fiscal forum

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TRANSPORTATION: ROAD CONSTRUCTION WARRANTIES

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In Michigan, almost all public roads are owned by public road agencies—either the Michigan Department of Transportation (MDOT), county road commissions, cities, or villages. These public agencies contract with private construction contractors for almost all of the construction and reconstruction work on those roads.

What happens when a road surface deteriorates and breaks up—especially if the pavement failure occurs relatively soon after the road was constructed or reconstructed? Is it the owner's responsibility or the contractor's? Should a public agency demand a warranty from the private contractor as a guarantee of pavement life?

This *Forum* examines the subject of road construction warranties and reviews legislative initiatives regarding road construction warranties, the use of road construction warranties by the Michigan Department of Transportation, and policy issues related to use of warranties.

In recent years there have been several initiatives by the Michigan Legislature regarding the use of warranties on highway construction projects. Boilerplate language was added to the 1996-97 transportation appropriations bill (1996 PA 341, Section 603) to require the use of warranties on state trunkline construction projects "where possible." Subsequent transportation appropriations bills included similar boilerplate language, including language that would have extended warranty requirements to county, city, and village road agencies.

In 1997, language regarding warranties was added to 1951 PA 51 (Act 51), the statute that governs the collection and distribution of most state transportation funds. In addition, in its June 1, 2000 report, the Michigan Act 51 Funding Study Committee recommended that "*all road agencies seek warranties from construction contractors, where appropriate.*"[1] See

[1] 1951 PA 51 (Act 51) governs the collection and distribution of most of the state's transportation revenue. Public Act 308 of 1998, which amended Act 51, provided for the creation of a study committee to "review transportation funding options, transportation investment priorities, and potential strategies for maximizing returns on transportation investments." The Transportation Funding Study Committee was appointed on February 17, 1999, and included four members of the Michigan Legislature (State Representatives Rick Johnson and Thomas Kelly, and State Senators Phillip Hoffman and Joe Young Jr.) as well as five non-legislative members. The

Appendix.

The Legislature's initial interest in road construction warranties came during a period of widespread public concern over the condition of Michigan roads. Roads were one of the top policy issues of the mid-1990s; according to one 1997 opinion poll, 91% of Michigan residents gave Michigan roads a negative rating.[2]

One element of this "pot hole crisis" was the premature deterioration of some highways built in the 1970s. Although contractor performance had not been identified as a principal cause of premature pavement failure, increasing the contractor's warranty responsibility for defects in highway construction appeared to be one way of ensuring that the state was getting what it paid for on highway projects.[3]

MDOT's Warranty Experience

The Michigan Department of Transportation awarded its first pavement warranty contract in 1996. From 1996 through September 2000, over 300 contracts awarded by the Department have included pavement warranty provisions. Most of these warranty contracts have been on Capital Preventive Maintenance (CPM) projects. To date, only 35 warranty contracts have been on pavement rehabilitation projects, and only 12 on reconstruction projects. During this period the Department awarded only one warranty contract on a new pavement construction project.

The Department has used two different kinds of construction warranties on paving projects: *materials and workmanship* warranties, and *performance* warranties. Under a *materials and workmanship* warranty, the contractor is responsible for correcting defects in work elements within contractor control (materials and workmanship), during the warranty period. Since the owner is still responsible for project design, the contractor assumes no responsibility for defects due to design decisions.

Under a *performance* warranty, the contractor assumes full responsibility for pavement performance during the warranty period. In effect, the contractor guarantees that the pavement will perform at a desired quality level.

Study Committee submitted its final recommendations in letter dated May 19, 2000. With the exception of Senator Joe Young Jr., all Study Committee members signed the recommendation letter. Senator Young submitted a minority report. The minority report can be found at http://www.senate.state.mi.us/dem/sd01/minorityreport.html. The Study Committee's recommendations are contained in a report dated June 1, 2000, entitled "Transportation Funding for the 21st Century." See http://www.mdot.state.mi.us/ACT51/finalreports/index.htm for the complete report.

[2] March 1997 EPIC – MRA Report.

[3] The Michigan Department of Transportation (MDOT) concluded that one of the principal causes of premature pavement failure on certain highways was the use of an experimental continuous reinforced concrete pavement design specification during the 1970s. This cause of premature pavement failure was due to a design decision and not within the control of construction contractors.

MATERIALS AND WORKMANSHIP WARRANTIES

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Since the owner is still responsible for project design, the contractor assumes no responsibility for defects due to design decisions.

PERFORMANCE WARRANTIES

The contractor assumes full responsibility for pavement performance during the warranty period. In effect, the contractor guarantees that the pavement will perform at a desired quality level.

Under a performance warranty the contractor assumes responsibility for some or all design decisions, e.g., *design/build* projects.

The following is a more detailed explanation of the different types of MDOT-contracted paving work, and the different types of warranties that have been used on each.

- **Capital Preventive Maintenance (CPM)**

CPM projects are intended to extend the life of an existing pavement that is still in good or fair condition. They can be considered relatively short-term fixes—good for approximately seven to ten years. Capital Preventive Maintenance projects are somewhat limited in scope in relation to rehabilitation or reconstruction work.

Michigan Department of Transportation uses eight different CPM treatments for asphalt or composite pavements, and eight different CPM treatments for concrete pavements. Asphalt pavement CPM treatments include such work as bituminous overlay (single course), surface seals, and crack filling. Concrete CPM treatments include full-depth replacement of concrete sections, joint resealing, and crack sealing.

From 1997 through 2000, MDOT used warranties on 270 CPM jobs. Most CPM contracts now include a three-year warranty. For some types of CPM treatments, the warranty contracts are characterized by MDOT as performance warranties; for other CPM treatments the warranties cover materials and workmanship only.

The performance warranties used in some CPM contracts might be better described as *limited* performance warranties. Since MDOT retains control over many design decisions, including the decision that the pavement is suitable for CPM treatment, there are instances where the contractor would not be responsible for pavement failure.

- **Rehabilitation**

Pavement rehabilitation is performed when the road pavement condition is not suitable for CPM work. Rehabilitation work is of greater scope than CPM projects; it may include multiple-course resurfacing of an existing bituminous pavement, or more extensive concrete patching than on CPM projects. Michigan Department of Transportation considers rehabilitation work to be a 10- to 20-year fix.

From 1996 though September 2000, MDOT awarded 35 warranty contracts on rehabilitation jobs—primarily on high traffic volume urban highway projects. The warranty period for 33 of these contracts was five years. Two contracts had a three-year warranty period. With one exception, these contracts covered materials and workmanship only.

To date, the Department has let only one pavement rehabilitation contract with performance warranty specifications—a 1996 rehabilitation of US-23 from Milan Road to Bemis Road in Monroe and Washtenaw counties. That contract is discussed further below.

- **Reconstruction/Construction**

  Reconstruction projects are of greater scope than either CPM or rehabilitation projects. They involve the removal of existing pavement—in some cases the existing base is removed or modified as well—and repaving. Michigan Department of Transportation considers these projects to be long-term fixes—20 years or more.

  From 1998 through September 2000, MDOT awarded 12 warranty contracts for pavement reconstruction projects—all with five-year material and workmanship warranty specifications. During this period, the Department awarded one warranty contract on a new highway construction project—also a five-year material and workmanship warranty.[4]

Michigan Department of Transportation is considered to be a national leader in the use of warranties. Warranty contracts now represent approximately 20% to 30% of state trunkline pavement construction contracts. To date, warranties have not been used on local federal aid construction projects administered by MDOT, and local road agencies have not used warranties on their own local construction projects.

MDOT Warranty Contracts Awarded 1996-2000

	Materials and Workmanship Warranties	Performance Warranties
CPM *	**270**	
Rehabilitation	**34**	**1**
Reconstruction	**12**	
New Construction	**1**	

[4] The one new construction warranty contract awarded during this period (February 2000) involved improvement of the interchange of Napier Road and I-94 in Berrien County. In December 2000 the Department awarded its second warranty contract on a new construction project—Phase I of the M-6/South Beltline contract in Kent County. This contract contains material and workmanship warranty specifications.

** Although MDOT characterizes some CPM warranties as performance warranties, CPM performance warranties do not pass full pavement performance risk to the contractor. For purposes of this analysis, we have classified all CPM warranties as materials and workmanship warranties.*

With limited exceptions, MDOT's warranty contracts concern only the *paving* element of construction projects. There have been no warranty provisions yet established for bridge construction or reconstruction work. The Department has developed separate specifications for both concrete paving and bituminous paving in cooperation with respective paving industries (the Michigan Concrete Paving Association and the Michigan Asphalt Paving Association).

Michigan Department of Transportation is required to follow quality assurance procedures of Part 637, Title 23 of the Code of Federal Regulations (23 CFR) for projects financed with federal funds. Starting in 1998, the Federal Highway Administration allowed the enforcement of warranty provisions in lieu of traditional inspection and testing procedures.

Material and workmanship warranty contracts reduce the need for MDOT inspectors. In effect, the contractor assumes full responsibility for construction methods and workmanship. Use of full performance warranties would reduce the need for MDOT material testing.

The Department's quality assurance responsibility is fulfilled through enforcement of warranty threshold criteria; MDOT verifies that the road was properly constructed by comparing the pavement condition to previously agreed-upon performance criteria at the time the project is initially accepted and throughout the warranty period.

According to MDOT, use of warranties has reduced the need for inspection. The Department indicates that construction engineering, which averages 10% of the construction contract on non-warranty jobs, is approximately 5% of the contract cost of warranty jobs. In addition, MDOT believes that the use of materials and workmanship warranties has had no material effect on contract bid prices.

Warranty Enforcement

Warranty contracts contain specifications which provide for the enforcement of warranty provisions. The contractor is required to maintain a warranty bond for the warranty period in order to ensure that warranty requirements are met. Material and workmanship warranty specifications provide for the enforcement of the warranty through a *forensic investigation* clause.

If there is a roadway failure, MDOT and the contractor perform a joint field investigation to determine the cause. If MDOT and the contractor cannot agree, the issue is resolved by a conflict resolution team (CRT) comprised of two MDOT employees, two representatives of the contractor, and one expert acceptable to both MDOT and the contractor. The CRT determines if the failure is due to a design decision (MDOT's fault) or failure of materials or workmanship (contractor's fault) or some combination.

If it is determined that the contractor is at fault, the contractor must propose a resolution acceptable to MDOT. The exact nature of the fix can not be defined in advance because it depends on the nature and cause of the failure, although guidelines are provided in the warranty specifications.

Warranties: What do they Actually Guarantee?

It is not clear if limited materials and workmanship warranties were what the Legislature intended when it mandated the use of warranties in 1996 PA 341 and subsequent statutes. If state legislators believed that all construction defects on warranty jobs would be corrected by the contractor at contractor expense, they were under a misapprehension.[5]

As noted above, most of MDOT's warranty contracts have been on the relatively limited-scope CPM projects. From 1996 through September 2000, only 48 MDOT construction, reconstruction, or rehabilitation jobs have included warranty specifications, and only one of those—a 1996 pavement rehabilitation job—included full performance warranty specifications. The other 47 warranty contracts on construction, reconstruction or rehabilitation projects have been materials and workmanship warranties.

Under a materials and workmanship warranty, the contractor agrees to correct, at the contractor's own expense and for a defined period of time, pavement defects caused by those work elements within the contractor's control, i.e., the materials and workmanship. However, under a materials and workmanship warranty, there are still a number of conditions under which a contractor would not be liable for pavement defects or premature pavement failure.

First of all, it is often difficult to determine the exact cause of pavement failure. In fact, there are frequently multiple causes of pavement failure, some within the contractor's control and some—such as design decisions—which are not. Because of the difficulty in identifying the exact cause of pavement failure, it may be hard to assign full responsibility to a contractor under a materials and workmanship warranty.

Under materials and workmanship warranties, contractors were still not responsible for many pavement defects, including the kinds of design defects that were a primary cause of the premature failure of many state highways in the mid-1990s.

[5] Some Department press releases may have contributed to the confusion between materials and workmanship warranties and performance warranties. For example, a May 13, 1998 press release on the reconstruction of I-196 in Grand Rapids indicated that "the 20-year road improvement is covered by a warranty from the contractor" without specifying the type of warranty. The press release also states that "If any problem develops for five years after completion, the burden of repairing it falls upon the contractor who did the work." In fact, the contract for this project included a materials and workmanship warranty which would not cover *any* problem that developed, only those which were established to be due to defects in materials and workmanship.

Performance Warranties

In contrast to materials and workmanship warranties, contractor liability for pavement failure is substantially greater under performance warranties. Under a performance warranty, the contractor warrants that the pavement will meet certain agreed-upon performance measures, and agrees to correct any defects at his own expense during the warranty period. However, unlike a materials and workmanship warranty, there are very few exceptions to contractor responsibility.

As previously noted, MDOT has, to date, awarded only one paving contract with a full performance warranty. That contract involved the rehabilitation of US-23 from Milan Road to Bemis Road in Monroe and Washtenaw counties. The contract was a design/build contract—MDOT set certain design parameters; other design specifications, such as pavement and base thickness, were determined by the contractor, Thompson McCully. The Department evaluated the bids both on cost (low bid) and technical merit. The project, completed in 1997, included a five-year, full performance warranty.

The Department has indicated that it intends to expand the use of performance warranties on construction and reconstruction contracts, and is currently developing performance warranty specifications for Phase II of the M-6/South Beltline project in Kent County—a contract scheduled for letting in February 2002. Michigan Department of Transportation is developing performance warranty specifications for this project in cooperation with representatives of the highway construction industry.

The Michigan Department of Transportation has proposed using a ten-year warranty period for the performance warranty contract. The contractor would be liable to correct any pavement defects, based on previously agreed-upon performance criteria, during the ten-year period. As an alternative, the Department may ask for a seven-year warranty and allow contractors to bid on each additional warranty year up to ten years. To date, the longest pavement contract warranty period has been five years.

Note that both the warranty periods currently used for MDOT warranty contracts (up to five years) and those proposed by MDOT for future performance warranty contracts (up to ten years) are for less than the pavement design life. Both MDOT and the paving industry agree that most significant pavement defects would be observable in the first several years after pavement construction.

Use of a warranty period that is less than the entire pavement design life would still provide reasonable assurance that the pavement would hold up for the entire 20- to 30-year design life. However, it is not clear what the most cost effective warranty period should be. The ideal warranty period would be long enough to provide assurance of pavement performance, but not so long as to unnecessarily inflate contract prices.

If MDOT wishes to expand the use of performance warranties, it will have to allow contractors a say in design decisions. As long as MDOT continues to do the design work, specifies the material properties, and prescribes construction specifications, it is unlikely that contractors would be willing to warrant the actual performance of the road. In effect, the contractors would be asked to warrant something they had no control over. Under performance warranties, contractors may be responsible, to at least some extent, for design decisions such as composition and depth of the both base and pavement. Contracts in which a contractor is responsible for essentially all design decisions are called *design/build* contracts.

Performance Warranty Issues

Expanding the use of warranties, particularly performance warranties, to additional state construction, reconstruction, or rehabilitation projects—and/or to local construction projects—raises several issues:

- **Direct Cost Increase**

  Materials and workmanship warranties have apparently not increased construction costs—although one could argue that is because

contractor liability is not significantly increased under a materials and workmanship warranty. However, it is quite likely that bid prices would increase in full performance warranty contracts for construction or reconstruction projects. Full performance warranties transfer the risk of pavement failure from the public owner, such as MDOT, to the contractor. Contractors will factor this increased risk into contract bid prices.

In a performance warranty contract, the contractor is required to obtain a warranty bond to ensure that any corrective work will be performed during the warranty period.[6] The warranty bond is a direct cost to the contractor which would likely be passed on to the owner in higher bid prices. How much bid prices would increase, and whether the owner receives additional value—increased assurance of a well-built road—for the increased cost, is difficult to determine. The Department's experience with full performance warranties on major paving contracts has been quite limited—one rehabilitation contract.

- **Indirect Cost Increase**

In addition to possible direct cost increases, the bonding requirements of performance warranties may indirectly increase construction bid prices by limiting the number of bidders on some jobs and thus reducing competition. Under a performance warranty, contractors would be required to secure a warranty bond for the warranty period – which may be as long as ten years. If the contractor goes out of business, the bonding company guarantees that the warranty will be honored.

As long as the warranty bond is outstanding, contractors would have diminished bonding capacity. Contractors, particularly smaller contractors, may find it hard to obtain sufficient additional bonding to bid on new jobs. In addition, a warranty claim could be catastrophic to a small contractor. The burden a performance warranty would put on a small contractor may limit the use of performance warranties to large MDOT jobs and may preclude the use of performance warranties on most county, city, and village projects.

- **Enforceability**

Even on projects that use full performance warranty contracts, there still may be instances in which the public owner (e.g., MDOT) would have to accept responsibility for pavement failure. In constructing a project, even a design/build project, the contractor relies on a number of representations made by the owner, such as traffic count estimates. Errors in information provided by the owner could conceivably relieve the contractor from liability under even a performance warranty. How much responsibility each party would bear for pavement failure will depend, to some extent, on how much of the project design work each party performs.

- **Comparability of Bids**

Performance warranties require that the contractor be given at least some control over project design elements, including the composition and depth of pavement and base. This makes it much harder to compare bids in order to determine the actual low bidder. Which is the preferred bid, a 10-inch pavement for $1.0 million, or a 12-inch pavement for $1.3 million?

- **Public/Private Responsibility**

Whether private contractors should be responsible for the design of public facilities, and not merely construction, is a question of policy. What is the role of a public road agency? What functions can be appropriately transferred to the private sector?

Life Cycle Cost Analysis

Public Act 79 of 1997, which amended Act 51, may limit additional use of design/build contracts and thus full performance warranties. Public Act 79 requires that the Department determine the appropriate pavement type (bituminous or concrete) for projects with pavement costs in excess of $1 million based on

[6] If the contractor were also responsible for some or all of the design specifications, the contractor may also have to carry errors and omissions insurance.

the lowest life-cycle cost. This would seem to preclude design/build contracts in which the contractor selects the pavement design specifications.

The use of a modified design/build contract could avoid the limitations imposed by PA 79. In such a contract the Department would select the pavement type based on life-cycle cost analysis. The contractor would then complete the design including such elements as pavement layer thickness, material specifications, and/or material properties.

The Public Act 79 requirement that the department base pavement selection on life-cycle cost analysis may also preclude the use of new or innovative construction designs proposed by contractors. If the Department has no historical data on long-term performance of new pavement designs, it can not compute a life-cycle cost. The life-cycle cost requirement may limit the Department to pavement designs for which is has historical performance data.

Conclusion

It is not clear what the Legislature intended when it added language to Act 51, and to transportation appropriations acts, to require warranties on highway construction contracts. If the Legislature intended for the Department to obtain a "no excuse" performance guarantee from contractors for highway construction work, then the materials and workmanship warranties used by MDOT do not satisfy that intent.

While the Department may obtain benefits from the use of materials and workmanship warranties, those warranties do not actually hold contractors responsible for all premature pavement failures.

Only under full performance warranties are construction contractors liable for all pavement failures. To date, the Department has let only one full performance warranty on a major paving project, a 1996 pavement rehabilitation project.

The Department has indicated that it intends to increase the use of road construction warranties, including performance warranties, on future construction and re-construction projects. It is quite likely that increased use of performance warranties will result in increased contract bid prices because of the increased risk to contractors, the direct cost of warranty bonds, and the effect of limiting bidders on some projects. Whether the benefits to the highway owner are sufficient to justify the increased cost is difficult to determine.

If the Department requires paving construction contractors to warrant pavement performance, and not just materials and workmanship, it will have to allow contractors to make some or all project design decisions—a significant departure from current practice.

Allowing contractors to design projects may be in conflict with PA 79's requirement that the Department select the pavement design with the lowest life-cycle cost on all projects with paving costs greater than $1 million. The use of modified design/build contracts, in which the Department selects the pavement type using life-cycle cost analysis while the contractor is responsible for other design details, may avoid the limitations of PA 79.

However, allowing contractors to design projects raises the policy question of whether a private contractor should be responsible for design decisions that affect public facilities with a 10-, 20-, or 30-year design life.

APPENDIX

Warranties: Legislative History

Public Act 51 of 1951

Public Act 79 of 1997 (introduced as SB 303) amended 1951 PA 51, Section 11 (2) (MCL 247.661(2)) as follows:

> *Of the amounts appropriated for state trunk line projects, the department shall, where possible, secure warranties of not less than 5-year full replacement guarantee for contracted construction work.*

Public Act 79 of 1997 also added new section 1h to Act 51 (MCL 247.651(h) which required the Department to develop and implement a life-cycle cost analysis for each project for which the total pavement costs exceed $1 million funded in whole or in part with state funds. The section required the Department to design and award paving projects utilizing material having the lowest life-cycle cost.

Appropriations Boilerplate

Section 603 of the 1996/97 fiscal year state transportation budget act (1996 PA 341) states:

> *Of the amounts appropriated in Section 101 for state trunk line projects, the department shall, where possible, secure warranties for contracted construction work.*

The 1997/98 and 1998/99 fiscal year transportation budget acts (1997 PA 117, Section 606; and 1998 PA 309, Section 602) modified the 1996/97 language as follows:

> *Of the amount of state funds appropriated for road and bridge projects under this act, the department, counties, and cities and villages shall, whenever possible, secure warranties for contracted construction work.*

The language was again modified in the 1999/2000 and 2000/01 fiscal year transportation budget acts (1999 PA 136, Section 602; and 2000 PA 271, Section 601) as follows:[7]

> *Sec. 602. The legislature encourages the department to work with the road construction industry to develop performance and road construction warranties for construction contracts. The development of warranties shall include warranties on materials, workmanship, performance criteria, and design/build projects. The department will report by September 30, 2000, to the house and senate appropriations subcommittees on transportation and to the house and senate fiscal agencies on the status of efforts to develop performance and road construction warranties.*

Act 51 Transportation Funding Study Committee

In its report dated June 1, 2000, the Act 51 Funding Study Committee made the following recommendation regarding warranties:

> *The Committee recommends that all road agencies seek warranties from construction contractors, where appropriate. Legislation should encourage experimentation with warranties covering the design and*

[7] Public Act 2000 PA 271 boilerplate made a minor modification in language and updated the reporting date to September 30, 2001.

construction of roads and bridges, without mandating warranty details or particular applications.