Short-Term Pavement Warranties Program for HMA
Cliff Notes

More detailed information is contained in the three documents that are contained on the FHWA Pavements web-page regarding warranties. The information below has been gleamed from those documents to form these "cliff notes" for the warranty program.

Definitions

A warranty is defined performance specifications that guarantee the integrity of a product and assigns responsibility for the repair or replacement of defects to the contractor. Warranty contracting places a greater emphasis on the quality of the constructed pavement than traditional contracts and shifts some of the construction risk to the contractor. Under a warranty specification, quality is measured based on the actual product performance of the pavement and not on the properties of construction materials or operations.

The two types of warranties in the highway industry are materials and workmanship warranties and performance warranties. The difference between the two types is focus. Materials and workmanship warranties consider performance but the emphasis shifts more to material properties and workmanship issues that contribute to poor pavement performance. The focus of performance warranties relies on the future performance of the pavement as defined in the warranty with minimal direction on how to achieve the desired performance. There are inherent risks associated with either warranty which can affect the outcome of the agency warranty program.

WARRANTY TYPE		WARRANTY PERIOD
Materials and Workmanship		2 – 4 years
Performance	Short-Term	5 – 10 years
	Long-Term	10 – 20 years

Typically for short-term performance warranties for HMA pavements, the agency is responsible for the structural design requirements of the pavement and the contractor is responsible for the mixture design. The warranty program utilizes the contractor's Quality Control Plan (QCP) to address construction details. The agency is responsible for the evaluation of the pavement performance over the warranty period. Final acceptance of short-term warranty projects does not occur until the specified warranty period has been completed.

Pavement Warranty Considerations

The agency needs to establish their objectives for implementing a warranty program upfront and they need to articulate them other divisions or units within their agency and to industry to gain support of all parties.

Measurable improvements in performance have been reported by some agencies on projects built with performance warranties, with some agencies reporting no significant differences. Some of these agencies found the performance of HMA short-term warranty projects exceeded that of equivalent non-warranted projects when evaluating distresses of smoothness and rutting. HMA pavements with fewer defects are safer over a longer period of time, which can be directly related to reducing delays and congestion on the facility and are cost effective over the warranty period. The development of the specifications is critical to the success of the warranty program and typically takes six to twelve months for the initial roll out. Good specifications are needed to reduce the impact of the transfer of risk to the contractor and reduce the cost of the warranty program. Remember the game is played as the rules are written. For those projects on the National Highway System, approval of the specifications and the program is needed by the FHWA Division Administrator.

Often there is initial resistance from the pavement construction industry when implementing new contracting methods or changes to an existing contracting process. The partial or complete shifting of responsibility for the performance of the roadway to the contractor is viewed as an economic risk. However, accompanying the shift in responsibility, there should also be more freedom for contractor innovation. The warranty program should include allowing the contractor to make decisions about the design and construction that today are made by the agency. Creating the balance of benefits and understanding the newly established responsibilities of the warranty program are facilitated through the buy-in and support of the industry. Risk is directly related to industry's knowledge of process, knowledge of materials, and knowledge of how to produce quality work.

A shift in responsibilities may cause a similar reaction for an agency as with the industry. Agency resistance stems from a perceived lack of control. Current method or prescriptive type specifications lend themselves to the agency engineer having direct control of a project using the specification book as the baseline authority. Under a warranty specification, the engineer has less ability to control the details of the HMA production and placement. The agency will need to make adjustments in their pavement specifications, field inspections, contract acceptance, and verification procedures. Generally agency staffing for a particular project is reduced for this operation as you do not have the need for as many plant or field inspection personnel, but you still have agency field staffing needs to address all the other project related construction activities. Agency staffing is increased in the review and evaluation portion of a warranty project. Overall all we don't see a trend on reduced numbers but we do see a trend for reallocation of existing agency personal. Agency field staff still has the responsibility to determine measured quantities to be used for payment to the contractor.

The risk to the agency is also related to the knowledge of the materials process and knowledge of quality work. If the agency warranty specifications are developed with an understanding of the availability of materials and the abilities of industry to provide a quality product, risk is not an issue. Risk does become an issue when the agency/industry

procedures do include the basic tenets for good quality control systems and project selections.

Specification Development

Pavement warranty projects require specifications that will be substantially different than the specifications most agencies use on most other types of projects. This section will identify issues an agency needs to consider in developing specifications for pavement warranties.

The agency needs to provide the design year traffic or Equivalent Single Axle Loads (ESAL's) for all warranty projects and to identify the number of Class 5 and above vehicles for a traffic level threshold. The contractor needs some maximum volumes to establish the risk. It is recommended that if the number of Class 5 truck ESAL's exceeds 150% of the design levels, the contractor should be released from the warranty. In order to obtain this type of information accurately, it may be necessary to install Automatic Vehicle Classification (AVC) devices in the vicinity of the warranty project, or rely on a nearby weigh station, for the warranty period. Holding the contractor to unlimited increases of traffic is beyond the contractor's control and is not recommended. Increasing the risk to the contractor will increase the cost of the project.

The core elements for performance warranties that should be included in the specifications are:

1. **Description:** The specification should clearly establish what work is being warranted. Mainline pavement is typically targeted as the warranted item, but if auxiliary lanes, shoulders, or other work, such as subgrade, base or roadway hardware items are included it needs to be clearly spelled out. In addition, the date or time when the construction activities end and the warranty period begin should be clearly defined. This is very critical when considering a multi-year contract or multi-phased construction as part of the warranty project. It is recommended that the warranty begins when the construction project is completed and opened up to unrestricted traffic regardless of the phasing or the length of the construction time of the project.

   The agency needs to establish the length of the warranty, and typically it is recommended to start with 5 years. In addition, minimum agency materials requirements for HMA pavements regarding binders and aggregates should be included and the length of the evaluation section needs to be identified. It is recommended to use 0.1 mile to maximize the ability to identify distress performance.

2. **Warranty Bond/Guarantee Requirements:** Bonding requirements are needed to assure the resolution of any noted deficiencies during the warranty period are defined as the warranty bond. Warranty bonds can be developed with various elements such as constant level, straight-line depreciation, stepped depreciation, or a variable depreciation over the length of the warranty. It is critical to include all warranted items into the bond.

Agency bonding requirements for initial construction activities are typically the same as for non-warranty projects. For HMA, the warranty bond cost should include only the cost of replacing the surfacing materials. If the construction project and the warranty include the subgrade, the warranty bond may include all of the pavement materials (full depth).

3. **Conflict Resolution Team:** Typically a CRT team consists of two representatives selected by the agency, two representatives selected by the contractor, and a fifth independent representative jointly agreed to by both parties. The scope of the conflict resolution team responsibilities needs to be included in the warranty specifications and should address issues concerning the warranted pavement relative to: material selection, contractor's construction activities and quality control plan, warranted pavement distress rate, measurement and calculation of pavement distresses, and evaluation and remediation of pavement distresses.

4. **Permit Requirements:** During the warranty period remedial work may be performed by the contractor at no cost to the agency and should be based on the results of pavement distress surveys. The contractor and the agency should make a joint decision on the remedial work to be performed, and the specifications and materials to be used. Depending on agency requirements, general roadway permits may be necessary to allow the contractor to work on the roadway after the initial construction activities are completed.

5. **Pavement Distress Indicators, Thresholds, and Remedial Action:** Warranty criteria should be based on the properties collected by the agency as part of the Pavement Management System (PMS) and should be measured objectively using current technology to the maximum extent possible. The use of subjective distress evaluations should be minimized. It is recommended that warranties be used for mainline, auxiliary lanes, and shoulders.

   It is recommended that the pavement condition indicators be friction, International Roughness Index (IRI), longitudinal cracking, rutting, and transverse cracking on HMA Pavement Warranty projects. These pavement condition indicators are recommended based on the assumption that the operations are under the control of the contractor.

Recommended Pavement Condition Indicators for HMA:

PAVEMENT PERFORMANCE INDICATORS	EVALUATION SECTION	THRESHOLD VALUES*
Friction Number	Three Consecutive Sections Entire Contract per lane	< 25 < 35 Average of all tests
International Roughness Index (IRI)	520 ft (0.1 mile)	75 in./mi.
Longitudinal Cracking	520 ft (0.1 mile)	0.0 ft
Rut Depth	520 ft (0.1 mile)	0.25 in.
Transverse Cracking	520 ft (0.1 mile)	0.0 ft

* based on 520 feet (0.1 mile) evaluation sections and a 5-7 year warranty period

6. **Elective/Preventive Actions:** Elective/preventive actions should be the contractor's option and should have agency concurrence. Maintenance operations (by the contractor) to keep the pavement within the limits of the distress indicators are the responsibility and the judgment of the contractor. Typical preventive maintenance operations for HMA pavements could be crack sealing, patching, or surface replacement or other acceptable surface treatments.

7. **Agency Maintenance Responsibilities and Traffic Volume Monitoring:** The warranty specifications need to clearly state the roles and the responsibilities of both the contractor and the agency regarding maintenance responsibilities. The contractor is responsible for the performance of the pavement for the warranty period. The agency should assume normal routine maintenance responsibilities during the warranty period for items not related to the pavement warranty such as snow plowing and applying de-icing chemicals, repairs to safety appurtenances, pavement markings, mowing, and sign maintenance, etc. The warranty specifications need to clearly state that during the warranty period, the agency will not perform routine pavement maintenance activities.

8. **Method of Measurement:** Agencies need to consider if the cost for the pavement warranty itself will be included in the cost of the bid item (either by the unit measurement or lump sum value) or as a separate lump sum pay item. Warranty expenses generally include the costs for additional bonding for the specified warranty period, additional testing of materials, anticipated preventive maintenance activities, and possible remediation activities. To facilitate the documentation of the costs of warranties, it is recommended that agencies utilize their standard measurement procedures for the pavement items for the warranted HMA pavements and use a

separate lump sum pay item for the pavement warranty cost. The agency is responsible for determining the pay quantities for warranted projects.

9. **Basis of Payment:** The specifications need to include in the cost of the warranted pavement, full compensation for furnishing, preparing, hauling, mixing and placing all materials. Additionally, the payment will be for the cost of the warranty bond, warranty work, mixture designs, quality control plan and all testing, recordkeeping, sampling and traffic control for remedial or elective/preventive actions.

   Typically, warranty projects should not include price adjustments for various pavement construction elements such as the initial smoothness of the pavement or degrees of compliance with the targeted material elements. It is an agency decision to use price adjustments for material costs during construction (i.e., liquid binders, fuel, etc.).

10. **Quality/Process Control Plans:** Quality control includes those Quality Assurance actions and considerations necessary to assess and adjust production and construction processes so as to control the level of quality produced in the end product. Process control includes monitoring the input material properties and processes used to manufacture the final product.

    The contractor's QCP should be provided to the agency, maintained in a timely manner, and followed to assure the agency that all materials furnished and placement operations are in accordance with the warranty specifications and the QCP. The QCP should not be approved by the agency, as this assumes ownership and responsibility of the contents. The agency may disagree with elements in the QCP and has the option to refer comments to the conflict resolution team for disposition.

11. **Verification and Evaluation (Objective vs. Subjective):** The agency is responsible for routine evaluations of the warranted pavement during the warranty period. The agency needs to clearly indicate how the pavement condition will be verified for each of the warranted pavement indicators and who will be conducting the evaluation during the warranty period. The agency will evaluate the findings from the field verification and will report the conditions to the contractor annually, biannually, etc., and at the end of the warranty period. It is recommended for agencies just starting a warranty project that annual evaluations should be utilized.

12. **Final Warranty Acceptance:** The agency needs to specify what will constitute final warranty acceptance. As a minimum, this section in the specifications needs to consist of a field evaluation that addresses each of the warranted pavement indicators and written documentation that transfers pavement maintenance responsibilities back to the agency. The original construction project will not be closed out until the completion of the project which includes the pavement performance warranty period.

Project Selection

Short-term performance warranties are adaptable to rehabilitation or HMA resurface type projects, and they are also applicable to new construction. For rehabilitation type projects, the contractor is only responsible for the new overlay and cannot be responsible for the roadway subbase unless remediation of the subbase is part of the project scope. New construction takes into account the entire roadway pavement and shoulders and typically includes the subgrade.

References

Title 23, Code of Federal Regulations, Part 635, Subpart D, Section 413, *Guaranty and Warranty Clauses*, August 25, 1995, amended on December 10, 2002 and August 14, 2007.
http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=d47bee1b101cafd41c9943c7f5c53f81&rgn=div8&view=text&node=23:1.0.1.7.24.4.1.8&idno=23