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EXECUTIVE SUMMARY

In response to House Bill 163 of the 123rd General Assembly, the Ohio Department of Transportation (ODOT) established a set of warranty contract requirements for implementation in highway construction projects. These specifications cover items such as pavements, bridge decks and other maintenance items for varying lengths of time. These contract documents were developed by ODOT in collaboration with the Federal Highway Administration (FHWA), the Ohio Contractors Association, Flexible Pavements of Ohio, the American Concrete Pavement Association, the Ohio Aggregates & Industrial Minerals Association and various contractor personnel.

Implementation

The implementation of warranties for highway construction contracts presents many potential benefits and challenges. The most important benefit is better product performance, meaning better use of taxpayer money and less impact to motorists. A second obvious benefit is the encouragement of the highway construction industry to use its knowledge more productively.

All 69 warranty projects implemented by ODOT are under the first year of construction. ODOT conducted an in-house interview in each ODOT district office to learn the advantages and disadvantages of the warranty provisions as seen by the construction staff.

The overall assessment of the district field staff is that contractors are more conscientious about their work and are willing to pay closer attention to the quality of the warranted product. However, construction personnel feel the department has lost control of the product under the warranty provisions. The districts are able to advise the contractor of obvious visual defects, but cannot stop the progress of the work under the warranty specification requirement.

Field reports also indicated that warranties did not reduce the need for inspection. Documentation of existing soil conditions and construction placement methods were recorded carefully by all parties in case of future claims against the department which could void a warranty.

Conclusion

ODOT recommends that new warranty provisions be written to require ODOT to use warranty specifications for up to 20 percent of the construction capital budget every fiscal year. ODOT is not opposed to using the current warranty provisions, rather ODOT would like to move cautiously and evaluate all projects sold under the provisions for the duration of the warranty periods. The department must determine which work items are best suited for warranty provisions and concentrate on developing performance specifications for those products. ODOT also needs time to determine if the warranty provisions are truly cost-effective.

INTRODUCTION

Through the implementation of the warranties program, Amended Substitute House Bill 163 requires the Director of Transportation to submit a report evaluating the use of warranties.

This report will highlight the following warranties issues:

- Comparison of cost
- Techniques
- Quality of warranted and non-warranted items
- Recommendations for further use of warranties

A report was provided to the Controlling Board in September of 1999 that detailed the process that was followed to intergrate warranties into highway construction projects. The 1999 report is included in the appendix of this report.

BACKGROUND

House Bill 163, the Ohio Department of Transportation budget bill, was passed during the 123rd General Assembly and became effective on July 1,1999. The bill included in permanent law a warranty provision (ORC 5525.25) which requires the director of ODOT to comply with the following provisions for each fiscal year :

Requirement 1. 20 percent of the department’s construction project contracts shall be bid requiring a warranty.

Requirement 2. 10 percent of the department’s capital construction budget shall be bid requiring a pavement warranty.

During 1999, ODOT undertook the task of meeting or exceeding the requirements of the legislation by forming teams of individual experts from within ODOT, FHWA, industry associations and various contractor personnel. These work groups jointly developed warranty specifications for 13 different warranted construction items as well as common contract language for warranty processes that could be applied to most warranty items. Specifications are contract provisions and requirements contained in the bidding document.

Each warranty specification requires the contractor to provide a bond and liability insurance for the duration of the warranty period. The bond varies from 30 to 90 percent depending upon the total amount bid for the actual work. The specifications also address the minimum material and quality control requirements. The annual reviews to be performed by the department and the appeal process available to the contractor are also addressed. Finally, each specification clearly requires the remedial actions that the contractor must undertake for each type of distress specified.

Current ODOT warranty specifications are listed below.

Work Item	Warranty Period	Application
Asphalt Pavement	5 & 7 years	Designed rehabilitated/new pavement 3 inches or greater overlay thickness
Asphalt Pavement	3 years	Other overlays on multilane, divided, trial
Concrete Pavement	7 years	Designed pavement structure, overlay
Deck Overlay	2 years	First overlay only
Class S concrete	7 years	New bridge deck
High Performance Concrete	7 years	New bridge deck
Bridge Paint	5 years	Existing superstructure steel only
Micro-surfacing	3 years	For existing asphalt pavement from average to good conditions
Chip Seal	3 years	For existing asphalt pavement average to good conditions
Hot Recycling	3 years	For existing asphalt pavement average to good conditions and good structure
Crack Seal	2 years	For existing asphalt pavement average to good conditions
Saw & Seal	2 years	As part of rehabilitation overlay for existing asphalt pavement
Pavement Marking	3 & 5 years	All markings; Warranty period depends on marking type

STATUS OF CURRENT PROGRAM

Fiscal Year 2000:

ODOT sold 69 warranty projects which are currently under construction. Despite the department's best efforts, ODOT was unable to achieve 127 projects, or 20 percent of projects, as required by law. The primary reason for this shortfall was a lack of lead time, since most projects were already designed and warranty provisions could not be added to the plans without delaying the sale date. Additionally, the department had agreed with the industry not to add warranty provisions to an existing project after the project has been sold. When warranty provisions are added to a project, contractors need more time to obtain the additional bond required by the specification.

FY 2000 Warranty Implementation Legislated Goals Summary

	* FY 2000 Budget Totals		Requirement 1: 20% OF PROJECTS		Requirement 2 : 10% OF PROGRAM		
District	Program	# Projects	Required	Actual	Required	Actual **	Actual ***
1	\$23,475,000	38	8	7	\$2,347,500	\$2,707,607	\$3,825,349
2	\$41,111,574	58	12	10	\$4,111,157	\$1,494,007	\$2,092,275
3	\$147,715,230	69	14	6	\$14,771,523	\$45,347,192	\$171,165,410
4	\$12,175,328	48	10	4	\$1,217,533	\$300,000	\$41,667,324
5	\$90,876,908	48	10	4	\$9,087,691	\$3,551,268	\$25,979,118
6	\$161,089,660	46	9	9	\$16,108,966	\$42,267,535	\$133,699,653
7	\$89,307,367	50	10	1	\$8,930,737	\$5,330,000	\$45,480,095
8	\$142,951,057	74	15	10	\$14,295,106	\$11,312,460	\$31,031,948
9	\$8,342,000	30	6	4	\$834,200	\$1,689,158	\$5,449,980
10	\$42,706,195	58	12	8	\$4,270,620	\$7,107,744	\$15,712,545
11	\$25,170,573	43	9	0	\$2,517,057	\$0	\$0
12	\$25,069,188	71	14	6	\$2,506,919	\$0	\$0
Total	\$809,990,080	633	127	69	\$80,999,008	\$121,106,971	\$476,103,697
			20%	11%	10%	15%	59%

* Projects that ODOT is the sponsoring agency

** Based on warranty ITEM cost

*** Based on total project cost

FY 2000 warranty program cost

Warranted item Description	Warranty Item Cost	Number of Projects
ASPHALT PAVEMENT	\$108,399,163	21
CONCRETE PAVEMENT	\$12,707,808	4
TOTAL COST FOR ALL WARRANTY PAVEMENT =	\$121,106,971	25
NEW CONCRETE BRIDGE DECKS	\$3,925,134	9
CRACK SEAL	\$112,911	1
MICROSURFACING	\$3,314,396	3
CHIP SEAL	\$99,939	1
HOT IN PLACE RECYCLED ASPHALT	\$0	0
SAW AND SEAL	\$0	0
Cost of all non pavement warranty items =	\$18,559,815	
TOTAL COST OF ALL WARRANTY ITEMS =	\$139,666,786	

NOTES :

1. The average number of bidders remained the same across the board.
2. For FY 2000, the number of new pavement construction and major pavement reconstruction projects = 38
25 of those projects, or 66% , have a warranty pavement.

ODOT has greatly exceeded requirement number two, 10 percent of the construction budget. The total cost of the pavement warranties actually reached \$1.21 million, or 15 percent of ODOT's total construction budget. It should be stated that 25 of the 38 new pavement and major pavement reconstruction projects sold included a five- or seven-year pavement warranty.

FY 2000 warranty cost comparison

Item Description	Unit	Warranty Duration (Years)	Average Unit Cost		Percent Price Increase
			Warranty	NON Warranty	
ASPHALT PAVEMENT	Cubic Yard	5 and 7	\$50	\$46	9%
ASPHALT PAVEMENT	Cubic Yard	3	\$68	\$63	8%
CONCRETE PAVEMENT (11")	Square Yard	7	\$30	\$28	7%
CONCRETE PAVEMENT (12" & 13")	Square Yard	7	\$31	\$27	15%
PAVEMENT MARKINGS	Miles	3	\$788	\$291	171%
PAVEMENT MARKINGS	Miles	5	\$1,710	\$1,571	9%
NEW CONCRETE DECK, class S	Cubic Yard	7	\$484	\$457	6%
NEW CONCRETE DECK, HPC	Cubic Yard	7	\$514	\$499	3%
BRIDGE PAINTING	Square Feet	5	\$5.11	\$4.06	26%

ODOT has observed that the inclusion of warranty specifications are currently raising project cost in the form of higher bid prices. Asphalt pavement bid prices are 8.5 percent higher than similar non-warranty pavements. Concrete pavement bid prices are 11 percent higher than their non-warrantied counterparts. The largest price increase by far was for pavement marking projects. Pavement striping bid prices were found to be, on average, 90 percent higher than non-warrantied striping. Because pavement markings are traditionally performed well in Ohio, there is little benefit to warrant this item of work. Therefore, in fiscal year 2001, ODOT elected not to sell pavement markings with a warranty.

ODOT Policy On Implementation and Administration Of Warranty Provisions

The department views the legislation on warranties as an opportunity to enhance the quality of Ohio's highways, thereby minimizing repairs and driver delay. ODOT's new warranty policy establishes responsibilities and requirements. The policy also seeks consistency in the implementation and administration of the warranty requirements in construction contracts, as well as proper selection of warrantied items. The policy will help ensure that the impact of warranty requirements on the contracting industry is manageable and fair while meeting the requirements of the legislation.

First Construction Season Report

The following is a summary of the field reports gathered by ODOT district construction personnel:

Advantages of the program

- Generally the ODOT field staff believe contractors appear more conscientious about their work and are willing to pay closer attention to the quality of the product warranted. Some indicated their contractor provided a higher level of quality assurance and quality control programs due to the warranty provisions.
- As for pavement warranties, the ODOT construction personnel indicated that contractors were more proactive and took steps to fix poor existing soil conditions prior to placing the pavement.
- The reports also indicated that maintenance staff saw potential savings in time and materials due to not needing to maintain pavements during the warranty period.

Disadvantages of the program

- Field reports indicated warranties did not reduce the need for inspection. Documentation of existing conditions and methods is necessary in case of future claims by contractors against the department.
- District field reports also indicated that contractors registered complaints on some warranty projects. For example, some districts received letters indicating that the pavement warranty provisions would be impossible to enforce during the review periods. Contractor letters cited existing faulty soil conditions will void the warranty provisions unless the necessary repairs were directed by the department prior to placing the warranted item. Other letters indicated that joints in the new asphalt pavement cannot possibly be included as a warranted item due to the maintenance of traffic schemes indicated in the plans. Contractors made suggestions for improving the existing conditions and requested additional compensation to perform the extra work.
- Another contractor concern relates to the Equivalent 18,000-pound Single Axle Loads from significantly heavy vehicles, known as "superloads," and how those loads are accounted for in determining the warranty pavement review requirements. The department specification states that superloads will be calculated by the department and prorated for the duration of the warranty period. Such information will be collected from the districts' weigh in motion systems where available. Even though past experience shows department pavement design is more than adequate for such loads, contractors believe superload traffic on the warranted pavement sections may void the warranty requirements.
- Some construction personnel felt the department has lost control of the product under the warranty provisions. They maintain that districts are able to advise the contractor of less than acceptable performance, but in view of the warranty specifications are not able to enforce better standards.
- Another concern for the district offices was the logistics of assembling review teams to inspect the warranted product during the warranty period. Future reviews are referred to as "delayed inspections." The larger multi-phase projects may have as many as 20 warranty expiration dates for various warranted items such as pavement, striping, bridge decks and bridge painting. The pavement warranty is the most complex to track. By specification, a pavement warranty starts when all safety items (guard rail, striping) are in place and the department accepts the pavement. On large multiple-phase projects, this may add up to three or four sections in each direction of travel, plus ramps and other collector roads.
- The districts believe warranties are only as good as the contractor and the surety companies involved. The concern is whether the contractor will remain in business for the length of the warranty period and whether the company will honor the warranty bond if problems arise. The true test will be the first time ODOT asks for remedial action to be performed on a warranted item.

**FY 2001
Warranty Implementation Goals Summary**

District	* FY 2001 Budget Totals		Requirement 1 : 20% OF PROJECTS		Requirement 2 : 10% OF PROGRAM	
	Program	# Projects	Required	Actual	Required	Actual * *
1	\$94,000,000	27	5	8	\$9,400,000	\$16,048,600
2	\$30,000,000	30	6	6	\$3,000,000	\$4,205,024
3	\$117,172,460	34	7	6	\$11,717,246	\$19,145,000
4	\$151,619,000	57	11	19	\$15,161,900	\$6,190,000
5	\$65,150,196	18	4	3	\$6,515,020	\$6,175,675
6	\$131,238,881	62	12	12	\$13,123,888	\$16,543,000
7	\$16,963,378	64	13	8	\$1,696,338	\$1,878,822
8	\$132,434,782	51	10	5	\$13,243,478	\$7,339,480
9	\$55,205,481	41	8	9	\$5,520,548	\$964,000
10	\$89,207,850	22	4	5	\$8,920,785	\$7,137,100
11	\$24,791,480	38	8	5	\$2,479,148	\$2,845,000
12	\$110,367,905	78	16	8	\$11,036,791	\$1,179,825
Total	\$1,018,151,413	522	104	94	\$101,815,141	\$89,651,526
			20%	18%	10%	9%

* Projects that ODOT is the sponsoring agency

** Based on ITEM cost

Fiscal Year 2001

ODOT has 94 warranty projects scheduled for sale in fiscal year 2001. Even though this number may increase before the end of the fiscal year, it may still be short of the 105 projects required by law. ODOT must comply with an FHWA rule stating that warranty provisions must be for a specific construction product or feature, while routine maintenance items are not eligible, and warranties are prohibited for items not within the control of contractors. Those stringent requirements make it difficult to achieve the statutory goal.

ODOT will in all likelihood meet the 10 percent requirement for pavements warranties, as the total cost has already reached \$89.6 million, or about 9 percent of ODOT's total construction budget.

RESEARCH PROGRAM

ODOT, in cooperation with the University of Cincinnati, will conduct 30 months of research in order to develop proper selection of projects with the current warranty requirements. Defining proper use of warranties to extend the life cycle of the product and to provide maintenance-free highways is also a goal of the research. Additionally, the research will aim to outline a system to consistently track the cost associated with reviewing and enforcing the warranty provisions statewide. The research program is an ODOT initiative to gain an in-depth knowledge of the effect of the warranty provisions. The program will commence in January 2001.

NATIONAL SCALE

The use of warranties varies greatly among the 22 states currently testing various provisions.

The Wisconsin DOT has an asphalt pavement warranty for a period of five years. Their experience is limited to a total of 19 projects. Their bid cost increased between 5 and 15 percent depending on the complexity of the project. The WDOT is discussing with their contracting industries extending their warranty to seven or 10 years. However, that state is moving very cautiously and is quite careful in selecting projects in order to ensure a success ratio.

On the other hand, New Mexico State Highway and Transportation Department (NMSHTD) is more progressive. A 146-mile-long section of State Route 44, which is currently under construction, will carry a 20-year warranty covered by a \$125-million bond. Performance Roads, a division of Koch Materials Company, is promoting this nationwide high-quality asphalt pavement which offers a unique cost-effective approach to road building. After Koch and NMSHTD determine the scope of the work, the pavement design, specification writing and construction is managed by Koch affiliates. Koch's 20-year warranty includes monitoring the pavement and making any necessary repairs to the product. This pavement warranty agreement includes performance-oriented specifications requiring distresses such as cracking, rutting and roughness be kept at acceptable levels. The agreement also states that the warranty requirements will be waived if the level of traffic prorated for the warranty period exceeds an agreed upon threshold. However NMSHTD determined that the initial warranty cost of \$62 million will save the taxpayers \$89 million in maintenance cost over the 20-year period. This is also part of a new innovative financial scheme called Design-Build-Operate-Maintain (DBOM) with which the NMSHTD is experimenting.

RECOMMENDATIONS

ODOT intends to maintain its ongoing effort to prolong pavement life on Ohio's interstate and multi-lane highways, by requiring a warranty on all multi-lane surface pavements. ODOT will require an industry warranty for three years to guard against material and workmanship defects in the first year, the most crucial time in the life of the product. The warranty will cover common pavement distress items such as raveling and rutting. The department will also require a warranty on all new bridge decks. The warranty will cover items such as deck cracking and scaling.

While the following points constitute ODOT's recommendation on the implementation of warranties in highway projects, the department is not pursuing these issues legislatively:

- ODOT requests the legislative mandate for each fiscal year in ORC 5525.25 be modified in order to allow the department the freedom to move toward performance-oriented specifications. The current mandate regarding the total number of warranty projects sold and the total dollar amount of pavement warranties forces the department to concentrate on prescriptive specifications.
- The department recommends that new warranty provisions be written to require ODOT to use warranty specifications for up to 20 percent of the construction capital budget every fiscal year.

ODOT is not opposed to using warranty provisions, but would rather proceed cautiously and evaluate all projects sold under the current provisions, for the duration of the three-, five- and seven-year warranty periods. This is needed in order to gauge the effect of using the current warranty provisions, conduct a fiscal analysis, and determine if those provisions are beneficial to the state and taxpayers. A cost/benefit analysis for each warranty item is critical in choosing the right type of treatment. The department must also determine how the cost of reviewing and enforcing the warranty specifications will compare to the cost of not needing to maintain the product during the life of the warranty.

Appendices

Appendix I	Ohio Revised Code Section 5525.25
Appendix II	ODOT Warranty Policy
Appendix III	Ohio Industry Reports
Appendix IV	1999 Report on the Implementation of Warranties

Ohio Revised Code Section 5525.25.

(A) In making contracts, the director of transportation shall comply with the following requirements for each fiscal year:

(1) at least one-fifth of the department of transportation's capital construction projects shall be bid requiring a warranty as specified in the bidding documents and in division (b) of this section.

(2) at least one-tenth of the department's capital construction program shall be bid requiring a pavement warranty as specified in the bidding documents and in division (b) of this section.

(B) a warranty period under this section shall be:

(1) not less than seven years, for pavement in the case of new construction;

(2) not less than five years, in the case of pavement resurfacing and rehabilitation;

(3) not less than two years, in the case of pavement preventative maintenance, bridge painting, pavement markings, raised pavement markers, guardrail, and other project items as determined by the director.

(C) this section does not apply to contracts the director makes on behalf of a political subdivision.