Texas A&M Transportation Institute

PROJECT SUMMARY

Texas Department of Transportation

9-1529: Low-Cost Safety Solutions, Pavement Preservation, and Maintenance Practices for Rural Highways

Background

Task 1

The objective of this project was to develop and demonstrate innovative low-cost solutions to improve safety at stop-controlled intersections. Preliminary directives from the project panel were to focus on treatments on the minor street approach and not necessarily on the major street approach, and to investigate solutions that are active in nature, i.e., have beacons come on when a vehicle arrives or when a vehicle is not slowing down.

Task 2

The focus of this task was to demonstrate the latest pavement preservation and maintenance treatments in a controlled environment, and then apply the best-performing products in demonstration projects. The focus of these treatments included:

- Thin hot-mix asphalt (HMA) overlays (dense graded, gap graded, and open graded).
- Modified and unmodified crack sealants.

What the Researchers Did

Task 1

The Texas A&M Transportation Institute (TTI), in consultation with Texas Department of Transportation (TxDOT) engineers, developed a low-cost system that can be configured with off-the-shelf components and can be installed fairly easily. The system uses wireless sensors to complete contact closures in a cabinet that was built by TTI researchers to activate beacons on the STOP sign and STOP Ahead sign when a vehicle is arriving on a stop-controlled approach. The system was developed at TTI facilities in College Station and installed at the intersection of US 285 and SH 302 near Pecos, Texas, in January 2014 after a demonstration at a test track near Pecos. Data were collected before and after the system was installed in multiple configurations to evaluate the system.

Upon a suggestion from the panel, TTI researchers developed a system where the beacons on the STOP sign would be turned on only if the motorist's speed was below a user-defined threshold. Such a system was developed and installed at the intersection of Loop 338 and FM 554 near Odessa, and demonstrated to engineers from the Odessa District.

Task 2

The researchers coordinated construction of six unique thin overlays on the Pecos Research and Testing Center (RTC) facilities. The mixes included two fine permeable friction courses (fine PFCs), two fine stone matrix asphalt mixes, and two crack attenuating mixes (CAMs). These

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were placed over two pavement sections having different severities of thermal and fatigue cracking. The successful fine PFC design was later constructed on Brownwood US 183 and on Loop 338 around Midland as a demonstration project. Similar designs were placed in various parts of the state.

Six crack sealant sections with different routing configurations were constructed at the Pecos RTC. Performance of these sealants was also tested in the lab. Four of the sealants were identified for further test/demonstration projects outside San Antonio on SH 16 and on SH 137 in Stanton (Odessa District). These test sections are still being monitored.

What They Found

Task 1

The key findings were as follows:

- It is advisable to have the beacons on the STOP Ahead sign flash continuously.
- At a distance of 400 feet, speeds were lower when the beacons were in an active mode.
- TxDOT engineers preferred a treatment that changes the flashing pattern rather than one that starts flashing when a vehicle is not slowing down.

Task 2

The key findings were as follows:

- Reflective cracking at the Pecos RTC was most prevalent in the Eastland CAM.
- The fine PFC performed as expected, reducing noise and quickly draining surface water.
- Field studies of crack sealant types/ configurations are inconclusive at this time.

What This Means

Task 1

This project has developed a product that is ready for immediate implementation. The research team's recommendation is to flash the beacons on the STOP Ahead sign continuously and operate the STOP signs in an active mode. The team, however, recommends further study of the development of a system that uses approach speeds to operate the beacons at the STOP sign.

Task 2

Thin HMA overlays are cost-effective preservation/maintenance treatments. The fine PFC designs in this study are particularly performing well. These thin mixes should be further implemented in TxDOT districts, at least as trial projects. Districts should also consider trying alternative crack sealants for routine maintenance because preliminary results suggest some products have better performance than TxDOT Class A and B sealants.

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