. An increase in midpoint deflection accompanied this increased strength. The addition of polyolefin fibers to a precast concrete railroad crossing will impart increased flexibility and strength to the panel. The fibers will also serve to keep cracks from propagating and opening

further in the case a crack does form. The addition of fibers, however, does not improve the properties of concrete enough to design a lay-in type panel of limited height using ordinary reinforced concrete. Post-tensioning used in conjunction with polyolefin fibers would allow a limited height panel to be designed adequately for both the strength and durability required.

Implementation

It is necessary that the ties supporting lay-in precast concrete panels be properly aligned so that the panel lies on all of the ties beneath it. If a tie is too low, it does not provide support, and if it is too high it may place undue stresses on fasteners.

When fasteners loosen, the panels are subjected to a rocking motion which causes

further wear on the ties beneath it. The rocking motion continues to grow worse and can cause panels to crack.

For these reasons it is important to make sure the ties are aligned properly prior to installation. Lag screws should not be fastened to damaged ties, or ties that have been used to fasten previous panels.

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