



# Project Summary

Texas Department of Transportation

## 0-5429: Considerations for Flexible Pavement Widening Projects

### *Background*

The Texas Department of Transportation (TxDOT) prepared safety bond projects to undertake the letting of construction projects for flexible pavement widening on current pavements with widths less than 24 feet. Typically, these projects were approximately 20-ft widths where widening will extend the pavement width to approximately 27 to 28 feet.

Few guidelines exist statewide for assisting designers in selecting the appropriate widening technique. Current specifications provide a basic framework for construction performance and compaction; however, there are major pavement-related issues that are not addressed. Some of these issues include:

- difficulty in meeting density requirements on narrow sections with typical compaction equipment,
- performance issues related to placing the joint in the wheel path, and
- performance issues related to unmatched pavement sections, which can cause moisture to be trapped in the original structure.

Several other design and safety issues exist, such as tying into existing structures and widening steep side slopes. Many districts have developed construction details and special notes to handle these situations.

### *What the Researchers Did*

To address these considerations and others, this project focused on an extensive literature review to obtain information regarding the various design and construction issues in pavement widening. Information in the following key areas was obtained:

- stabilization,
- pavement edge-drains and subsurface drainage,
- longitudinal construction joints,
- pavement edge drop-offs,
- construction equipment, and
- embankment widening.

A large part of the project effort was directed toward surveying TxDOT pavement engineers and maintenance personnel to catalog the various strategies for widening flexible pavements. Researchers visited with districts by phone, by email, or in person to document what is working and what is not. The survey focused primarily on strategies used when widening under different circumstances, such as widening a flexible pavement in good condition, widening a flexible pavement in poor condition, and widening a jointed concrete pavement. More specifically, this survey sought to identify strategies regarding:

- structural evaluation,
- pavement coring and field testing,
- typical sections used, and
- inspection methods and quality control.

Typical construction drawings for each of the above circumstances were obtained when available.

### *Research Performed by:*

Texas Transportation Institute (TTI),  
The Texas A&M University System

### **Research Supervisor:**

Tom Scullion, TTI

### **Researcher:**

Stacy Hilbrich, TTI

### **Project Completed:**

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## What They Found

Although a structural evaluation of the existing pavement structure was strongly recommended in all circumstances, it was found that often a “windshield” survey of the pavement section was conducted with little or no laboratory investigation. Experience of the district is relied upon quite heavily for design decisions in these cases.

Several investigatory methods are employed in the districts where a structural evaluation is conducted. This evaluation typically includes the use of the falling weight deflectometer every tenth of a mile to obtain in-place moduli values, a ground penetrating radar survey to verify pavement layer thickness, and boring typically at 1-mile intervals down to a depth of 7 feet in order to validate thickness and document pavement support conditions.

Researchers found that the specification requirements for the contractor to receive payment of the particular item are what is followed for construction techniques, specifications, and quality control measures for the widening construction. However, if the widening involves only addition of a narrow section where it is difficult to achieve density because of the lack of proper equipment, then a change from density control to ordinary compaction under TxDOT Specification Item 132 may be employed. It was suggested that a requirement be made that the density of the hot mix on the shoulders be the same as on the main lanes; however, there is no current spec item for this.

Full-depth recycling was found to be a first choice alternative when existing pavement was in poor condition. For this particular method, TxDOT Specification Items 112 and 132 are followed for widening and compacting the subgrade, respectively. TxDOT Specification Item 251 is followed for reworking the existing hot mix asphalt (HMA) surface into the existing base.

Use of grid was found to be important in the full-depth recycling process where the section is on top of a highly expansive subgrade (Plasticity Index > 35). The grid is placed between the treated layer and the new flexible base and thin surfacing. This method is very effective at intercepting reflection cracks from the lower layers and thus minimizing longitudinal cracks that are often a result of edge drying.

Another cost-effective alternative for widening low volume roads when there are fewer than 1000 vehicles per day (vpd) and the existing pavement is in poor condition is to rework and treat the existing base before widening to the desired width. A two-course surface treatment would then be applied.

## What This Means

This project concluded with a site-specific approach to selection of proper material use and/or re-use, construction techniques, and traffic control to achieve rapid construction and long-term stability of widened pavement. These findings are summarized in a flexible pavement widening guideline provided in TxDOT Product 0-5429-P2.

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