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Project Summary Report 0-4498-S
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Project 0-4498: Warranty Based Specifications for Construction

Authors: Stuart Anderson, David Trejo, Byron Blaschke, and Cuneyt Erbatur

PROJECT SUMMARY REPORT

Development of TxDOT Warranty Implementation Plan

The Texas Department of Transportation (TxDOT) continues to be proactive in finding innovative practices in programming and administering projects, including the construction contracting area. Since warranty specifications have shown potential to reduce the life-cycle cost of facilities while ensuring the quality of constructed facilities, TxDOT elected to further explore this innovative contracting method. TxDOT's objectives for investigating warranties and potentially implementing a warranty program were to:

- reduce TxDOT manpower requirements for inspection, testing, and maintenance;
- reduce project life-cycle costs; and
- improve quality of materials and construction.

A warranty is defined "as a guarantee of the integrity of a product and of the contractor's responsibility for the repair or replacement of deficiencies. A warranty is an absolute liability on the part of the warrantor (contractor), and the contract is void unless it is strictly and literally performed" (D. Hancher, *NCHRP Synthesis of Highway Practice 195: Use of Warranties in Road Construction,* Transportation Research Board, National Research Council, Washington, D.C., 1994).

Construction warranties fall into two categories: performance warranties, and materials and workmanship warranties. This research focuses on the latter. The Federal Highway Administration (FHWA) has described materials and workmanship warranties as follows: "…the contractor is responsible for correcting defects in work elements within the contractor's control during the warranty period. This includes distresses resulting from defective materials and/or workmanship during construction. The owner is responsible for the pavement structural design. The contractor assumes no responsibility for pavement design or those distresses that result from the design. Some responsibility is shifted from the owner to the contractor for materials selection and workmanship."

What We Did…

The goal of TxDOT Project 0-4498 was to develop a warranty contracting implementation plan. The plan developed in this project is based on guidelines for warranty contracting previously developed under NCHRP Project 10-49 and reported in *NCHRP Report 451: Guidelines for Warrant, Multi-parameter, and Best Value Contracting.* The Project 10-49 guidelines were modified to be consistent with the TxDOT design, contracting, and maintenance systems.

The researchers conducted several tasks to develop the warranty implementation plan. A TxDOT advisory team was created to confirm TxDOT objectives for the warranty program and maximize TxDOT's role in developing the warranty program and to ensure that the program was designed to meet TxDOT objectives. The team also determined the initial end products to be warranted: hot-mix asphalt concrete (HMAC), surface treatments, and microsurfacing. The advisory team consisted of representation from both state headquarters and district offices.

The project also reviewed the state of the practice for warranty contracting. *NCHRP Report 451* captured the essence of warranty contracting in the form of guidelines. NCHRP Project 10-49 provided background information through 1998. In order to obtain the most recent information, a literature review focused on the period between 1998 and 2004.

A short e-mail informational survey polled those states currently identified as using warranties. The focus of the survey questionnaire was on the recent experiences of state highway agencies (SHAs) using warranties. Sample warranty specifications were gathered for HMAC, surface treatments, and microsurfacing end products. Furthermore, several Texas municipalities, including Austin, Dallas, Houston, San Antonio, and El Paso, were contacted to obtain information about their use of warranties.

The model warranty specification previously developed under NCHRP Project 20-7, Task 109, Technical Provisions for Innovative Contracting, served as a starting point for developing TxDOT warranty specifications. HMAC and surface treatment warranty specifications were based on the generic warranty specification framework from Task 109 and modified to accommodate TxDOT requirements. The microsurfacing warranty specification was based on Special Specification 3278, Micro-surfacing Warranty, which TxDOT had approved for use with *TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges* (1993). The TxDOT Project Advisory Team provided input during the development of the warranty specifications via several meetings and telephone conference calls. The Project Advisory Team made the critical decisions regarding the warranty specifications; therefore, the warranty specifications developed reflect the team's perspective on warranties.

The following generic warranty specifications/provisions were developed based on the *2004 TxDOT Standard Specifications* and following TxDOT procedures/formats:

- Special Specification, Item 5XXX Warranted Construction;
- Special Provision to Special Specification, Item 5XXX Warranted Construction;
- Special Provision to Item 3, Award and Execution of Contract;
- Special Provision to Item 5, Control of the Work;
- Special Provision to Item 7, Legal Relations and Responsibilities;
- Special Provision to Item 341, Dense-Graded Hot-Mix Asphalt (QC/QA);
- Special Provision to Item 316, Surface Treatments; and
- Special Provision to Item 350, Microsurfacing.

An industry interaction forum shared information, discussed issues and concerns, obtained input from different industry participants, and attempted to establish a cooperative partnership with the industry for warranty contracting in Texas. The warranty specifications were modified to address the concerns raised by the industry during the forum.

A warranty implementation plan was developed to provide TxDOT district office personnel with the information necessary to successfully implement warranties. The plan provides the steps for implementing a warranty contracting program. TxDOT offices that plan to implement warranty contracting for the first time and those that have previous experience with warranties can both make use of these guidelines.

A warranty implementation plan provides TxDOT district office personnel with information necessary to successfully implement warranties.

The original research plan required conducting pilot projects to test the warranty specifications developed. The pilot projects would also provide valuable lessons that could have been incorporated into the warranty implementation plan. TxDOT decided not to conduct pilot projects at this time. Consequently, the warranty specifications developed under TxDOT Project 0-4498 were not tested.

What We Found…

The objective of reviewing the most recent practices in warranty contracting was to ensure that any lessons learned during warranty implementation by other states were understood and could be

used to assist TxDOT during the implementation of warranties.

The literature reviewed indicated that the big issues related to warranty contracting were the effect on bid prices and life-cycle costs; anticipated improvements in quality; SHA contractor risk allocation; difficulties in bonding; involvement and cooperation of the industry (contracting and surety); and warranty project selection criteria.

The basic goal of the survey questionnaire was to focus on other state agencies' recent experience with warranties, and to gather sample warranty specifications in the three primary areas of hot-mix asphalt concrete, surface treatments, and microsurfacing. A framework was created for comparing the obtained warranty specifications. The framework included the following key parameters: warranty period, bonding requirements, maintenance, conflict resolution team, warranty indicators, and threshold values.

The researchers made an effort to use historical pavement performance data for determining threshold values for selected warranty indicators. Potential warranty indicators were identified by reviewing other SHAs' warranty specifications for HMAC, microsurfacing, and surface treatments. Several of the warranty indicators that other SHAs used were being measured by TxDOT and recorded in the Pavement Management Information System (PMIS). An evaluation of the PMIS was conducted to determine whether the data stored in the system could be used for determining threshold values for selected warranty indicators.

As a result of this evaluation, the researchers determined that the PMIS data as evaluated and stored at this time could not be used for determining threshold values for warranty indicators. One of the most important problems for potentially using PMIS data was that PMIS is an indicator of pavement performance/quality at the network level as opposed to the project level. The researchers needed pavement performance data at the project level. Another problem was that a pavement section identified as an HMAC (Type D), microsurfacing, or surface treatment end product was not necessarily evaluated every year, which caused problems for the researchers in monitoring the performance of that section throughout the years. Furthermore, maintenance activities that were conducted on some of the identified sections at some time during the life of the pavement negated the usefulness of these sections.

During the industry interaction forum, the researchers observed that the industry did not support implementing highway construction warranties in Texas. As a result of this opposition, establishing a cooperative partnership with the industry, the main objective for conducting an interaction forum, was not accomplished. Still, the forum proved to be useful for the research project because the industry highlighted several valid issues that needed to be addressed before the warranty specifications could be finalized.

The researchers recommend that TxDOT review draft warranty specifications with industry representatives and test specifications through pilot projects.

The Researchers Recommend…

The researchers recommend that TxDOT conduct a review of the draft warranty specifications with the industry and try to mitigate concerns regarding the possibility of using warranties in Texas. Furthermore, TxDOT should test the warranty specifications by conducting pilot projects. The warranty implementation guidelines developed during this research project should be modified to reflect the lessons learned from the pilot projects. Conducting pilot projects would also provide a valuable opportunity for TxDOT to verify the objectives set forth for implementing warranties in Texas.

TxDOT's goals for investigating the implementation of warranties were to: reduce TxDOT manpower requirements for inspection, testing, and maintenance; reduce project life-cycle costs; and improve quality of materials and construction. Several SHAs have used warranty contracting successfully, and TxDOT should further investigate whether warranties can be effectively implemented and used in Texas.

For More Details...

The research is documented in:

Report 0-4498-1, *Draft Warranty Specifications*
Product 0-4498-P4, *Draft Warranty Implementation Plan*
Report 0-4498-3, *Development of Warranty Based Specifications for Construction*

Research Supervisor: Stuart Anderson, TTI, s-anderson5@tamu.edu, (979) 845-2407

Researchers: David Trejo, TTI, trejo@civilmail.tamu.edu, (979) 845-2416
Byron Blaschke, TTI, bcbpe@verizon.net, (979) 693-5800
Cuneyt Erbatur, TTI, cuneyt-erbatur@neo.tamu.edu, (979) 845-5982

TxDOT Project Director: David Head, El Paso District, dhead@dot.state.tx.us

TxDOT Research Engineer: German Claros, P.E., Ph.D., Research and Technology Implementation Office, gclaros@dot.state.tx.us, (512) 465-7403

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Texas Transportation Institute/TTI Communications
The Texas A&M University System
3135 TAMU
College Station, TX 77843-3135