

# Research Problem Statement

**Problem Title:****Methodology to Determine Requirements and Specifications for Pavement Condition Data****Background:**

Pavement condition data (quantifying the physical characteristics and distresses in the pavement) are used in a wide variety of applications. Examples include, but are not limited to, data to support project and network level pavement management systems, safety program requirements, pavement mechanistic-empirical (ME) data analysis, HPMS reporting, and future MAP-21 reporting requirements. In order to adequately collect the appropriate data for each of these applications, clear specifications should exist related to the data requirements. Unfortunately, in the current state of the practice, most data collection specifications are developed based on what is expected that the data collection process can deliver, rather than what data quality is required for the decisions that will be made using the data. Transportation agencies need a clear methodology to assist them in developing data collection specifications (i.e., precision and accuracy) that relate to the requirements of how and where the data will be used (i.e., confidence level). These requirements-based specifications will allow the agency to achieve the benefits desired from their data collection investments.

**Research Objective:**

The objective of this research is to develop a methodology whereby an agency can determine data requirements and the associated confidence level of pavement data collection. With this information the data collection specifications for precision and accuracy can be developed and used appropriately, that will lead to delivery of data that meets the needs of the agency.

**Potential Benefits:**

Agencies that implement the methodology developed through this research project will benefit by:

- Being able to more accurately tie data collection requirements to the specific way the data is being utilized.
- More quickly and accurately determine data collection specifications that are related to the delivery of a quality data product that meets the requirements of the data use.
- Determine the most practical and productive methods to collect data that meets the specific objectives of the agency.
- Improve decision making by having data quality at the required level
- Industry will efficiently use resources to meet the defined data collection requirements
- Improved uniformity of data across agencies
- Improve the ability to assess gaps between available and desirable data
- Enhance technology development and specification
- Consistent data enhances data collection, analysis and reporting results within and between stakeholders and improves communication

**Existing Body of Knowledge:**

The existing state of practice related to pavement data collection relates primarily to quality control, acceptance, and management of collected data. For example, in 2013 the FHWA published the *Practical Guide for Quality Management of Pavement Condition Data Collection*. However, this document has no guidance related to the development of data collection requirements or specifications. A synthesis of practice was published in 2009 (NCHRP *Synthesis 401 "Quality Management of Pavement Condition Data Collection"*), but it also concentrates on the QC/QA aspects of pavement data collection. A TRB paper from 2000 (*Transportation Research Record 1699, "Structured Approach to Managing Quality of Pavement Distress Data"*) does briefly discuss one approach to development of precision and bias requirements for pavement data collection, but no further work in this area was found. AASHTO R9, *Acceptance Sampling Plans for Highway Construction*, provides a methodology that may be used in

developing statistical based specifications. Conceptually, portions of this methodology may be applicable to this research problem statement.

**Tasks:**

The research team will develop the detailed tasks and work plan for this project. A phased approach is utilized as the results of the phase I effort will have broader more general application. In comparison the phase II effort will be more complex and a detailed work plan will be required for phase II.

Phase I:

- Survey and review current agency practices regarding a) various uses of pavement condition data, b) what the requirements are regarding the use of the pavement data, and c) how pavement condition data quality collection specifications are developed and implemented.
- Develop a methodology whereby an agency can develop data collection specifications that are appropriate for the requirements (i.e., confidence level) of how the data will be used. The methodology should allow the agency to develop specifications that completely describe the final product to be delivered (including precision and accuracy of all required data elements).
- Demonstrate use of the methodology by working cooperatively with several states. Demonstrate the ability to develop requirements to compare pavement condition data between the states at an appropriate confidence level. Use these requirements to develop appropriate precision and accuracy specifications for data collection for this application.
- Complete a final report that documents the work completed in Phase I.
- Propose a Phase II work plan that will include as a minimum the following:
  - o Demonstration of the methodology by working with at least one state agency to develop a more detailed set of requirements related to pavement management decision making.
  - o Use of the methodology to continue development of the data quality collection specifications associated with the confidence level(s) of the documented requirements.
  - o Perform a Gap Analysis that assesses existing off the shelf data collection technology ability to collect the data at the specified quality level.
  - o Perform a Gap Analysis that examines existing AASHTO protocols and standards and make recommendations for modifying these standards to incorporate the methods developed during this project.

Phase II:

- Following approval to proceed with Phase II, execute the Phase II work plan. Complete a final report that documents the work completed in Phase II. Develop an implementation package that will describe the methodology and provide instruction for an agency that desires to implement it.

Note: The scope of work does not include the development of methods to perform data validation, calibration, or QC/QA related to data collection.

**Implementation:**

The final phase of this project shall include the development of an implementation package that will provide the instruction and tools necessary for a transportation agency to adopt the methodology developed during this project.

**Cost and Duration:**

The estimated cost and duration for this project is:

\$350,000

30 months

**Person(s) Developing the Problem Statement:**

TPF-5(299) Improving the Quality of Pavement Surface Distress and Transverse Profile Data Collection and Analysis; administered by Andy Mergenmeier (FHWA)

[Andy.Mergenmeier@dot.gov](mailto:Andy.Mergenmeier@dot.gov)

**Date and Submitted By:**

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