**TAM MegaMeeting**  
July 14, 2020

**TAM Research Workshop**

## Research Statement Development

[1. Support Data Governance Implementation 2](#_Toc44057702)

[2. Assess Benefits Realized from TAM 4](#_Toc44057703)

[3. Engage Stakeholders in TAM 6](#_Toc44057704)

[4. Evaluate Federal Measures and Metrics for Pavements 8](#_Toc44057705)

[5. Develop Methods to Allow Agencies to Incorporate Quantitative Risk Assessment at Project and Network Level 10](#_Toc44057706)

[6. Develop Approaches for Corridor Planning and Allocation 12](#_Toc44057707)

[7. Knowledge Transfer within Agencies 14](#_Toc44057708)

[8. Impact of Missing an Annual Data Collection Cycle 16](#_Toc44057709)

[9. Lessons Learned from Consistency Determination 18](#_Toc44057710)

[10. Causes and Effects of Transportation Data Variability 20](#_Toc44057711)

# 1. Support Data Governance Implementation

## Champions

|  |  |  |
| --- | --- | --- |
| **Karuna Pujara** | Maryland SHA | kpujara@sha.state.md.us |
|  |  |  |
|  |  |  |

## Statement Outline

### Background/Research Problem Statement

* Recent NCHRP research products have documented data governance techniques and provided tools for agencies to assess their current data governance practices and identify strategies for improvement.
* NCHRP 08-115 (publication pending) included data governance as one of several foundational activities for improving use of data and information for transportation asset management. An NCHRP 20-44 proposal is in process to conduct pilot implementations of the guidance and assessment tool developed through that project, and produce supplemental guidance materials based on the pilots.
* Many DOTs are implementing data governance – through establishing governance bodies, defining data stewardship roles and putting standard processes in place. The AASHTO Data Management and Analytics Committee has established a Chief Data Officer (CDO) peer group to enable ongoing sharing of data governance practices.
* This project would build on the established base of prior and ongoing work on data governance. It would focus specifically on providing specific examples or models that can be applied to help advance asset management practice through data governance.

### Objective

Provide support to implement the data governance practices and processes recommended through NCHRP 08-115, *Guidebook for Data and Information Systems for Transportation Asset Management*.

### Proposed Research Activities (work steps)

* Conduct outreach to identify implemented examples of transferable TAM-related data governance practices. These might include:
  + role/responsibility descriptions for asset data stewards and asset management system owners,
  + charters for TAM advisory bodies or governance groups,
  + asset data-related policies or guidance documents,
  + flowcharts or process descriptions for initiating new asset data collection efforts,
  + work products related to establishment of data glossaries, catalogs or standards,
  + asset data quality management plans or process descriptions, and
  + asset data MOUs or agreements.
* Conduct a series of follow-up interviews to document the processes by which each of the identified examples were developed, and to seek permission for sharing the examples.
* Make the documented examples accessible (via the AASHTO TAM Portal and/or the AASHTO Data Management and Analytics Committee website)
* Conduct a webinar highlighting selected examples – featuring the DOT staff who were involved in their implementation.
* Recommend an ongoing mechanism for periodically refreshing the body of examples collected through this effort.

### Desired Products

* Library of documented examples
* Webinar slides and recording
* Recommended approach for ongoing updates to the body of examples

### Urgency and Potential Benefits

* *To be completed at 7/13 research workshop*

### Estimated Timeframe and Funding

* 12 months
* $150,000

### Related Research

* Synthesis 508 Data Management and Governance Practices
* NCHRP Report 920 Management and Use of Data for Transportation Performance Management: Guide for Practitioners
* NCHRP Report 814 Data to Support Transportation Agency Business Needs
* NCHRP 20-44 (12) Building Capacity for Self-Assessment of Data Effectiveness for Agency Business Needs (new project)
* NCHRP 08-115 Guidebook for Data and Information Systems for Transportation Asset Management

# 2. Assess Benefits Realized from TAM

## Champions

|  |  |  |
| --- | --- | --- |
| **William Johnson** | Colorado DOT | will.johnson@state.co.us |
|  |  |  |
|  |  |  |

## Statement Outline

### Background/Research Problem Statement

* It’s difficult to communicate the value of an asset management approach to the public.
* In many cases agency leaders and stakeholders, including the public, may not see discernable benefits from TAM, reducing support for a preservation-focused investment strategy and/or improved systems and data required to support a TAM approach.
* Research has been performed in the past regarding how to calculate the return on investment (ROI) of TAM systems and how to communicate the value of preservation. Also, private sector entities use a separate set of approaches for evaluating the benefits of providing transportation as a concession.
* Additional research is needed to quantify the benefits of TAM generally, and incorporate consideration of other factors such as sustainability, equity, resilience, etc.

### Objective

Develop a framework and guidance for calculating and communicating the overall benefit of improved asset management approaches to transportation agencies, transportation system users, and society of improved asset management approaches. The framework should address monetized benefits, as well as issues such as equity, sustainability, and resilience. Illustrate use of the framework and examples through a set of pilot studies of U.S. agencies.

### Proposed Research Activities (work steps)

* Literature and practice review
* Develop TAM benefit framework
* Prepare guidance for implementing the framework
* Perform a set of pilots to test and refine the guidance, as well as to help illustrate the benefits of TAM
* Provide updated examples of effective communication of TAM benefits
* Prepare a guidebook detailing the framework, guidance, pilots and communication examples.

### Desired Products

* Guidebook for calculating and communicating the benefits of a TAM approach
* Spreadsheet or web-based tool transportation agencies can use to perform their own calculations following the guidance.

### Urgency and Potential Benefits

* *To be completed at 7/13 research workshop*

### Estimated Timeframe and Funding

* 18 months
* $250,000

### Related Research

* NCHRP Synthesis 330, Public Benefits of Highway System Preservation and Maintenance
* NCHRP Report 742, Communicating the Value of Preservation: A Playbook
* NCHRP Report 866, Return on Investment in Transportation Asset Management Systems and Practices
* TCRP Report 206, Guidance for Calculating the Return on Investment in Transit State of Good Repair

# 3. Engage Stakeholders in TAM

## Champions

|  |  |  |
| --- | --- | --- |
| **TBD** |  |  |
|  |  |  |
|  |  |  |

## Statement Outline

### Background/Research Problem Statement

Agencies have made progress in implementing TAM within their agencies. The impact of TAM will be much greater if stakeholders are engaged as a part of the decision-making and TAM approaches were collaborative for given geographic areas.

### Objective

Develop communication tools and methodologies for engaging stakeholders in TAM program activities such as strategies development, performance management implementation, and budget development.

### Proposed Research Activities (work steps)

* Collect existing documentation of best practices related to TAM stakeholder engagement and communication
* Consider conducting a synthesis of practices used by agencies to communicate successfully the importance and value of TAM
* Package communication and other engagement resources from existing examples in a way that makes it possible for other agencies to use it for their stakeholder communication and engagement needs
* Assess the stages of maturity in communication and engagement and determine what actions and resources are most relevant to advance practice given current practices
* Develop guidance on when stakeholder engagement is important and what processes and products are most useful at each engagement opportunity
* Develop new resources that support the guidance

### Desired Products

* Communication portfolio that allows asset owners/managers to draw on best practices from others during TAM program activities to engage stakeholders
* Stakeholder communication and engagement guidance

### Urgency and Potential Benefits

* *To be completed at 7/13 research workshop*

### Estimated Timeframe and Funding

* 18 - 24 months
* $300,000
* Could be funded by NCHRP/FHWA/FTA

### Related Research

* APTA published two recommended practices in September 2019 on this topic.

1. Building Internal Stakeholder Support for AM Program and
2. Communication and Coordination with External Stakeholders for TAM. They can be found at [www.apta.com/standards](http://www.apta.com/standards)

* NCHRP Project 20-05, Synthesis Topic 51-05: Practices for Coordinating Asset Management Performance Measurement and Monitoring between State Transportation Agencies and Metropolitan Planning Organizations (under development, will be completed in September 2020)

# 4. Evaluate Federal Measures and Metrics for Pavements

## Champions

|  |  |  |
| --- | --- | --- |
| **Anne-Marie McDonnell** (or Ed Block) | Connecticut DOT | AnneMarie.McDonnell@ct.gov |
| **Laura Heckel** | Illinois DOT | Laura.Heckel@illinois.gov |
|  |  |  |

## Statement Outline

### Background/Research Problem Statement

* States are finding discrepancies between pavement conditions as determined by the PM2 measures as compared to their internal, state-developed measures. Despite federal performance measure and transportation asset management plan requirements, this discrepancy hampers the adoption of the PM2 cracking measure as the primary input into condition summary reporting and pavement investment prioritization and decision-making.
* The resulting differences between state metric-determined and federal metric-determined network conditions creates confusion among the public, senior executive staff, and legislative bodies, along with non-DOT owners of NHS assets.

### Objective

Evaluate current federal pavement condition measures (Ride Quality, Rutting, Faulting, and Cracking), performance thresholds, and overall performance measure with respect to:

* Consistency – across various pavement type, network designations, and lane configurations
* Usefulness – in network-level pavement condition summary and asset management decision-making, prioritization, and forecast; and
* Alignment – with state established pavement condition metrics

Provide recommendations to improve existing measures and/or identify metrics that better reflect pavement failure mechanisms. Specifically address challenges related to percentage of wheel path cracking; determine if it could be revised to provide more consistent results across pavement types (e.g. composite, concrete) and pavement widths (e.g. <12 ft.).

### Proposed Research Activities (work steps)

* Conduct outreach to State DOTs and evaluate DOT publications (e.g TAMPs) to:
  + Capture current uses for federal and state-specific pavement condition metrics and their relative strengths and weakness with respect to identified network-level uses
  + Quantify the extent of the State DOTs’ issues with current federal pavement metrics,
  + Capture alternative procedures states are using to determine and communicate pavement condition and/or failure, and
  + Source State DOT condition data sets, including corresponding state and federal ratings and network-level pavement maintenance recommendations
* Conduct evaluation to assess correlation between state and federal measures and to determine ability to utilize federal measures to replicate existing network-level decisions
* Evaluate alternate methods of federal measure quantification and summary
* Provide summary of current vs. alternative methods with respect to evaluation criteria at national and individual state levels
* Recommend revisions to federal measures and/or condition thresholds in format useful to adoption into the HPMS Field Manual

### Urgency and Potential Benefits

* *To be completed at 7/13 research workshop*

### Desired Products

* Evaluation of federal measure with respect to consistency, usefulness, and alignment
* Recommendations for revised Pavement Condition Metrics and/or Thresholds
* Updated HPMS Field Manual

### Estimated Timeframe and Funding

* 12 to 18 months
* $500,000

### Related Research

* TBD prior research to establish current metrics

# 5. Develop Methods to Allow Agencies to Incorporate Quantitative Risk Assessment at Project and Network Level

## Champions

|  |  |  |
| --- | --- | --- |
| **Jean Wallace** | Minnesota DOT | Jean.Wallace@state.mn.us |
| **Nathan Lee** | Utah DOT | nlee@utah.gov |
|  |  |  |

## Statement Outline

### Background

Managing risk is a critical component of asset management. On a day-to-day basis transportation asset managers spend much of their time responding to or mitigating risks, such as external events that damage transportation infrastructure, or unplanned changes to budget or workloads resulting from unexpected events. Recent research has been performed and/or is ongoing to improve approaches for risk management for transportation agencies. However, the research today has necessarily focused on risk management as a high-level activity. Further research is needed to develop quantitative, repeatable approaches to assessing the highest priority risks to physical assets that transportation agencies face.

### Objective

Develop quantitative, repeatable approaches for assessing risk likelihood and consequences, analyzing the effectiveness of proposed mitigation actions, and characterizing an agency’s overall level of risk for selected common threats to transportation assets faced by asset managers. These should include, but not be limited to risks of:

* Flooding
* Culvert failure
* Geotechnical asset failure (e.g, slopes and rock slide locations)
* Earthquakes
* Fire
* …

### Proposed Research Activities (work steps)

* Review existing literature, current practice and ongoing related research.
* Perform a critical evaluation to determine the gaps in existing practice and establish the specific types of risks the research should focus on.
* For each type of risk addressed by the research, develop guidance for risk assessment and analysis of mitigation actions.
* Develop one or more measures for characterizing the overall level of risk to a transportation agency’s assets to use for communicating risk and helping prioritize potential mitigation actions.
* Test the guidance and measure calculations through a set of agency pilots.
* Prepare a guidebook with step-by-step instructions for implementing the guidance and measures recommended through the research.

### Desired Products

* Guidebook for assessing specific types of TAM risks
* Spreadsheet or web-based tool transportation agencies can use to perform their own calculations following the guidance.

### Urgency and Potential Benefits

* *To be completed at 7/13 research workshop*

### Estimated Timeframe and Funding

* 12 to 18 months
* $500,000

### Related Research

* FHWA report series on Risk-Based Asset Management: Examining Risk-Based Approaches to Transportation Asset Management
* AASHTO Guide for Enterprise Risk Management
* NCHRP Report 903, Geotechnical Asset Management for Transportation Agencies
* NCHRP Project 20-44(02), Implementation of the AASHTO Guide for Enterprise Risk Management
* NCHRP Project 08-113, Integrating Effective Transportation Performance, Risk, and Asset Management Practices
* NCHRP Project 08-118, Risk Assessment Techniques for Transportation Asset Management

# 6. Develop Approaches for Corridor Planning and Allocation

## Champions

|  |  |  |
| --- | --- | --- |
| **TBD** |  |  |
|  |  |  |
|  |  |  |

## Statement Outline

### Background/Research Problem Statement

* Asset conditions are typically determined currently in separate silos - leading to asset treatments that are applied on varied schedules by asset (pavement, bridges, culverts) even over the same corridor.
* Significant resources may be misallocated on treatments applied at the wrong time due to lack of coordinated corridor planning.
* Corridor planning can organize the asset treatments — while also looking at environmental issues, congestion, and safety
* There may be other issues such as operation needs in a corridor as well.
  + “Project delivery” can be achieved more efficiently because projects are organized into a corridor delivery strategy. Projects can be peeled off as funding is available
  + Public can be engaged all at once instead of multiple times for multiple projects.
  + Minimize contractor costs

### Objective

* Develop guidance on an asset management corridor planning process to prioritize and schedule project delivery for cost effectiveness while also considering mobility/accessibility issues, drainage, and more.

### Proposed Research Activities (work steps)

* Conduct a review and evaluation of existing agency corridor planning processes with respect to transportation asset management
* Synthesize noteworthy practices in asset management corridor planning
  + Identify potential case studies targeting specific corridor planning scenarios
  + Develop a framework for corridor plans that can be applied for better asset management and resource allocation
* Conduct targeted stakeholder outreach (interviews or similar) to validate and further develop noteworthy practices and framework (consider whether research statement addresses inclusion of international practice)
* Develop asset management corridor planning guide outline and complete how-to guide
  + Identify steps for agency necessary to address, for example: potential project areas; asset inventory/proposed treatment schedule; traffic volume/transit analysis; land use inventory and future land use; drainage issues; financial resources, schedule and coordination).
  + Identify candidate case studies
* Drawing upon review and outreach efforts, develop 3-6 case studies for inclusion in the guide
* Plan and deliver three regional workshops to present guide and framework and advance corridor planning at DOTs/MPOs

### Desired Products

* Asset management corridor planning how-to guide including case studies
* Workshops to introduce guide and advance corridor planning

### Urgency and Potential Benefits

* *To be completed at 7/13 research workshop*

### Estimated Timeframe and Funding

* 18 months
* $350,000

### Related Research

* Boadi, Richard S; Amekudzi, Adjo A. Risk-Based Corridor Asset Management: Applying Multiattribute Utility Theory to Manage Multiple Assets. Transportation Research Record: Journal of the Transportation Research Board, Issue 2354, 2013, pp 99–106 <https://trid.trb.org/view/1241970>
* Anderson, Scott A; Rivers, Benjamin S. Corridor Management: A Means to Elevate Understanding of Geotechnical Impacts on System Performance. Transportation Research Record: Journal of the Transportation Research Board, Issue 2349, 2013, pp 9-15 <https://trid.trb.org/view/1241789>
* *Additional TBD*

# 7. Knowledge Transfer within Agencies

## Champions

|  |  |  |
| --- | --- | --- |
| **TBD –** consult with the chair and vice-chair of the AASHTO KM Committee – Victoria Sheehan, NHDOT and Leni Oman, WSDOT |  |  |
|  |  |  |
|  |  |  |

## Statement Outline

### Background/Research Problem Statement

* Effective asset management requires specialized knowledge built through both experience and training
* When lead TAM staff leave an agency or change jobs, agencies can experience “backsliding” in capabilities due to the loss of institutional knowledge
* There are typically uneven levels of expertise and experience across staff responsible for different asset classes – and opportunities for staff in more developed areas to transfer knowledge that can lead to improvements in the less developed areas
* Through AASHTO and TRB activities, a wealth of information is disseminated about successful TAM practices – successful application of improved TAM techniques depends on transfer of knowledge from staff who are exposed to this information to others in the agency that have less exposure to externally available information.
* There are many proven knowledge management (KM) techniques that have been documented in prior research – and opportunities to apply them for sustaining and advancing TAM practice in transportation agencies.
* The AASHTO KM Committee is interested in compiling a series case studies of KM implementation – this research would support this goal.

### Objective

Demonstrate effective techniques to transfer knowledge about transportation asset management practices within transportation agencies – both to retain valuable institutional knowledge and to foster continued learning and innovation.

### Proposed Research Activities (work steps)

* Conduct a peer exchange to share (1) current challenges and strategies for retention of institutional knowledge as transitions in asset management staff occur, (2) approaches for transferring asset management-related knowledge within the agency and (3) techniques that enable staff in planning, engineering, and financial functions to collaborate and coordinate on TAM implementation.
* Based on the peer exchange (and drawing from the existing body of KM research), conduct a set of pilots to demonstrate effective TAM knowledge transfer techniques.
* Document the results of the pilots in a series of case studies.
* Conduct a webinar to build awareness of the techniques demonstrated.

### Desired Products

* Peer exchange report
* Case studies of knowledge transfer for asset management
* Webinar slides and recording

### Urgency and Potential Benefits

* *To be completed at 7/13 research workshop*

### Estimated Timeframe and Funding

* 18 months
* $200,000

### Related Research

* Current or New:
  + Research Roadmap for Knowledge Management (new NCHRP project)
  + Assessing and Measuring the Business Value of Knowledge Management (new NCHRP project)
  + Understanding Knowledge Management in Context with Other Organizational Practices (new NCHRP 20-24 project)
* Completed
  + NCHRP Report 813, A Guide to Agency-Wide Knowledge Management for State DOTs.
  + TCRP Report 194, Knowledge Management Resource to Support Strategic Workforce Development for Transit Agencies.
  + NCHRP Synthesis 365, Preserving and Using Institutional Memory Through Knowledge Management.
  + NCHRP Report 867, Keeping What You Paid For - Retaining Essential Consultant-Developed Knowledge within State DOTs.
  + [Best Practices in Guidance for Workforce Transition and Succession Planning](https://wisconsindot.gov/documents2/research/WisDOT-Policy-Research-0092-10-15-final-report.pdf) (includes WisDOT 'Guide for Knowledge 'Management)
  + NCHRP Project 20-68A, Scan 12-04 (Domestic scan), Advances in Transportation Agency Knowledge Management

# 8. Impact of Missing an Annual Data Collection Cycle

## Champions

|  |  |  |
| --- | --- | --- |
| **TBD** |  |  |
|  |  |  |
|  |  |  |

## Statement Outline

### Background/Research Problem Statement

* Disruptions of typical agency activities related to COVID-19 have resulted in data collection challenges, focusing attention on potential impacts of missing an annual data collection cycle
* DOTs typically collect pavement condition data on an annual cycle, both due to external stakeholder requirements and expectations as well as internal DOT uses
* In times of reduced budget, DOTs may desire to reduce the frequency of data collection, however should be informed of the potential impacts of that decision
* DOT may also face unforeseen workforce, contracting, data collection or processing challenges or other issues which could result in missed pavement data collection. In these cases DOTs would benefit from understanding the range of potential impacts as well as potential mitigation strategies available to address these issues.

### Objective

Evaluate the impacts of missing annual pavement data collection to various aspects of agency asset and performance management, including technical considerations, such as network-level condition summary and performance forecast, maintenance, rehabilitation, and reconstruction decision-making, and condition deterioration and treatment improvement modeling as well as organization and process considerations, such as federal performance reporting and transportation asset management planning requirements, impacts to other internal and external stakeholders and decision-making processes.

### Proposed Research Activities (work steps)

* Conduct a literature review to document:
  + DOT motivations and/or requirements for annual data collection.
  + Potential technical and organizational impacts or issues associated with missing an annual data collection.
  + Techniques available to mitigate the impacts of missing the collection.
  + DOTs known to currently (or in the recent past) complete pavement data collection on a 2 or more year data collection cycle.
* Building from the literature review, survey State DOTs to capture:
  + DOT motivations and/or requirements for annual data collection
  + Potential technical and organizational impacts or issues associated with missing an annual data collection
  + Techniques available to mitigate the impacts of missing the collection.
  + DOTs that currently (or recently) collected pavement data on a 2 or more year data collection cycle
  + DOTs which have previously missed their established collection cycle
* Conduct follow up interviews with DOTs that have longer collection cycles or which had previously missed an annual pavement data collection to understand perceived vs. actual impacts (both technical and organizational) and any mitigation strategies they employ.
* Summarize literature review, survey results and follow up interviews to guide ongoing research activities
* From a representative set of DOTs, collect available pavement condition and work history data, pavement deterioration and improvement benefit models
* Utilize collected data to complete a statistical evaluation of the impact missing a year of data collection with respect to forecasted vs. actual performance results, and ability to identify priority investment areas based on previous year’s data collection, as well as other issues identified through the survey
* Document survey results and evaluation outcomes
* Produce a technical report summarizing impacts of, and potential mitigations for, missing an annual pavement collection cycle

### Desired Products

* Detailed listing of current requirements and/or motivations for annual pavement data collection
* Summary of perceived and actual impacts of missing an annual data collection against the listed motivations, supported with a statistical evaluation of actual DOT datasets where applicable
* A summary of potential mitigation strategies that can be employed to reduce the identified impacts

### Urgency and Potential Benefits

* *To be completed at 7/13 research workshop*

### Estimated Timeframe and Funding

* 12 months
* $150,000

### Related Research

* TBD

# 9. Lessons Learned from Consistency Determination (Synthesis Candidate)

## Champions

|  |  |  |
| --- | --- | --- |
| **Todd Shields** | Indiana DOT | tshields@indot.in.gov |
|  |  |  |
|  |  |  |

## Statement Outline

### Background/Research Problem Statement

* State DOTs have completed two consecutive years of FHWA consistency determinations
* State DOTs will continue to have consistency determinations on an annual basis
* The purpose of a consistency determination is to assess if the state is making progress on the commitments that are described in the TAMP and are on track to meeting the ten-year performance forecasts

### Objective

* Conduct a survey of the key elements and practices of a state’s consistency determination in order to understand what are common versus unique practices
* Understand what are best practices and describe the techniques that others can benefit from

### Proposed Research Activities (work steps)

* Conduct a literature review of related information
* Design the survey/questionnaire
* Implement the survey
* Evaluate the survey results
* Conduct interviews of states that indicate best practices
* Produce draft and final reports

### Desired Products

* Synthesis summary report
* Best practices
* Possible further research

### Urgency and Potential Benefits

* *To be completed at 7/13 research workshop*

### Estimated Timeframe and Funding

* 12 months
* $45,000
* This project could also be funded by FHWA since they have all of the consistency reviews

### Related Research

* FHWA TAMP evaluation report

# 10. Causes and Effects of Transportation Data Variability

## Champions

|  |  |  |
| --- | --- | --- |
| **Aimee Flannery** | AEM | kpujara@sha.state.md.us |
| Matt Haubrich | Iowa DOT | matthew.haubrich@iowadot.us |
| Mike Johnson | Caltrans | michael.b.johnson@dot.ca.gov |
| Dave Schrank | Texas A&M | d-schrank@tamu.edu |
| Charlie Pilson | Kercher | cpilson@kerchergroup.com |

## Statement Outline

### Background/Research Problem Statement

* State departments of transportation (DOTs) and metropolitan planning organizations (MPOs) across the United States are required to establish performance targets as part of their asset management efforts. The target- setting requirements for transportation performance management (PM2) of pavement and bridge condition generally require agencies to consider three factors; the measured condition of the assets, expected deterioration over time and project level accomplishments. The measured condition of the asset is the ultimate measure of progress and an effective way for agencies to demonstrate that they are making progress as required by federal regulations.
* Research assessing the consistency of National Bridge Inventory (NBI) condition metrics has found variability between individual inspectors when inspecting “control bridges” for study. In other words, there is the potential for any given bridge inspector to assess the current condition of same bridge differently. This variability means that the conditions of bridge could improve in the absence of a project just by having a different inspector interpret the field condition differently. A similar potential exists for pavement condition assessments. This demonstrates the potential inconsistencies due to human interaction, but the same could be true of technologies if applied or calibrated differently across agencies.
* Pavement and bridge conditions rely on assessment methods that are subject to variability from one assessment to the next and from one assessor or one technology utilization to the next. This variability may occur in the absence of projects or significant field deterioration. This research project would attempt to evaluate the impact of condition assessment variability on agency wide target setting required for asset management.

### Objective

The outcome from this effort will benefit quality assurance (QA) methods for data collection and inspection efforts, quantify the variability and sensitivity in target setting for DOTs, and help budget planning for asset inconsistencies.

### Proposed Research Activities (work steps)

* Review and summarize existing published research related to the
* consistency of field-assessed pavement and bridges whether based on human interaction or applied automation, and include a review of training programs associated with human and automated assessments. Additionally, review research on the impact of assessed condition variability on target setting.
* Review NBI and Highway Pavement Monitoring System (HPMS) submittals over multiple years to identify examples of spontaneous improvement or rapidly changing conditions from one assessment to the next and assess the sensitivity of condition assessment variability on target setting in transportation asset management.
* Develop a methodology and guidance manual to define the uncertainty associated with variability in condition assessment when setting asset management targets and provide means to rectify inconsistencies in the assessments when they appear.

### Desired Products

* According to FHWA’s transportation performance management (TPM), the purpose of transportation asset management is to provide the most efficient investment of funds. This decision-making is being based on data that is subject to variability. Understanding and quantifying (if possible) the impact of data variability will allow federal, state, and local agencies to recognize the importance of data quality and how it might impact their ability to deliver projects and strive for the national transportation goals. The outcomes and benefits are:
  + Showcase the importance of quality and consistent data collection methodology
  + Tie the data to decision making and funding
  + Evaluate the impact of condition assessment variability on agency wide target setting
  + Highlight progress on 490.319(c) Data Quality Management Program
  + Provide states and federal a baseline expectation for changes in annual variability in measures, failure to reach targets, and/or best practices to avoid data quality issues.

### Urgency and Potential Benefits

* *To be completed at 7/13 research workshop*

### Estimated Timeframe and Funding

* 12 Months
* $400,000

### Related Research

* Much research has been done to quantify and understand the impact of improving data quality for individual assets and specific measurables (i.e. cracking distresses on pavement). This research would reference those improvements but illustrate how the variability within some of the more prominent asset condition ratings on a local level have a positive or negative influence on a statewide reporting level. Existing research covers actions by DOTs to improve the quality of their data (ex - TPF-5(299): Improving the Quality of Pavement Surface Distress and Transverse Profile Data Collection and Analysis
* (PSDAT)). Research around bridge guidelines for improving element-level data (ex - NCHRP 12-104: Guidelines to Improve the Quality of Element-Level Bridge Inspection Data (web-only Doc 259)) is more recent and relates directly to performance measurement. However, there is a void to understand what potential fluctuations in condition reporting may look like for an agency and quantifying how this fluctuation may affect the performance reporting and, ultimately, funding potential for each asset and the state. With the economic wellbeing of an agency tied to the vitality of their transportation network, understanding the data used and potential ripple effects of data change year- over-year.

*Other research references:*

* NCHRP 20-07/Task 411: Review and Update of AASHTO R87, Determining
* Pavement Deformation Parameters and Cross-Slope from Collected
* Transverse Profiles
* NCHRP 01-60: Measuring the Characteristics of Pavement Surface Images
* and Developing Standard Practices for Calibration, Certification, and
* Verification of Imaging Systems
* NCHRP 01-57A: Standard Definitions for Comparable Pavement Cracking
* Data
* NCHRP Synthesis 401: Quality Management of Pavement Condition Data
* Collection

*Implementation Considerations and Supporters*

* Since the performance measures are consistently tied to specific data inputs, each state could use this research to understand the potential volatility in target setting and performance measures. The summary of best practices and pitfalls will also allow transportation agencies and vendors to improve inspection protocol. Testing of the data should be a part of the research, with a few select agencies comparing potentially the same data in a single year across multiple sources or reviewing the historic trends of individual data pints to highlight inconsistencies and the impact of those inconsistencies to overall measures and targets.
* This research would best be shared in an open forum or webinar so all agencies and consultants tasked with data management can obtain the information. The AASHTO Performance Management Committee should be interested in supporting this research to ensure that the performance measures produced by transportation agencies are of the highest quality.