Project Summary

Texas Department of Transportation

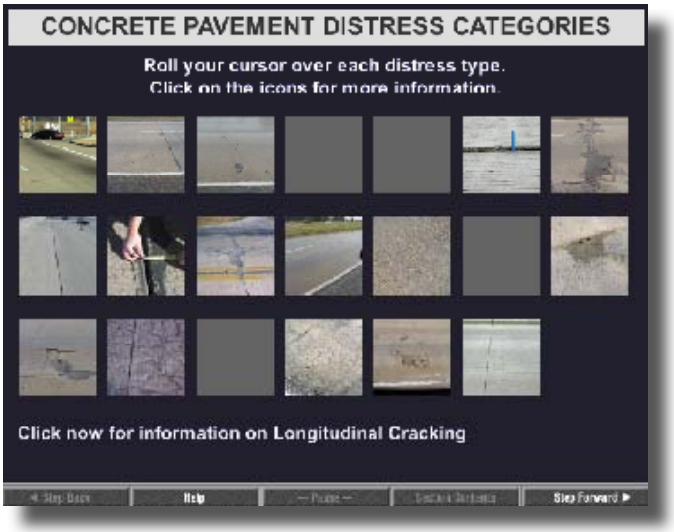
5-1731-01: Development of a Concrete Pavement Rehabilitation Training CD-ROM

Background

The Texas Department of Transportation (TxDOT) has many miles of concrete pavement that are nearing the end of their service lives or that have reached a condition that requires rehabilitative action. Few formal guidelines are available to provide TxDOT engineers with recommendations on how to diagnose concrete pavement problems and how to select the optimal rehabilitation strategy. Project 5-1731-01 was initiated to develop training tools for TxDOT engineers involved with concrete pavement restoration projects.

What the Researchers Did

Based on interviews with TxDOT district personnel, reported performance of rehabilitation treatments in Texas, and results of numerous research studies, Texas Transportation Institute researchers developed the training CD-ROM described in this summary report. In the Introduction section Dr. Andrew Wimsatt covers the history of concrete pavement construction and performance in Texas. This is followed by a detailed discussion of each major distress type commonly found on concrete pavements in Texas, a description of how to use nondestructive testing equipment to investigate pavement problems, and recommendations on the selection and application of the concrete pavement maintenance and rehabilitation options.



Introductory screen from the "Distresses" section. Moving the cursor over each photo displays the distress name. Clicking on any photo brings up a detailed discussion on relevant potential causes and treatments.

One complicating issue for pavement engineers is that in order to select the optimal rehabilitation strategy it is often necessary to identify the cause of the distress. However, any particular distress can have multiple causes; longitudinal cracking is a good example. The discussion for longitudinal cracking is shown on page 2. These cracks could be caused by a number of design- or construction-related issues such as the uniformity of the pavement support, the use of heavily stabilized support layers, or the time when the longitudinal joints were sawed. For several of the distresses described on the CD, short animations are also provided to demonstrate the mechanisms causing the distress.

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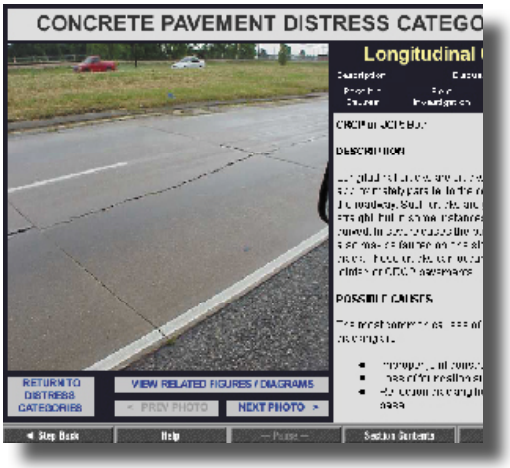

Partial view of "longitudinal cracking" screen.

In the area of field investigation the use of nondestructive testing equipment is described. Ground-penetrating radar, either air-launched or ground-coupled radar systems, is used primarily to locate sub-slab air-filled or water-filled voids. The falling weight deflectometer is described for load transfer and general structural evaluation purposes. The rolling dynamic deflectometer is described and strongly recommended for all investigations on jointed concrete pavements. The dynamic cone penetrometer is presented as a tool for subgrade strength testing. For each piece of equipment a short video supplies information on how to collect and interpret data.

Repair strategies covered on the CD include options like those shown below. In each case possible, the training describes performance of each of these strategies on Texas highways and references the appropriate specification or design standard. Several of these treatments are not common in Texas, and in that case national recommendations are referenced.

What They Found

Concrete pavements constructed in Texas in the last 10 to 15 years are performing very well. Most are continuously reinforced concrete pavements (CRCPs) with tied-concrete shoulders and asphalt-stabilized bases. Few of these have needed any major repair. However, problems exist in selecting the optimal repair strategy for both older jointed concrete pavements – many of which were built prior to 1960 – and older CRCPs built prior to current design standards.

Partial view of "Recommended Rehabilitation Options" screen.

Many new repair strategies such as rubbilization and dowel bar retrofit have not been widely used in Texas. No long-term performance studies or cost-effectiveness information was found for many of the possible repair strategies. In some instances strategies are tried locally but no documentation is collected on their performance. More work is clearly needed to provide cost-effectiveness recommendations for the large variety of possible repair options.

What This Means

The CD developed in this project provides a framework for future development. Many research studies are being conducted on both materials (patching materials, crack resistant hot mixes) and repair options (thin bonded overlays, rubbilization). The results from these studies should be used to update the appropriate sections on this CD. Consideration should be given to placing the content of this CD in TxDOT's on-line training system so it can be readily updated as new information becomes available.

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