



# TECHSUMMARY *April 2012*

State Project No. 736-99-1024 / LTRC Project No. 00-2P

## Implementation of Warranties in State Contracts for Highway Construction

### INTRODUCTION

In 1997, The Louisiana House of Representatives passed Bill Number 1698, which addresses warranties in state contracts for highway construction. This bill states that every contract for the construction of or improvements to highways will include a warranty by the contractor as to the quality of materials and workmanship for a duration of three years. The House asked the Louisiana Department of Transportation and Development (DOTD) to promulgate rules and regulations to effectuate the purpose of warranties. In response, DOTD formed a committee to supervise the development of warranties made up of representatives from DOTD, FHWA, and contractor organizations to conduct a comprehensive evaluation of warranties in order to consider impact. This project summarized the efforts taken by the Department to meet the legislative directive.

### OBJECTIVE AND SCOPE

The aim of this research was to develop warranty specifications based on performance requirements for state highway infrastructure construction projects that are in compliance with FHWA requirements and to assess their impact on DOTD's construction practice.

### METHODOLOGY

Research efforts began by developing an implementation plan that could provide the framework and outline the schedule of action items needed to facilitate the legislative requirement. An initiative was proposed that logistically divided warranties into eight distinct areas of investigation (asphaltic new construction, asphaltic overlays, microsurfacing, chip seal, portland cement concrete [PCC], raised pavement markings, painted traffic striping, and plastic pavement markings). Warranty projects built as part of this plan were performance controlled, requiring projects to maintain distress levels to within prescribed thresholds for a period of three years subsequent to project acceptance.

Warranty specifications were modeled on work done by other agencies with DOTD archives being utilized to establish distress thresholds. At least five representative projects from each of the eight warranty areas that shared similar characteristics (age, construction type, cross section, loading, etc.) were built according to these specifications as the basis for a pilot study. The projects were monitored for the full duration of their warranty lives with the intention of using findings to refine future warranty specifications.

The archival resource that was utilized in this regard consisted of historic ARAN data that had been collected as part of an ongoing statewide inventory contract (collected on non-warranty projects). This archival data was supplemented by ARAN, friction, and high-speed profiler data that would be collected on the pilot projects once constructed.

#### *Pilot Projects*

Of the prescribed array of pilot projects, only two asphalt projects and one PCC project made it to bid and were eventually constructed incorporating full warranty clauses. These were SP 819-02-0012 (I-10: asphalt new construction) that received acceptance on May 6, 2002, SP 450-03-0037 (LA-422: asphalt overlay) that received acceptance on June 6, 2002, and SP 817-08-0023 (LA-946:

### LTRC Report 490

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PCC) that received acceptance on September 1, 2009. The two asphalt projects were monitored for the full duration of their three-year bond period. Presently, the PCC project is still undergoing monitoring.

The two asphalt pilot projects passed inspection in all cases with only one exception. In the case of LA 422, longitudinal cracking developed that was in excess of warranty requirements. Follow-up investigations indicated that the distresses appeared to be fatigue cracking in nature. But, further investigation showed that the distresses were, in reality, reflection cracks associated with cement-stabilized base shrinkage. Additionally, there was some cracking resulting from slope failure in the embankment adjacent to culverts and bridges, but this was minimal. Both the soil-cement reflective cracking and slope failure cracking were determined to be beyond contractor control and, as such, the contractor was released from liability. The PCC project has shown no warranty related problems to date.

#### **Archival Analysis**

The archival analysis indicated that the majority of DOTD's non-warranty inventory would have manifested no significant warranty problems during the first three years of their service life. In a few cases, like that of high-level fatigue cracking, some marginal failure was evidenced. But, it was felt, this was evidence that the proposed warranty specification reasonably reflected a non-warranty project performance. In these failed cases, it is likely that the warranty would have been evoked and a few warranty related repairs mandated, provided it was shown that the contractor was proven to be liable. Low and medium cracking was the only exception wherein the analysis appeared to indicate that over 50 percent of the archival projects would have failed. Investigations indicated, however, that these cracking estimates were in error. It was determined that ARAN has difficulty correlating cause (fatigue, reflective, and slope failure) with effect (alligator, transverse, and longitudinal). As such, crack types were often misclassified or had correction factors imposed that erroneously inflated the distress totals. Taking these errors into account brought the crack estimates into agreement with the rest of the archival analysis.

#### **CONCLUSIONS**

The proposed warranty thresholds were not unreasonable. This was evidenced by the fact that pilot projects passed or are currently in full compliance with all imposed warranty requirements. The archival analysis supports this conclusion in that it showed that over 95 percent of the projects previously constructed in Louisiana without warranty bonds surpassed the proposed warranty requirements even without the requirements being imposed.

Warranties would provide the Department with an improved mechanism to pursue remediation in the event that a sub-standard product is discovered post-construction and, thereby, improve the Department's legal position in the event that remediation resulting from a sub-standard product becomes a necessity post-construction.

Resolution of the shrinkage cracking issue that arose in connection with the LA-422 pilot project indicates that the current mechanism of mitigating conflict is sufficient to resolve warranty related disputes.

Implementation of a warranty program will likely improve product quality as evidenced by the fact that participants in the pilot phase of the study did take more care during construction. There was evidence that warranties will be marginally more costly, however, owing to perceived risk on the part of stake-holders.

#### **RECOMMENDATIONS**

If the proposed warranty program is to be instituted in Louisiana, it must first be complemented with an increase in the manpower and resources needed to properly manage such an endeavor. At a minimum, this should include a full-time staff that will be tasked with close examination of all pavement images collected. This is a necessity because existing automated distress analysis technologies cannot meet the levels of accuracy that the warranties will require. A Departmentally owned ARAN fleet or other more advanced pavement monitoring resource should be kept and staffed by the Department to facilitate pavement monitoring of warranty projects on demand.

It is recommended that a widespread series of non-binding warranty contracts be let in order to gather enough performance data to establish a more comprehensive vision of what three-year distress development entails and to verify that the distress thresholds being proposed are sufficient and reasonable.

If a series of non-binding projects is instituted, then it is recommended that binding agreements be phased in, gradually, not to commence until after the non-binding contracts begin to retire. A cost impact study should be simultaneously undertaken during this effort in order to properly assess cost-benefit.