

<b>UTC Project Information</b>	
Project Title	MPC-494 – Statistical Analysis and Sampling Standards for Maintenance Management Quality Assurance
University	University of Utah
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Funding Agencies	USDOT, Research and Innovation Technology Administration
Agency ID or Contract Number	DTRT13-G-UTC38
Project Cost	\$50,000
Start and End Dates	September 30, 2013 to September 30, 2018
Project Duration	September 30, 2013 to September 30, 2018
Brief Description of Research Project	<p>Maintenance management is very critical to the efficient allocation of resources and greater efficiencies in work processes. State DOTs need to continuously plan maintenance activities to monitor and maintain their highways, bridges, and other transportation infrastructures. Considering the limited budget and resources, maintenance activities need to be carefully planned and deployed such that the field inspections for measured conditions are conducted appropriately and statistically representative. It is thus necessary to develop a standardized statistical method to determine the samples (frequency and amount) to be collected to streamline productivity and ensure maintenance quality. This project will also develop a methodological framework for compiling, processing and statistically analyzing the data from sampled field inspections. Resampling statistical method might be used here in case the collected data are not significantly representing the “true” measurement. The framework will be able to determine the overall conditions of the system based on the collected sample data.</p> <p>It is critical to streamline the process of sampling field inspection sites through developing a statistical framework. An effective sampling method ensures that the items chosen to be measured from the entire “population” is statistically represented. Instead of inspecting all the sites available, the sampling method can identify a limited number of sites for inspection yet accurately represent the conditions of the overall system. The proposed statistical method would be effective to achieve the satisfying accuracy with significantly less resource and funding.</p>

	<p>Upon the collection of measured items, it is of great importance to report the finding in a manner that all maintenance levels are fully aware of the quality of maintenance of the areas that are pertinent to them. The proposed methodological framework will achieve this by generating a transferable analytical procedure to determine the overall conditions of the system, which provides references for senior leaders to prioritize the maintenance activities.</p> <p><b>Research Objectives:</b>  The primary objective of this research project is to develop sampling standards for MMQA to effectively measure roadway conditions and return a Level of Maintenance (LOM) grade that is statistically valid at the statewide level, the region level, and the station level. Secondary objectives of this research project are to develop methodological framework to analyze the measured samples in order to obtain the overall system conditions. Resampling method might be developed as well in case that the sampled measurement is insufficient to represent the overall population.</p>
<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	<p>The proposed sampling method was implemented by the UDOT MMQA program to guide asset condition data collection in terms of sample size selection and sample segments for LOM estimation.</p>
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>The proposed framework lays a strong theoretical foundation for the maintenance asset sampling based on the customized requirements/needs for local agencies and is effective in estimating LOM at state, region, and station levels for budget allocation. The proposed method represents a potentially useful contribution that can be easily adoptable to any agency for optimal maintenance management.</p>
<p>Web Links</p> <ul style="list-style-type: none"> <li>• Reports</li> <li>• Project Website</li> </ul>	<p><a href="https://www.ugpti.org/resources/reports/details.php?id=907">https://www.ugpti.org/resources/reports/details.php?id=907</a></p>