## PART I: Ranking of Continuation Candidates and New Problems

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<td>Evaluation of Tools and Methods to Mitigate and Manage Utility-Related Risks on State Department of Transportation Projects</td>
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## PART I: Ranking of Continuation Candidates and New Problems

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<td>Temporary Traffic Control at Driveways within a One-Lane, Two-Way Section</td>
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<td>Design of Geosynthetic MSE Walls Subjected to Vehicle Impact on Roadside Barrier Systems Placed on Top of Them.</td>
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## PART I: Ranking of Continuation Candidates and New Problems

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## PART I: Ranking of Continuation Candidates and New Problems

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<td>Best Practices in determining rural transit fleet size – How to provide service for changing demographics of rural ridership (Right-sizing of rural transit fleets).</td>
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I-9
PART I: Ranking of Continuation Candidates and New Problems

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<td>Evolving TMC Operation to Emulate a Video Game Environment</td>
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<td>15-61 Applying Climate Change Information to Hydrologic and Hydraulic Design of Transportation Infrastructure ($400,000)</td>
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<td>17-84 Pedestrian and Bicycle Safety Performance Functions for the Highway Safety Manual ($320,000)</td>
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<td>20-05 Synthesis of Information Related to Highway Problems ($765,000)</td>
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<td>Impact of Traffic Speed on Perceived and Actual Risk of Bicycling ($500,000)</td>
<td>90</td>
<td>74</td>
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<tr>
<td>Safety Benefits of Lane Reduction on Major Urban and Suburban Streets ($500,000)</td>
<td>61</td>
<td>55</td>
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<td>Next Generation of the USLIMITS2 Speed Limit Setting Expert System ($350,000)</td>
<td>84</td>
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<tr>
<td>Improving Traffic Incident Management in an Automated Vehicle Environment ($250,000)</td>
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<td>Evolving TMC Operation to Emulate a Video Game Environment ($600,000)</td>
<td>125</td>
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<tr>
<td>Impacts of Color, Intensity, and Duration of Emergency Traffic Patrol Lights on Human Perception ($500,000)</td>
<td>107</td>
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III-6
### PART III: Candidates for Funding As New Problems

<table>
<thead>
<tr>
<th>Candidate Problem and Title</th>
<th>Item Number</th>
<th>Ranking R&amp;I</th>
<th>Ranking RAC</th>
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<tr>
<td><strong>G - Traffic</strong></td>
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<tr>
<td>G-19 Challenges, Gaps, and Solutions in the Deployment of Advanced Traffic Control (ATC) Systems ($150,000)</td>
<td>101</td>
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<tr>
<td>G-20 Predicting Urban Street Speed and its Relationship to Reliability and Level of Service ($300,000)</td>
<td>104</td>
<td>103</td>
<td>103</td>
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<tr>
<td>G-21 Applications of RFID and Wireless Technologies for Highway Construction ($400,000)</td>
<td>38</td>
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<td>G-22 Attitudinal Study of Seat Belt Use in Rural Areas of Texas ($400,000)</td>
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<td>G-23 Effects of Automated/Connected Vehicles (AVs/CVs) on Freeway Capacity and Operations ($500,000)</td>
<td>62</td>
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<tr>
<td>G-24 Upgrade Existing Traffic Control Devices for Connected and Automated Vehicles ($350,000)</td>
<td>58</td>
<td>69</td>
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<td><strong>SP - Special Projects</strong></td>
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<tr>
<td>SP-01 Development of Business Case and Communication Strategies for a State DOT Resilience Program ($350,000)</td>
<td>57</td>
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<tr>
<td>SP-02 Organizational and Operational Models used by State DOTs for Emergency Response ($600,000)</td>
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<tr>
<td>SP-03 Effectiveness of Zero-Tolerance Drug &amp; Alcohol Policies for Rural Transportation Agencies ($400,000)</td>
<td>122</td>
<td>124</td>
<td>108</td>
</tr>
<tr>
<td>SP-04 Force Multiplier Toolkit for Rural Traffic Safety Enforcement ($250,000)</td>
<td>105</td>
<td>106</td>
<td>104</td>
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</tbody>
</table>
Item #1: Support for AASHTO Committees and Councils
20-123

Special Committee on Research and Innovation
- [Rating: NR] FHWA defers to R&I on the need for continuing support for AASHTO Committees and Councils.
- Important to Wyoming

Research Advisory Committee
- Continue funding.
- This is an essential element of the TRB Cooperative Research Program.
- "I like the availability of these funds for the Committees and Councils."

Item #2: Synthesis of Information Related to Highway Problems
20-05

Special Committee on Research and Innovation
- [Rating: 5] This is a cost-effective way to bring together useful knowledge and practice in a well-recognized format and series. Continuation of this effort is supported.
- Important to Wyoming

Research Advisory Committee
- Continue funding.
- Continued interest.
- Would like to see flooding added to the list and discuss DOT obligations when developers want to build around existing undersized structures.
- This is an essential element of the TRB Cooperative Research Program.
- "Love that there is so much interest in Synthesis projects. Given the difficulty in getting selected (18 of 150 submissions), I think that the selected projects have high value for the States."

Item #3: Accelerating the Application of NCHRP Research Results
20-44

Special Committee on Research and Innovation
- [Rating: 5]

Research Advisory Committee
- This project is important to continue as it is providing funding for implementation of NCHRP project deliverables. It has begun providing a culture that implementation is considered during problem statement stage for NCHRP projects. Provides funding to replicate research to the state level.
- Panel has improved the implementation of NCHRP reports.
Summary of Comments

Reviewer | Comments
--- | ---

- Continue funding.
- We have almost $2M unspent funds.
- Implementation of research can be difficult for DOTs; it is important to provide funding and support to implement completed NCHRP projects.
- Program continues to increase implementation in the field
- This is an essential element of the TRB Cooperative Research Program.
- "Vermont is trying very hard to get more than our share of these Implementation funds. I hope that the program will soon have a giant number of applications."

<table>
<thead>
<tr>
<th>Item #4:</th>
<th>Administration of Highway and Transportation Agencies</th>
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<tbody>
<tr>
<td>20-24</td>
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<tr>
<td>Special Committee on Research and Innovation</td>
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<td>[Rating: 5]</td>
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<td>Important to Wyoming</td>
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<td>Research Advisory Committee</td>
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<tr>
<td>Continue funding.</td>
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<tr>
<td>The continuation of research will provide benefit to State DOTs regarding issues such as performance measures and management, workforce and funding. It allows for timely information for leadership.</td>
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<td>This is an essential element of the TRB Cooperative Research Program.</td>
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<table>
<thead>
<tr>
<th>Item #5:</th>
<th>NCHRP-IDEA Program</th>
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<td>20-30</td>
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<td>Special Committee on Research and Innovation</td>
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<td>[Rating: 5] NCHRP IDEA is a well run program with a good success rate. 15% of the projects make it to the marketplace and 18% are considered having high potential for implementation and commercialization.</td>
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<td>Research Advisory Committee</td>
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<tr>
<td>Continue funding.</td>
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<tr>
<td>I believe this is a great approach to identify short-term, focused research on new and innovative concepts that have the potential to provide leapfrog technological advances.</td>
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<tr>
<td>Many new ideas come from this program and it should continue</td>
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<tr>
<td>This is an essential element of the TRB Cooperative Research Program.</td>
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<tr>
<td>&quot;Again, it's very hard to get an IDEA proposal funded and there's a big emphasis on innovation and implementation. I think that this is a great program.&quot;</td>
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</table>
Item #6: Bridge Deck Overhangs with MASH-Compliant Railings  
C-01

Special Committee on Research and Innovation

- Priority for the Region
- Could provide value and have a direct benefit to empirically designed decks to ensure the most efficient design for the overhang is performed. Just performing analytical work does not seem sufficient to properly vet the concept; would likely require physical testing.
- There is some disconnect between MASH compliant barriers and LRFD bridge design. In designing the barriers for MASH, the loads are extremely high; however, the bridge deck overhang has to develop the capacity of the barriers. This research will help better understand the load distribution to the overhangs and provide a practical design methodology. It will also provide benefit in evaluating existing structures that may need MASH compliant barriers.
- [Rating: 5] AASHTO and FHWA have an agreement to get all bridge rails in compliance with MASH, and we need to provide overhangs that can support the new loads. The need for this is critical.
- This is a top priority for UDOT in order to meet FHWA certification changes for parapet.
- This is important, timely and practical research as we move to implementation of MASH compliant barrier rails.
- Need this information, even though overdue. This is a high priority for our bridge program. We are beginning to use taller MASH approved bridge railings. With cantilever bridge decks the MASH Design Loads are incredibly conservative and can lead to very costly designs to accommodate those loads. More accurate, lower design loads need to be developed.
- Not sure they will evaluate our rail system
- COBS #1. NCHRP also supports.

Research Advisory Committee

- unless the intent is to reduce reinforcing in deck overhangs based upon rational engineering and crash test results, this project is potentially problematic
- This Research Needs Statement is identified by the Connecticut DOT as a high-priority and high-interest research need that we see as an excellent fit for addressing through the NCHRP Program. I strongly support this problem statement. This could address a nationwide problem in retrofitting 2016 MASH crash-test compliant bridge barriers to existing bridge decks. The study, if approved, may lead to revisions in current LRFD bridge design standards for design of the bridge deck overhangs that could result in construction cost savings.
- This will help the DOTs and the designers with bridge railing that meet the code.
- Crashworthy bridge rails continue to be a problem. With new MASH requirements, decks may need to be thicker.
- This is one of the top ranked projects for Michigan.
- Many bridges in the state have railings that do not adhere to the current specifications. Enhancing the railings in a cost and time efficient manner would benefit the state and the public.
- We strongly believe overhangs are fine based on empirical evidence but it would be nice if the research could prove this. This is also relevant to meeting MASH requirements.
Need to determine what, if any, changes are needed to LRFD bridge deck overhang design specifications for solid and see through post-beam barriers subjected to TL-4 and TL-5 collision loads and to develop design guidance on when to retrofit an overhang and the methods for doing so.

This was the No. 1 priority from AASHTO Committee on Bridges and Structures (COBS)

"Overhang design has evolved over the years. With the implementation of MASH guardrail these designs will be even more critical. "This is an overlooked risk for many bridges in VT"

Based on a presentation at the Virginia Concrete Conference, there is a concern about parapet design, given the changes in vehicle sizes over the years. Given that barriers are directly attached to the deck overhangs, I would think that the deck design would be concern as well. In reaching out to CO S&B, I received support for the project, but admittedly, not overwhelming support.

This is an important topic when MASH is adopted by AASHTO.

Item #7:   U. S. Domestic Scan Program

20-68

Special Committee on Research and Innovation

[Rating: 5]

Important to Wyoming

Research Advisory Committee

Continue funding.

Information sharing seems like a great idea, I don’t know the exact need for MDOT. E-construction, asset data collection, etc. might be some good discussions to have.

AASHTO's Multimodal Task Force has been actively involved with developing topics for the Domestic Scan Program

This is an essential element of the TRB Cooperative Research Program.

"Some of the topics are sketchy--some are of giant interest."

Item #8:   Legal Problems Arising Out of Highway Programs

20-06

Special Committee on Research and Innovation

[Rating: 5]

Important to Wyoming

Research Advisory Committee

Continue funding.

Highest level of importance. This project funds legal projects selected for research that provide vital information of great use to state DOTs.

Very useful guidance for making sure our bridges aren’t inadequate a few years after built - would like to see more in-depth guidance.
Summary of Comments

10-Jun-19

Reviewer | Comments | Distribution of Ratings
--- | --- | ---

- This is an essential element of the TRB Cooperative Research Program.
- "Someone from VT is on this panel and she feels that she has been able to fund small rural state Legal Research Digests of interest."

**Item #9: Update to AASHTO M 180-18 and Associated Highway Guardrail Specifications**

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**Special Committee on Research and Innovation**

- Good project but budget seems low for what the study would involve
- [Rating: 5] The original problem statement meant to update the M180 standard did not account for a critical part of cable guardrail systems that should have been included. After careful review by the panel, it was decided additional work should be added to the current scope and continuation request is necessary.
- With the deadlines already in effect, more testing and updated specs are needed.
- creating AASHTO standard
- Several recent lawsuits involving guardrail crashes shows this is risk area that could benefit from completion of this study

**Research Advisory Committee**

- Need is here for our projects
- Continue funding.
- Development of the specification is a good idea but it seems like it should have been part of the original scope.
- Interested in relevancy to aging guard cable
- We have been utilizing HTCB significantly in PA with little negative feedback to address safety. While this would be good research there are higher priorities.
- Important for Tennessee

**Item #10: Impacts of Connected Vehicles and Automated Vehicles on State and Local Transportation Agencies**

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**Special Committee on Research and Innovation**

- High region priority for the continuation of this multi-part research, especially for public transit and shared mobility.
- [Rating: 5] This series of projects continues to be relevant to USDOT-FHWA CAV research priorities, and research products are valued resources to national policy development as well as professional capacity building priorities for roadway automation readiness. There is effective and active management of the research roadmap guiding these projects.
- This is not a single project, but an on-going program that funds several projects each year. These are tailored and useful projects for the states.
- WYDOT involvement with connected vehicles warrants support of this research
- Ongoing research is necessary in regard to CAV technologies, the changes that are occurring, and how we need prepare for them. This may encompass some of the work proposed in the other proposals.
Summary of Comments

Reviewer | Comments
--- | ---

- This would be an important capability for NH due to our preponderance of two-lane rural highways.

Research Advisory Committee
- This is a need but premature for Alaska.
- DOTs need guidance on how best to plan, prepare for, and operate the transportation system for CV/AVs
- Continue funding.
- To be automated is to be connected - to other vehicles and to the transportation infrastructure. These two technologies must and I believe federal and state transportation agencies should take a proactive role to participate with in the convergence.
- This is the continuation of a multi part research project. I sit on task 11, and these are answers that will help inform state, federal and local investment and implementation of AV/CV technologies on roadways and for public transit/shared mobility.
- It will be key to gather as much data as possible at this point in time to prepare our infrastructure for CAV. This is ongoing research but there is still continued interest.
- CAV technology and implementation are going to occur, implementation necessitates new public and private partnerships and collaboration across multiple disciplines. Implementation of CAV technology must be well planned and managed with little or no past experience to draw from.
- From a safety perspective this is important but this is a substantial multi-year investment and there is more pressing safety research that is need that will be able to assist today’s safety needs.
- On general interest to the Division. How will connected and automated vehicles detect non-motorists, affect transit usage?
- Very relevant to understanding more about CV/AVs at a national level.
- An extension of an existing and valuable project. Grouping CAV efforts together under this project helps to coordinate efforts and reduce overlap. Highly recommend.

Item #11: Pedestrian and Bicycle Safety Performance Functions for the Highway Safety Manual

Special Committee on Research and Innovation
- High Priority for the Region, due to importance of increased use of Ped/Bikes for DOT modes
- The existing HSM does not include specific performance models involving bicycle and pedestrian crashes. This research fills a gap in the HSM by providing guidance to calculate a risk score based on the overall contributions of each factor contributing to the probability of a crash involving a bicyclist or pedestrian. A concern is that a number of these workplans would not be looking at crash rates and instead just crash numbers--need to address incorporating exposure data into all workplans.
- Increase in bike/ped related crashes noted in Georgia.
- [Rating: 5] Improved safety performance metrics related to pedestrians and bicyclists are critical given the upward trend in such fatalities in recent years. This project will help fill a key gap.
- There are a lot of manuals out there that discuss performance functions. We are looking to the AASHTO Bike Guide to create a consolidated place for people to reference. We are hoping this level of effort is being put into the Bike Guide.
We don’t want another manual to reference that might be conflicting. We would rather have a reference in the HSM to the complete AASHTO Bike Guide. But if relying on the Bike Guide is not an option, then this would rank higher for us (UDOT).

- Concerned on the cost, are they going to accomplish the task?
- I think this would be powerful and give us a quantitative way to evaluate multiple alternatives for improvements.
- Ped crashes are up, but the raw number of crashes remains low. It is hard to identify / prioritize / justify improvements based simply on the observed crashes. SPF’s would provide important analytical tool for ped-bike safety.

**Research Advisory Committee**
- Planning is more interested than our Design representatives.
- Continue funding.
- There is a human element with Ped/Bike decision making that may not be quantifiable.
- At this time, it seems as though pedestrian and bicycle crashes are too random to draw meaningful trends.
- Work Plans A, B, and C seem like "additional research needed" so perhaps they should be treated as a new project instead of a continuation.
- This is a valuable project that has need in MA. This work will tie into the HSM so it has a lot of value.
- Ped/bikes are a key focus area nationally with very little research to date on models for DOTs to use.
- Developing SPF’s for peds and bikes would be beneficial.
- SPF’s for non motorized users would be beneficial to justify safety funds - great idea.
- This is a critical component of data-supported decision making and related to North Dakota’s Vision Zero initiative.
- Proposed work is still relevant. Budget seems reasonable. Additional $ amount is two-thirds of the full initial project amount to do one-third of the initial project.

**Item #12:** Addressing Construction Inspector Qualifications for the Future: Best Practices for Education, Training and Certification

**Special Committee on Research and Innovation**
- Definitely needed; this research will help establish what is needed for an effective inspector.
- [Rating: 4] Cited urgency and need is clearly documented and workforce development is an urgent issue identified by the construction community. The proposed budget appears low considering the breadth of investigation and expertise needed to address all elements cited; education, training, experience, certifications, qualifications, policy, costs and time savings vs. construction quality, legal issues, legislative language, case studies, best practices, and multiple contract/project delivery types. Scope may need to be narrowed or budget increased.
- This is one of the greatest threats to construction. The gains in inspection efficiency have reduced inspection forces throughout the nation and have reduced the ability to learn through mentorship. Further, assessing consultant inspectors' competency has become increasingly difficult without a certification program. The Western Alliance for Quality Transportation Construction (WAQTC) training and qualification program model may be helpful to this study.
- This would help with consultant training and also potentially improve consistency for internal staff training requirements.
very important as the Grey Tsunami is impact this field substantially. Would like to see this research highlight critical needs and risks with construction workforce and changing requirements on issues such as seismic, liquafigation, roadside safety. This budget might need to be increased to adrest these additonal topics.

Interested in learning about effective training and certification processes used by other state DOT’s. This could dovetail with current agency efforts

Many certification programs already exist. Would consider support if this focused on efforts to recruit talent to the industry.

Worthy research but in the end it all depends on resources others provide for training.

This is an advancing concern, may be one of our biggest personnel issues. Our Civil Tech programs are shutting down due to lack of interest. We need staff to perform this work. I believe this is a challenge facing MnDOT and we are likely interested in this research. AASHTO Construction ranks this #1. FHWA feels the problem statement needs revision.

Research Advisory Committee

Much has changed and need a redo with current technology and risk based inspection.

The average age of the staff are in their late 40’s these individuals represent the same people making up the average age 25-30 years ago.

The research problem statement describes the exact challenges our agency is facing. We are currently working to identify internal needs to address training of inspectors. Our process needs to be improved. There also may be a risk to the DOTs to not have a minimum basis of training for inspectors.

Inspector training on more advanced technologies has been emphasized to support the movement to 3D plans.

This challenge is faced by every state DOT.

There are already certification programs out there to bring inspectors up to speed. Cut the Budget to $150,000 and survey states on what initiatives have tried or are trying to recruit people to the Transportation Industry. The problem is not HOW to train, it’s WHO to train.

This topic should be addressed as it affects most states. I definitely think this one should be considered.

Future workforce needs are an important issue across DOTs. This project will address a single aspect, albeit an important one.

WSDOT developed its own inspector certification program for our inspectors in anticipation of this need. It is not practical for WSDOT to train, certify and track external inspector certifications due to the level of effort and resources necessary. The next step is developing acceptable inspector certification standards for consultant/contractor provided inspectors on WSDOT contracts.

Item #13: Applying Climate Change Information to Hydrologic and Hydraulic Design of Transportation Infrastructure

Special Committee on Research and Innovation

[Rating: 5] While there has been valuable outcomes in this project, the rapidly evolving nature of this topic requires continuing the effort with supplemental research. Both FHWA Infrastructure and Environment and Planning offices support this continuation to ensure transportation programs and projects have the best available science and data needed for extreme events. Additionally, this project aligns with the Title 23 §503(3)(B)(viii) “... to study vulnerabilities of the transportation system to ... extreme events and methods to reduce those vulnerabilities.”
Summary of Comments

It would be useful to look at climatic regions of the United States to determine storm distributions. Currently most of the United States falls under SCS Type II distribution.

Especially useful for coastal projects and it seems like work is nearly completed.

This is becoming more of a need than a want. The climate will impact how we design our future drainage systems.

**Research Advisory Committee**

- We have a current research project that this would support.

- Continue funding.

- Resilience will become an important issue in the future.

- With new bridge service lives expected beyond 75 years, climate change implementation is something to keep in mind.

- The effects of climate change continue to be accounted for in models with each passing year. It would be hard to develop design criteria based on uncertainty of climate change effects.

- This is nearly done. Let's get it completed. It will provide useful guidance for DOTs, especially for coastal states.

- Although I am unaware of the work conducted to date on this study thus far, I gave this continuation request a high rating given the strong need for design guidance for the impacts of climate change. Having a national form of guidance would save DOTs a great deal of time/costs over the individual efforts that are or will be underway in numerous states.

**Item #14: Operational and Safety Considerations in Making Lane Width Decisions on Urban and Suburban Arterials**

**[Rating: 5]** As noted, this project ran into some issues. There is significant data that was collected and substantial work was completed. It would be a shame to lose $600k worth of research. These additional funds would allow for the project to be completed. (The other option is to release the data and an incomplete report for use of others.) Much has been invested already.

- This effort is sorely needed to help validate existing approaches to choosing lane widths and understanding their impact on operational safety.

- to reduce lane widths without impacting safety would be great to know.

**Research Advisory Committee**

- Planning is more interested than our Design representatives.

- Continue funding.

- Lanes narrower than 12 ft are already allowed and thoroughly discussed in the Green Book.

- It makes sense to complete this project and adds only $150,000 of additional funds. the results of this project will have applicable use in MA and can help with design exceptions and others elements of project review. This would have more value if it could be combined with G-14. I included it as a "4" assuming they could be combined. Also, the fact that it is already started and only needs $150,000 of additional funds. Look at combining with G-14.

- With PBPD having such research would support DOTs to apply system wide lane widths with minimal impact on safety thus freeing money to spend on other safety treatments.
Summary of Comments

Reviewer | Comments | Distribution of Ratings
---|---|---

■ Only slight interest. Do not anticipate much benefit.

■ This research is important - many requests to narrow up lanes; good to have research to know when and where this might be appropriate or not.

■ This is critical research to allow implementation of our customer-demanded context-sensitive design addressing all system users.

■ We aren't doing a lot of new construction in our state so this lowers the overall score. Additionally they should also add in the Highway Safety Manual in addition to the Green Book.

■ Relevant to retrofitting existing roadways with multimodal facilities

■ This is an attempt to complete an ongoing study where the PI needs to be replaced and the scope change requires additional funds. Let's get this finished and in practitioners' hands.

Item #15: The Application of Federal Funding Flexibility at the State DOTs

Special Committee on Research and Innovation

■ High priority for the region to better utilize the limited funds.

■ GDOT utilizes fund transfers annually to maximize funding needed to deliver its construction work program.

■ [Rating: 4] This topic is very timely and can provide valuable information for reauthorization discussions.

■ Transferability among programs is increasingly important to states as a tool to manage cash flow in the face of on-going federal funding uncertainties. Transferability is also an important tool to help states transfer funds among programs and projects to advance federal and state performance management goals. This research will help advance knowledge and best practice.

■ Important to States to have some flexibility between categories without incurring penalties. However, it may be of little value, as the variance between states is so great.

■ The ability to flex funds is important to state DOT in an increasingly constrained environment

■ Continuing Resolutions and the uncertainty around Federal funding makes it difficult for State DOT’s to manage Federal funding categories. This project will assist in understanding current rules and to identify methods to increase flexibility or provide changes to laws to allow for greater flexibility.

■ MAP-21 and FAST Act has directed federal funding focused on performance outcomes, without providing long term adequate funding to meet the performance outcomes. States, including Minnesota are looking for ways to most effectively use their limited federal funding towards performance outcomes. Having a synthesis or guidebook would be help. This project compliments NCHRP 19-16 and would provide MnDOT with ways of using federal funding, including in areas where MnDOT does not currently use federal funds, like project development and maintenance. As funding becomes more and more constrained, flexibility to leverage funds is very important. It seems we talk about needing more flexibility every time funding is part of a discussion. Let's research it and see if it really might be part of a solution we need. AASHTO Committee feels it is timely and deserves consideration.

Research Advisory Committee

■ ADOT does transfer FHWA funds to Transit. Preserving the option is extremely positive.

■ Increasingly important considering stagnant federal funding
Increased flexibility for use of Fed funds would help State DOTs implement projects faster and more efficiently. Empirical data collected and reported by the study could be used to inform Congressional decision-makers and FHWA management about tangible benefits of flexibility and provide them with evidence needed to propose expanded flexibility to State DOTs.

This is one of the top ranked projects for Michigan.

The proposed research could help states identify additional federal funds transferability opportunities. Also, this could create additional opportunities for all states to know what various methods are used by other states and the effectiveness of their methods.

MoDOT is aware of the existing flexibility to transfer funds between federal highway funding categories, but would be interested in the identification of additional transferability opportunities that can improve efficiency, lower costs and speed-up project delivery.

Great to see the flexibility that has allowed states to better align priority needs and available funds, accelerate projects, and has helped some states manage the impacts of federal fund rescissions. Yes, good project.

While this is an important issue, this research seems unnecessary to prove the point or even "sell" the need/benefit to Congress.

the top research priority for the Committee on Funding and Finance

Current restrictions on the flexibility of funding have a large effect on both which projects move forward and when projects move forward while working with the limitations. It complicates the selection of projects, leaves open the possibility of not being able to use all available federal authority if a particular type of project is not available to let within the obligation period, and complicates the distribution of state vs. federal funds, all of which may lead to delays in moving projects forward.

"Like A-01, practical and necessary Will Congress pay attention to a report on this topic? In order to influence the "target" audience the research must focus not only on cases where flexibility enabled a DOT to make an obviously favorable investment and on cases where inflexibility prevented a DOT from making an obviously favorable investment. To be seen as objective the research must also look for cases where a DOT abused (or arguably would have abused) flexibility to steer funds away from a program that Congress clearly intended to favor."

One of the most significant restrictions in the FAHP is the formulas that drive which projects get programmed. The formulas, which represent Congressional priorities, limit a state’s ability to program its highest priority projects. There are a number of program (past and present) from which you cannot transfer or have limited transferability. Greater flexibility could help WA better address its priorities while still achieving the preservation performance expected in MAP-21. More than 50% of our apportionment balances have limited or no transferability.

Item #16: Targeted Guidance and Information Support to State DOT CEOs on Cybersecurity Issues and Protection Strategies

Special Committee on Research and Innovation

Combine with A-03.

Per NCHRP comment, use NCHRP 20-44 funding instead?

[Rating: 3]

The Iowa DOT and other government transportation entities are facing tremendous challenges in securing our
environments from a variety of bad actors seeking to gain access and control of critical systems. Failure to research, identify gaps, and share knowledge could lead to severe operational disruptions and public safety issues.

- While both are important, out of these two options, protection strategies and response to security incidents is higher priority than a guidance document.
- combine with A-03
- use 20-24 funds? TSSR #3
- It is very important, the write up is correct, we are a target.
- Definitely a need for the research but the timing of NCHRP may be too slow for results to be relevant. Consistent with SMTP work regarding risk/resilience. TSSR ranks this proposal 3rd

Research Advisory Committee
- With recent cyber attacks to DOTs that have shut down systems for extended periods of time, this will be useful guidance for state to defend against cyber attacks.
- no comments
- Cybersecurity issues are already problems in smart vehicles; personnel should be educated on public risks of same
- As mentioned in the research background, transportation is the 3rd most vulnerable sector to cyber-attacks. With the advancement of new age technologies (such as CAV, IoT and AI), it is important to learn to protect sensitive information related to both agency’s data and it personnel.
- MDOT has preventive measures in place, but a study such as this, will continue to shed light on an increasing problem.
- Cyber security and related practices continue to be a priority for MoDOT.
- Funding is strongly encouraged. It will provide guidance and awareness for DOT leadership on cyber risks and also a strategy to mitigate.
- This topic is important, but seems to dependent on the specific needs of each agency to be very useful.
- Challenge here is to ensure there is quick turn-around on research as cyber security continues to change and morph multimedia outreach strategies. The reason to put a 4 is I do like that a key element of this research would include identification of best practices in terms of training and maintaining a level of awareness of the criticality surrounding cyber security. Keep in mind, we follow controls/standards thus keep focus more on what we don't know that is published.
- "Cybersecurity is a very important topic for DOTs and other transportation agencies. $350,000 and 18 months for pulling together information from other places seem high. As mentioned by Stephen Parker, a checklist will likely become stale soon.
  The proposed objectives are covered in some NASCIO studies for state agencies, which can be applied to state DOTs too."
- Cyber crime is a growing concern; cyber security impacts all organizations. This research may be successful. However, without knowing all the different systems operating in the work environments, this project may end up too general and not applicable to every DOT.
Item #17: Performance Specifications Implementation Guide

D-09

Special Committee on Research and Innovation

- Very broad scope. Needs to be more specific. Maybe limit it to Concrete as asphalt has a plethora of "performance tests" to choose from.

- GDOT is moving toward more performance-based specifications in lieu of prescriptive specifications.

- [Rating: 5] Performance specifications have the potential to dramatically improve the long-term durability of pavements and structures. Even a small increase in project life would result in millions of dollars in annual savings for State DOTs. This project was widely supported by the AASHTO COMP and TRB Committee AFH20 and agencies will benefit significantly from a performance specification implementation guide.

- This is an important step in moving towards Performance Based Specifications.

- Performance specifications are slowly being implemented. Full implementation is still many years out. This research adds to the body of knowledge currently available.

- There are no current plans to implement performance specs, but a guidance document could facilitate a change in that status

- Widely supported by AASHTO COMP and multi-state support

Research Advisory Committee

- Very relevant topic. Will provide guidance to developing performance related specifications.

- As the department moves towards these types of specs this would be helpful.

- We would like to go to more Performance based specs to assist with accepting and paying for work.

- This could be a great starting point for Perf. Specs.

- Development of a formal guide for incorporating asphalt and concrete Performance Engineered Mixture testing into construction specifications will be necessary at some point in the future.

- An important topic that still needs work.
  Need more refinement on which test methods will actually be used first.

- NDDOT has a vested interest in this topic and could leverage the results with internal research.

- BMD/PE design is something a lot of states are interested in, including TDOT but most of the systems have been widely different from each other. I'm not sure I see academia as the place to provide a practical implementation guide for Materials QA programs, however.

- This is high priority research for Texas.

- "With ongoing implementation of balanced mix design (BMD) for asphalt mixtures, along with continued work on performance engineered concrete (PEC), the development of a specification implementation guide would be a tremendous benefit for VTrans and assist in filling knowledge gaps throughout the Agency."

- Interest in, and initial use of performance specifications is rising rapidly, and while there is research into particular testing for use with various materials, there has been very little information available about the impacts on process control, quality assurance, and acceptance. This study proposes to address those areas to provide guidance to agencies navigating
the implementation of performance specs. This should be a high priority.

- Performance specifications are slowly being implements. Full implementation is still many years out. This research adds to the body of knowledge currently available.

**Item #18: Incorporating Resilience Concepts and Strategies in Transportation Planning Efforts**

**B-15**

**Special Committee on Research and Innovation**

- Very important to our long range planning process

- Research related to resiliency increasingly is necessary in planning. Problem statement provides needed information/discussion.

- [Rating: 4] The research team should consider FHWA’s ongoing work on integrating resilience into the transportation planning process. FHWA is finalizing case studies and a handbook on Integrating Resilience into the Transportation Planning Process, both of which should be available in early 2019. In addition, the research team should include a designer and/or engineer and consider the results of NCHRP 15-61.

- This seems like a worthy effort that can be appended to another project (20-117) already underway. The basic idea of SP-01 should be covered within this problem, as stakeholder engagement/communication should be part of the planning process.

- This is a planning function that needs expanding. Also tied to freight.

- I am unclear what the guidebook would provide. Additional detail would be helpful

- Importance but funding allocations limit implementations of the strategies.

- Highest rated statement by AASHTO Committee on Transportation System Security and Resilience. Could benefit from more funding… Proposal references many existing and emerging guides on the topic being broad/high level, include efforts sponsored by FHWA. Philip has been a SME for a FHWA funded effort creating a guide for integrating natural hazard resilience in planning. Will be published soon. It is high level but address full range of planning and programming. This effort wants “very detailed and specific advice”. Support the need for creating that, but skeptical $120K over 1 year is unlikely to make substantial progress. It would be great to have the guidance from this research on how to incorporate resilience into planning and not just emergency management efforts. Co-developed by Tim Sexton and highly supported by AASHTO Committee, FHWA, NCHRP evaluators as value add to Resilience Guidebook development. TSSR’s #1, COP’s #2 and supported by CPBM.

**Research Advisory Committee**

- There is ample (years and years) of NCHRP, FHWA guidance on planning and resilience how to. Provides a better and more full definition of “resilience” in the Outline. No definition is provided by the proposer. Could be useful, but not urgent.

- Could leverage lots of other state and federal studies

- Resilience will become an important issue in the future.

- Hopefully this project will complement and not overlap what FHWA is already developing.

- The challenge of incorporating resilience into planning practice lies in the lack of quantifiable information and suitable, applicable tools that can integrate resilience (from concept to actionable information) into planning processes at various levels.
Summary of Comments

10-Jun-19

Reviewer Comments

- Very relevant for TAMP and SLRTP.

- This research might produce good results. But it’s not at the forefront of what’s needed nationally—considering resilience in planning efforts in order to set the overall direction of how resilience can be considered throughout the project development process.

- Resilience is becoming an increasingly important topic and is difficult to implement in an integrated manner, as this problem statement suggests researching. However, NDDOT doesn't seem concerned with this topic, at this time.

- SC has endured several historic flooding events in the past few years. There is a need to assist DOTs with planning and implementing resiliency concepts for future events. The current guidance is at a high level, and this research will provide a more indepth review and guidance.

- For now, the research should include as Task 0 a review of the results of the $1 million 20-117 effort which is due in "early 2019." Two modifications are needed for this to be useful: (1) given the role of network analysis and scenario planning in Figure 1, identify specific performance measures that can be adapted to existing network analysis methods (e.g., one example is percent increase in vehicle hours of delay with 10% of the network removed). (2) Make the methods suitable at the regional and not just statewide level: while some corridors and modal plans are truly a statewide effort, much planning occurs at the MPO level although the state is certainly involved in such project prioritization decisions.

- 2nd priority--This research should incorporate the results of NCHRP 08-36 Task 146.

Item #19: Developing Testing Protocol for a Family of Devices - Signs, Breakaway Poles and Work Zone Devices

Special Committee on Research and Innovation

- Region Priority with new MASH requirements

- Evaluating the crashworthiness of roadside safety hardware that have significant variations in possible configurations is an issue confronting the industry a whole. For example; crash testing highway sign is very difficult because of the vast number of possible sign panel areas, heights, and support dimension possible. This research would help better define what matrix of testing should be done to evaluate such a larger number of possible combinations. There seems to be significant research in this area, so it would be important to assure proper complementarity.

- MASH is a critical issue. This research is needed to fill testing gaps for MASH 2016 for these devices.

- [Rating: 4] Guidance is needed to help support decisions to not test every variation of a device.

- This is a high priority for our Traffic Program. FHWA has recently required testing with a full crash test matrix for all configurations of signs. This is not practical, therefore research is needed to determine necessary testing for a class of signs and other supports without having to test every size sign and support.

- Not sure why the high cost

- With the FHWA compliance date fast approaching, this research is needed so that there will be competition.

- Low priority for MN

Research Advisory Committee

- MASH testing requirements for sign supports is very complex and difficult to accomplish. The procedures in MASH need to be clarified to reduce the need to do multiple tests. This research will address this issue.

- Worthy topic, but more time sensitive research needed. 3 year study when answers are needed much sooner due to
Summary of Comments

10-Jun-19

Reviewer | Comments
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FHWA requirements.

- This is long overdue. MASH implementation dates will likely be pushed back due to the lack of test protocols.

- MASH testing requirements have proven to be overly burdensome for low cost devices since crash testing costs can be steep. Development of testing protocol for family of devices will allow manufacturers and state departments to determine crashworthiness of a vast array of low cost temporary traffic control devices with limited testing, improving the ability of states to continue delivering safe and cost-effective projects.

MASH efforts are currently being led by BSPE and we would recommend the panel member be from their bureau. Marshall Metcalf or Kyle Armstrong could provide assistance.

MASH has been and currently still is a highly debated topic. We will be required to have MASH compliance for sign supports and work zone devices. FHWA recently required the states to self-certify or pay for testing to ensure MASH compliance for these devices. This research could be a tremendous benefit for us and all states to establish MASH compliance as currently we have little direction.

- At this time DOTs are not ready for sign supports that meet MASH. We really needed this research several years ago but it would still be beneficial. This is one of the top ranked projects for Michigan.

- Relevant to developing MASH approval processes. It could give us crash analysis for a family of devices.

- This matter is valuable but suggest putting more resources into other areas. I am not aware of research or evidence indicating that MASH approved signs, breakaway poles and work zone devices will substantially reduce the severity of crashes as compared to devices meeting NCHRP 350 standards.

- NCDOT would like a rep on this panel if not represented already. There should be sufficient crash data from across the country to determine if these devices are contributing to severity of crashes. Crash Testing is NOT a deterministic test, it is intended to be used in cases where insufficient data are available. Anything to reduce costs could be beneficial.

- This would be a high priority to ND as we are working on adapting the MASH hardware.

- Critical to MASH for temporary traffic control.

- Getting some testing done for these "families" of devices would be very beneficial. A high need for determining testing protocols for family of devices as not every single version could be crash tested. It is not practical to crash test every single version of a device. We might wait and see if new MASH Test Levels are developed as mentioned in C-13.

- "Ultimately, this is likely an area where Vermont will be a "following" state, because we are not a large enough market for anything VT specific. Advancing this is still important, but it's not a VT-specific need."

- This looks like it will have significant overlap with NCHRP Project 03-119, which is ongoing. Perhaps put on hold until the ongoing project is completed?

- This is a potentially significant issue as it relates to breakaway pole structures for traffic signal and illumination systems. Any method to make crash testing more efficient such that adoption of MASH standards in field applications could be more rapid would be beneficial.

Item #20: Developing an AASHTO Guide to System Level Asset Valuation in Support of Transportation Asset Management Decision Making

Special Committee on Research and Innovation

- Having a better method to determine asset to manage would be a good tool for DOTs
Summary of Comments

Reviewer | Comments
--- | ---
Rating would be higher if this statement were rewritten to be more focused and to make sure it builds on recent research, (both completed and underway). $600,000 for an 18 month project seems high also.

[Rating: 5] This is important for practitioners to address: determining asset value: asset depreciation; value of undertaking work by work type; and the application of asset valuation/ sustainability for managing a highway network.

UDOT sees a big need for this in our state and nationally.

As agencies have become more mature in implementing asset management practices, it is becoming increasingly apparent that asset valuation is a critical gap for us. Research in this area, in coordination with current and previously-completed research, will be extremely important to improve the state of the practice, ultimately leading to improved investment decisions.

System level value is being used in other countries, but little is being done in US

This would be a good document but valuation would be difficult nationally

Committee on PBM #1

All DOTs are required to have asset valuation complete by 6/30/19. This project would have been more useful 2 years ago.

Good Project. Management Gap Analysis for the agency, and Asset Valuation was one of the identified gaps. There is little guidance and very few examples how to perform this system level valuation, therefore this would be helpful in meeting that goal. We struggle with asset valuation and what it means for management of our system. The idea is frequently brought up in discussions of measuring how we are doing with our assets. This research is of highest importance. Highly needed and supported per AASHTO Committee/FHWA evaluators and certainly benefits MnDOT. NCHRP evaluator recommends some rewriting. AASHTO CPBM’s #1. COP’s #3, and FHWA is also supportive.

Research Advisory Committee

Important subject since there is a need for more consistency on this subject nationally. However, the proposal focuses on developing multiple approaches and alternatives. I feel the development of a more standardized approach would add more value.

This Research Needs Statement is identified by the Connecticut DOT as a high-priority and high-interest research need that we see as an excellent fit for addressing through the NCHRP Program. This is an issue that CT has been asking FHWA for guidance. We totally disagree with FHWA’s suggestion that GASB 34 could be used for this data as we feel that GASB 34 drastically underestimates the value of transportation assets. For the time being, Connecticut is using a simple replacement construction cost until further guidance could be provided. Colorado took the approach for bridges by incorporating condition and age into their asset valuations. Having guidance on this federal requirement in the TAMP would be great especially for consistency across states.

Voted 1 of 3 by Comm on Perf Based Mgmt

Statewide asset management is already in place in Maryland but MDOT SHA supports research on how other agencies conduct a system level asset valuation and their replacement plans for current assets, especially in the age of new and emerging technologies and related infrastructure.

This may help MDOT determine which assets to manage based on a financial model. Many want the asset that they work with tracked. This may be a scientific method that could be used to draw the line.

The study might help improve the value and applicability of the relatively newly developed Transit Asset Management plans as a useful blueprint for transit funding decisions. While FHWA allows flexibility in how assets are valued, it could be useful to the asset management efforts of the department.

One of our biggest issues currently within programming, we are seeing very high cost overruns from poor estimates
Asset valuation has been a common problem for states across the nation during TAMP development. A guide providing consistent methodology for valuation of pavements and bridges would be very useful, as the methodologies vary greatly.

- Asset valuation is a complex issue, especially when trying to use it in the investment-decision process. This is the #1 issue, nationally, related to Asset Management and performance-based decision-making processes.

- Should incorporate a valuation and management methodology of all OTHER Hwy Assets (not BR and PVT)

- Asset valuation is huge for transit. No issues with this as written.

- This will be very beneficial for TAMP. The value of the network should include all assets, should it include ROW costs, should it only include the value of pavement replacement. AASHTO guidelines will be extremely helpful on this topic.

- "I think it important for asset valuation to be done a standardized way." "We have our initial asset valuation that was modified slightly based on CDOT’s methodology. Asset valuation, I believe, will be an effective way to communicate our challenges and successes. Formalizing or standardizing asset valuation across the US would be beneficial."

- Will be challenging to scope appropriately so that valuable outcomes are derived that go beyond previous work.

- 3rd priority--This research should think broadly about “value” to include the concept of economic value of the asset in its context.

**Item #21: Developing High Strength Corrosion Resistant Steel Strands for Prestressing**

**C-05**

**Special Committee on Research and Innovation**

- Needed to get to 100-year service life for bridges. The initial material durability for SS strands has been established, and this research will further support implementation of SS strands from the structural standpoint. It will provide major benefit to DOTs by eliminating the high cost of repairs on pre-stressed and post-tensioned structures. Cost and time are reasonable since it will require engineering analyses and some testing.

- GDOT research on stainless steel pre-stressing strands has been implemented to provide corrosion-free PSC piling. This NCHRP research would seek to obtain strands at higher strengths as well as provide a wider range of availability (thus reducing cost).

- [Rating: 5] Durability of prefabricated concrete components in highly aggressive environments is critical to overall system performance. Further development of stainless strand technology is needed before owners can feel comfortable specifying them. This task addresses a critical need in terms of corrosion prevent and mitigation for prestressed and post tensioned structures. Work in this area is urgently needed. In addition to stainless steel, there are other materials that may want to be examined as replacements for 'black-bar' cable. Besides the strand material, other related areas that need to be examined include the grouts used (for PT tendons) and the design and construction methods. Given the amount of test and validation work to be done, in addition to the modifying the specifications, the cost and time frame may be too low.

- UDOT does not have issues with our prestressing strands.

- Corrosion is one of the biggest contributors to end of service life for structures. This research may help contribute to more durable bridges.

- Supported by AASHTO B&S

- Not an issue, we have a lot lower use than some states

- COBS #2. FHWA also supports.
Research Advisory Committee

- This Research Needs Statement is identified by the Connecticut DOT as a high-priority and high-interest research need that we see as an excellent fit for addressing through the NCHRP Program. I strongly support this problem statement. Nationwide, risk of corrosion of pre-stressing and post-tensioning strands is a major concern related to the mixed performance of post-tensioning duct grouts. The availability of a stainless steel strand for concrete post-tensioning applications would provide a good belt-and-suspenders protection strategy needed for these critical bridge structural elements. Many pre-stressed concrete beams with corroding pre-stressing steel strand cannot be repaired and must be replaced unlike structural steel beams that can often easily be repaired for corrosion-related deficiencies.

- Corrosion is a big problem in prestressing, and this will help in addressing it.

- Behavior of stainless steel prestressing strands is of concern.

- Due to the near exclusive use of prestressed concrete girders, progress in this area could extend the service life of our bridges.

- This is worth exploring since 90% of our new bridges use prestressing strands.

- Corrosion is the first mode of deterioration for all bridges and the 7-wire strands are the most sensitive steel to corrosion. Delaying the onset of corrosion will reduce maintenance needs, extend the bridge service life and enhance the safety overall. The objective of this research is to develop guidance and AASHTO specifications for the use of high strength stainless steel strands for pre-stressing concrete structures and components.

- Benefit may target Coastal DOTs

- "As we seek to produce the 100 year life expectancy in our bridges it is important to research all elements that make up our structures. Vermont currently uses corrosion resistant reinforcing steel in precast structures while the prestressing strands are consistently uncoated steel strands. This research will be good for Vermont as our environment is corrosive and we could benefit from corrosion resistant steel strands in our prestressed structures."

- Potentially, this statement could have a "5" rating, but as indicated in the problem statement, VA has already incorporated or will soon be incorporating stainless steel strands into concrete pile and girder designs. With that said, this issue is of keen interests to DOTs across the country, particularly in the realm of designing bridges for longer service lives. Modifying the LRFD code to include this material will be immensely beneficial. The research objectives in this problem statement need to be fleshed out a little more... which specific structural elements should the research focus on? Is it reasonable to expect development of new stainless material other than what is already commercially available? Or should there just be a study on that which manufacturers are currently producing? Period of study is sufficient, but the amount of funding is insufficient when suggesting full-scale testing of structural elements.

- Corrosion resistance of steel strands is important to service life of prestressed bridges.

Item #22: Understanding and Analyzing the Contributing Factors to Crashes

C-18

Special Committee on Research and Innovation

- Understanding factors contributing to crashes would help in developing/implementing effective countermeasures and approaches to address crashes and, thus, improve the overall safety level. The guidelines are needed in project evaluation.

- Could be helpful in recommending appropriate CMF.

- [Rating: 2] It may be more useful to have an assessment of best practices in crash diagnosis across crash types. This problem statement is perhaps too ambitious, as the best practices assessment may reveal a range of issues that aren't anticipated. The statement authors should consider the Georgia DOT report on "Applying the Highway Safety Manual to Georgia" to see if some of the recommendations can be addressed through NCHRP.
Summary of Comments

<table>
<thead>
<tr>
<th>Reviewer</th>
<th>Comments</th>
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<tbody>
<tr>
<td>■ This research would help quantify and account for one of the most impactful and varied inputs into determining the relative safety or crash occurrence rate for a transportation system. Accounting for Human Factors and behavior is an area that really needs additional review, understanding and consistent application into project specific decisions.</td>
<td></td>
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<tr>
<td>■ This is the top rated proposal from the Committee on Safety and will add to the existing body of knowledge</td>
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<tr>
<td>■ Anything to support DDSA is vital; tools that are sensitive to mode and context would be beneficial.</td>
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<tr>
<td>■ comm. on Traff. Eng - high priority; Safety - #7 or 7</td>
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Research Advisory Committee

■ no comments

■ A good project that could lead to process changes at our DOT.

■ Looking at contributing factors more thoroughly will be beneficial and will possibly reduce crashes. Researching new methods, guidelines and tools to analyze contributing factors in crashes will be very useful in finding ways to decrease fatalities and serious injury crashes.

■ Very worthwhile project and ranked high from Committee on Safety. It was discussed among other states and has value to all.

■ This supports DDSA with improvement to diagnostic assessment and countermeasure selection tools but see the benefit more for local agencies.

■ Looking at safety performance of the roadway for various highway users would be a good idea.

■ Complete streets for safety Analyses

■ HFG, especially as related to complete streets and multi-modalism as this study proposes, is extremely important to the ultimate adoption and implementation of the kinds of features our customers are starting to demand of our industry. This study should be a very high priority for NDDOT.

■ We need to know more about this to determine which countermeasures we deploy as well as determine in there are gaps where new countermeasures need developed.

■ Current CMF's largely based on rural crashes.

■ "Depending how good the tool is, we could use it for the selection of countermeasures. SafetyAnalyst which we are looking to implement has an expert system to assist with countermeasure selection."

■ The title is a bit deceiving. The focus is on crash diagnostic assessment tools and selection of countermeasures treatments. It sounds good but there is uncertainty of the usefulness of the output.

■ This is the top rated proposal from the Committee on Safety and will add to the existing body of knowledge

Item #23: Designing for Target Speed

G-09

Special Committee on Research and Innovation

■ This research will be an added value to the departments implementation efforts of Complete Streets.

■ [Rating: 5] This project gives designers tools to develop projects that yield intended speeds. Communities are demanding roadways that function in a way that is compatible with communities, but designers don't have the tools they need to

20
accomplish target speed results. The outcome from this study would build foundation for achieving harmonization among design, operating, and posted speeds and achieving safe speed for all roadway users.

- The current state of practice for designing roadways within the United States is to choose a “design speed”. Changing this culture nationwide will be a considerable and necessary effort to obtain lower speeds in this target area.

- Lower priority for Wyoming

- The target speed issues are very valuable to design parameter selection with DOTs

- Very complex issue, which we deal with continuously. In order for communities and vulnerable users (bikes and peds) to achieve lower highway speeds, there needs to be a shift in design practice. This research would be one step in that direction.

- Moving to use of target operating speed in design/scoping decisions is part of our complete streets policy. G-09, G-11 and C-12 have important complementary relationships to inform needed flexible and context appropriate revisions to the AASHTO Green Book. Lots of interest in this. COD's #2 priority; COP's #5 priority; COTE's #1 priority

**Research Advisory Committee**

- This will justify traffic calming affects.

- The range of speeds should be increased to account for most standard driving conditions.

- Speeds are a major concern for safety, particularly in urban areas.

- We don't yet need a 3rd speed to take into account during design.

- With increased speed limits this research could address spill over and provide us with the tools to build a roadway where we really mean the speed limit posted.

- This research focuses on post speed limits of 30-40 mph which are not applicable to most MoDOT roadways.

- This research would help designers move away from the cookie cutter approach of designing highways and help in design towards how the roadway should be used in that context.

- Vehicle speeds have a large impact on the severity of crashes. The info learned would have benefits for all phases of project development.

- This is an important concept that designers nationally need to understand more about.

- Design Speed is outdated and often leads to overbuilt roadways when considering 80th percentile

- One of the important factors of this research could focus on reducing vehicular speeds to improve the safety of pedestrians and bicyclists.

- I doubt that if we need "design speed", considering that we have speed limits and people do not even follow. Relates to a high-ranking local research topic. 36 months seems long, though.

- This is a priority for WSDOT for the past 5 years.

**Item #24: Snapshots of Planning Practices**

**B-14**

**Special Committee on Research and Innovation**

- Snapshots are focused and targeted research on timely topics that can be easily incorporated into planning work.
Summary of Comments

10-Jun-19

<table>
<thead>
<tr>
<th>Reviewer</th>
<th>Comments</th>
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<tbody>
<tr>
<td></td>
<td>Distribution of Ratings</td>
</tr>
<tr>
<td></td>
<td>■ $25k per snapshot seems high.</td>
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<tr>
<td></td>
<td>■ This a becoming a comprehensive resource of great value to the Planning community.</td>
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<tr>
<td></td>
<td>■ [Rating: 4] This is a useful research project for keeping planning stakeholders informed on hot planning topic areas. This project would continue a series &quot;snapshots&quot; of planning practices on hot planning topics throughout the year. The snapshots are typically 2 to 4 pages, produced 3 to 4 times per year, and sent electronically to planning stakeholders. Each snapshot focuses on a specific planning topic area and is intended to keep practitioners informed on the state of planning practice on specific topical areas. Examples of previous topic areas covered included automated and connect vehicles, scenario planning, freight planning, statewide planning, and bike/ped planning.</td>
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<tr>
<td></td>
<td>■ This has been used this to find states that are using similar techniques to WYDOT</td>
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<td></td>
<td>■ This could have benefits to improved planning on a national basis</td>
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<tr>
<td></td>
<td>■ Interested in more specific outcomes.</td>
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<tr>
<td></td>
<td>■ This appears to be super useful research for learning about real examples of innovation and best practices in planning. Top Priority submitted by AASHTO COP. Previous Task 120 Snapshots were valuable to SDOTs which warrants adding more Snapshots. COP's #1.</td>
</tr>
<tr>
<td></td>
<td>Research Advisory Committee</td>
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<tr>
<td></td>
<td>■ These snapshots are informative summaries on the state-of-the-practice that I have distributed to various Multimodal Planning Division (MPD) staff.</td>
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<td></td>
<td>■ To vague.</td>
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<tr>
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<td>■ Voted 1 of 2 by Comm on Planning</td>
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<td>■ This might make a good pooled fund study.</td>
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<td>■ Asking for a lump sum to later determine what tasks to complete seems like a way to work around the committee funding earmarks being eliminated.</td>
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<td>■ The snapshots can help to identify and fill knowledge gaps, share innovative ideas and practices, improve efficiency and create a collaborative environment among transportation practitioners nationwide.</td>
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<td>■ Timely sharing of best practices/innovations on a variety of planning topics.</td>
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<td>■ Timely and useful planning information</td>
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<td>■ There are a lot of visualization tools and planning tools. Not critical. Seems like a synthesis project, reduce budget.</td>
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<td>■ The past Planning Snapshots have, typically, been very useful for us in identifying peer agencies that are working on methods or problems similar to ours. This information allows us to quickly identify colleagues with whom we can discuss difficult problems in technical topics for which there are few, if any, in-state peers.</td>
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<td>■ This request is the top research priority for the Committee on Planning for this research cycle</td>
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<td>■ Being a top COP priority and the continuing need of sharing innovative planning ideas for actionable stakeholder practices makes this a highly ranked need.</td>
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<tr>
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<td>■ 1st priority--This research continues AASHTO Committee on Planning's Subcommittee on Research for quick-response transportation planning research (1st priority of COP-Research)</td>
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Item #25: **Guidebook on Integrating Freight Movement into 21st Century Communities’ Land Use, Design, and Transportation Systems**

**Special Committee on Research and Innovation**

- Work is needed and problem statement seems to provide a comprehensive resource for freight planners. It also discusses public-private communication and collaboration; however, the Research Objectives and Potential Benefits seem to speak to a more technical audience. The concern is that small municipalities don’t have the technical or time resources to use this Guidebook effectively.

- Combine with B-31.

- Understanding the impact of freight movement needs on transportation planning is vital to supporting economic and quality of life issues.

- [Rating: 4] The question of land use and freight has been explored numerous times. However, there is a gap in the research on impact on local planning. This proposal has some promise, but it does not seem to acknowledge the impact of “through-freight”, either through truck parking needs, truck routing, or encroachment of non-freight uses on existing freight infrastructure and facilities. Although economic “viability” is mentioned a few times, there needs to be an emphasis also on communicating the economic impact of freight to the local communities. This is a critical link to understanding freight transportation, land use, and community impact. Any guidebook to local planners should include this discussion.

- This is an important operational topic for freight.

- Could have some benefit to the MPOs. Methods to consider freight movement during complete streets debate would be good.

- Good project considering context and modal issues, would be of benefit to the GB8 discussions.

- Awareness of these issues became apparent in the development of the Freight Plan.

- MnDOT submitted; COP's #4. supported by NCHRP and suggested to combine with B-31

**Research Advisory Committee**

- This study is very similar to project B-29 below. Before moving forward with a guidebook, recommend the completion of B-29 to inform the guidebook. This appears needed and timely. Could help prepare for freight plan updates and potential new federal monies, as well.

- Lots of federal emphasis on freight so this could be useful.

- Sounds not super different from other referenced reports, but its future-industry focus could be interesting?

- This would help address several recommendations from the Massachusetts State Freight Plan.

- Deals more with MPOs, research is not groundbreaking, but interesting supply chain attributes.

- It’s too early for a guidebook and may not be the best approach due to the dynamic nature of freight movement. The problem statement would need modification.

- This is a very important issue and difficulty for freight planning, nationwide and within ND. Incorporating freight needs into urban planning will be critical as we move into greater multi-modalism. So, the timing of this effort is nearly perfect, too.
Summary of Comments

Reviewer | Comments
--- | ---

- A better understanding of freight movement would be beneficial for various aspects of our programs.

- Great topic and a concern for the major cities in Tennessee

- Important, I think, given that freight has historically not been fully considered at the regional level. In the 7th bullet under Research Objective (“Challenges in freight data collection”) I suggest including examples of how to use the old Freight Analysis Framework and the newer AASHTO resources to extract the limited data that are publicly available; that section of the guidebook would show how to use such public data to better procure the private data sources (money must be spent but we can at least spend it for a better product). As long as land use decisions are made at the local level where no one is really considering the statewide/multi-state/regional impacts, we're going to keep going around this tree. I think both B-25 and B-29 will be helpful. Let's move at least one of these forward.

- Topic meets all research criteria and is very relevant in context to practical solutions approaches and first/last mile connectivity, especially when looking at all modes of the freight network. However, its unclear how the changing paradigm of land use planning is incorporated into the research objectives. Additional funding and scope adjustment may be needed. The research should also consider context sensitive design tailored to goods movement, and to land use practices and policies such as siting of micro-warehousing.

**Item #26: Aligning Geometric Design Controls, Criteria and Elements with Roadway Context, Modal Priority and Functional Classification**

**Special Committee on Research and Innovation**

- The direction of the AASHTO Greenbook is towards a more context based design approach. This research will further those efforts.

- [Rating: 5] Combine with C-12. Important extension of the work presented in NCHRP Report 855. Design guidance that identifies the geometric design parameters for the types and designs of facilities needed to serve the travel demands of all current and planned user modes across a range of contexts within each functional classification will help planners and designers develop better projects.

- Designation as simply urban or rural land use context is insufficient to adequately account for the full range of contexts that can exist along a highway or street. Classification leads to recommended or limited design choices that may not be optimal for the particular facility and its adjacent land use contexts. This research will significantly help with our local culture shift to "quality of life" and "moving people rather than vehicles".

- This would forward the idea of flexible design

- This is a higher value project for WSDOT and was submitted by the Department. The value of understanding context, modal priority and functional class is important

- G-11, G-09 and C-12 have important complementary relationships to inform needed flexible and context appropriate revisions to the AASHTO Green Book. COAT supports; endorsed by COD; supported by Safety; COTE thinks it's important. High priority to FHWA.

**Research Advisory Committee**

- Need guidance for new Classifications.

- Functional classification changes often lag ADT increases and DOT projections in developing areas. ADT and vehicle mix need to be consider in selecting design standards.

- This aligns with the direction the Green Book is going with how design criteria are determined.

- Most states are in a "maintenance mode" and not building new roadways.
Summary of Comments

10-Jun-19

Reviewer  Comments

Not as urgent as others presented

This could be relevant to our bike/ped/ADA guidance.

Updating highway design manual to reflect the current push for flexible/context design is a great idea - move away from cookie cutter design approach.

This builds on prior work that refined Green Book functional classes, but is a lower priority than other issues listed. Perhaps a candidate for implementation funding, as it's designed to implement NCHRP 855. Could become the design component of C-12, which is more planning-focused.

This is a higher value project for WSDOT and was submitted by the Department. The value of understanding context, modal priority and functional class is important

Item #27: Acceleration and Deceleration Rates used in Roadway Design Criteria

The research doesn't work well for freight traffic or total traffic; it discusses that entrance ramps could have a shorter required acceleration length and exit ramps could have a shorter required deceleration length. This would be counterproductive for congestion management given that large truck lengths have not changed though breaking performance has changed, and large trucks have a passenger-car-equivalent of 2-3 cars depending on the speed and elevation of the roadway.

[Rating: 4] Currently models do not reflect current fleet/tire characteristics nor ADS technologies. It is a design characteristic that affects how flexibility is exercised to achieve Performance Based Practical Design, and would inform the future AASHTO GB8. However, research should not focus only on justifying reduced accel/decel distances that otherwise provide safety benefits.

This research is important, because as our vehicular technology advances, so must our design criteria. We should use design criteria that is applicable to our current vehicle fleet. This is also a major point of contention locally.

This research would be of significant benefit to the field if it results in shorter stopping requirements in design and operations

May reduce number of project design exceptions.

COD's #1 priority; strong support from FHWA, but low priority to MN.

Research Advisory Committee

Agree they are out dated but due to it causing our designs to be a bit conservative, I don’t feel the urgency.

The underlying assumptions may be inconsistent with most driver expectations. Particularly older and fuel conscious drivers (hybrids). My daily observations indicate that aux lanes are usually too short as some of the acel/decel is already assumed to occur on the highway. In heavy traffic this causes forced platooning and road rage. The widespread adoption of rumble strips has actually acerbated the situation forcing more decel/acel to happen in the through lane. If anything we should be looking at making aux lanes longer. I would support this study if the topic was expanded to account for fuel conscious drivers and the effects of decel/excel in through lanes on platooning and safety. As well as increased wear and tear on breaks/tires and the associated contaminant issues.

Good research idea that may have significant impact on Idaho when it comes to freeway on and off ramp lengths.

Poor proposal and may take away any factor of safety we have to combat distracted drivers.
Relevant to practical design of our acceleration/deceleration lanes.

This research will provide updated accel-decel values that are based on current vehicle fleet operating capabilities.

I believe many agencies would be interested in this topic. The research result would be applicable to the state-of-practice and would also benefit VDOT.

We know that current criteria is conservative. It would be good to know this but in the context of all the other significant proposals this year doesn't rank first.

**Item #28:** Developing Test Method and Specification Limits to Evaluate Trackless Tack and Tack Coats for Different Paving Applications

### Special Committee on Research and Innovation

- The Department requires all emulsified tack coats to be non-tracking (trackless). Products are added to the APL only after a demonstration section has been constructed with adequate bond strength and a subjective evaluation of the non-tracking characteristics. The specification requirements for non-tracking tack coats in Florida are based on the manufacturer’s recommendations and standards that were developed prior to the use of trackless tack coats. Additionally, a standard method for evaluating the non-tracking characteristics of tack coats in the laboratory is not available at this time. This research project would develop more effective, performance-related specifications to evaluate the non-tracking tack coats that are used in Florida.

- [Rating: 3]

- We could use help with our tack coats. Trackless tack, if it worked, could be a great benefit to us.

- WSDOT is definitely interested in this topic. This topic is visited frequently with oil suppliers and Washington paving contractors. Interest in developing test methods and procedures is high.

- More information on trackless tack is always welcome. Interest from our paving industry seems to come and go.

- No FHWA or AASHTO input. Lower priority for MN.

### Research Advisory Committee

- no comments

- There has been a growing concerns about the tack coat application process. This study can answer some of the currently observed issues in the field.

- MoDOT has conducted a lot of internal research into this issue over the past four years and still not come to a complete resolution of tack coat spec adequacy.

- Performance based specs would be the best, inplace bond strength in the field.

- Another important topic that still needs work. Dr. Castorena has already begun similar research for NCDOT. Continuing to attempt to evaluate Tack in the Laboratory is fruitless -- there are just too many variables involved with storage, handling, and application after the tack material leaves the manufacturer’s facility to warrant further development/refinement of LAB protocols.

- Trackless tacks are a product that TDOT uses and looks to increase use of. Some states have questioned whether the hard asphalt used in the most commonly used one really glues pavement layers together well. There are now several newer versions of this material coming onto the market so a resolution to these doubts is needed.
"Penetration values for trackless tack tend to be extremely low in cold climates, so I see little value in opening the door to allowing trackless tack in Vermont. However, better test methods in evaluating tack coats in general need to be developed given that the penetration test has been in use since, at a minimum, the 1940s."

Mohammad's work for NCHRP 9-40 was very thorough when it came to quantifying the benefits of adequate tacking and resulting bond, but work to evaluate (and accept) tack coating materials remains to be done. Virginia's intended approach was very performance-oriented, but probably does not help with material development.

WSDOT is definitely interested in this topic. This topic is visited frequently with oil suppliers and Washington paving contractors. Interest in developing test methods and procedures is high.

**Item #29: Design Options to Reduce Turning Motor Vehicle / Bicycle Conflicts at Intersections**

**C-24**

Special Committee on Research and Innovation

- This is a high priority. Interested in crash rates, not crash numbers. Would like to learn more about protected intersections, and leading bicycle intervals.

- [Rating: 5] Vehicle and bicycle conflict at intersections is an important issue that is mostly informed by anecdotal experience. This research is important to provide an empirical basis for how to better design intersections for both modes, especially since bicycle volumes continue to increase.

- Turning movements are a significant portion of bicycle collisions. This is something that hasn't been studied thoroughly. There has only been one solution really identified and that is LPI's. But there are some conflicting studies and it is hard to swallow by signal timing crews. $600k feels high to perform a study of this type though.

- Low priority research for Wyoming. Seems like a re-hash of existing knowledge. Design will not fix this.

- At least according to Bicycle Coalition, this continues to be a significant issue here in Maine even if Crash Data may not support.

- If this study follows NACTO lead, the guidance will tend to be applicable to mostly urban conditions.

- Good research that is limited in its benefit for MnDOT, but could be beneficial for local road authorities. Not overly strong support from AASHTO, FHWA, NCHRP.

Research Advisory Committee

- The research will provide conflict data analysis to provide needed guidance that could be implemented into the AASHTO Green book as bike/ped data is still lacking with many safety analyses.

- Combine C-24, 25 and 29.

- Critical need. May also consider corner radii effect on crashes under Research Objectives (5.3).

- Bike Boxes and Dedicated bike lanes.

- Some of the issues would be addressed in C-25

  Research on the safety of bicycle facilities in needed to determine the type of facility that should be used to provide pedacyclists with the greatest amount of safety to reduce fatal and serious injury bicycle crashes. As more bicycle capacity is built into the trans system, research like this is needed to improve safety for users.

- States are lacking in solid design treatments for intersections. This will be good research to reference for future projects.

- I wonder what new designs could be produced.
Summary of Comments

Might be beneficial to our bike/ped guidance

This research is good - but there is quite a bit of guidance on this issue.

Combine C-24, 25, & 29

Conflicts with turning vehicles is a primary concern with non-motorized users. What are some intersection design options for urban arterials where you have a variety of users including non-motorized users AND large trucks, buses?

Could provide much needed mitigation measures for reducing motor vehicle-bike conflicts in intersections.

"I support this research, especially with all the innovative bike facilities now part of the design toolbox."

The vehicle/bicycle conflict issue has become more significant, especially in urban areas (e.g., Richmond and NOVA). A study to explore the intersection design options that mitigate this conflict issue can be very helpful to both state and city DOTs. $600K budget for a 2-year project seems high. Forthcoming VTRC bike box/turn box report may be a useful reference. Upcoming implementation efforts for that study include VDOT requesting interim approval for one or both treatments. This study should consider the "protected intersection" design. It should also consider road user understanding and education, which is a key challenge if designs are unfamiliar.

This research will address high-priority safety issues. Bicycle design improvements at intersections should also have ancillary benefits for pedestrians since the bike lane serves as a buffer between driving lane and crosswalk--this is something the research could address in defining outcome measures. A request for this and other research statements: Please remove the term "impacts" where you mean "effects". The impact is what happens when the driver hits the person on the bicycle.

Item #30: Estimating Safety Performance of Infrastructure Improvements Incorporating Consideration of Driver Behavior

Special Committee on Research and Innovation

This research supports a need (to include driver behavior factor(s) in crash prediction models to allow for a more comprehensive assessment of existing and expected safety performance.

Could be useful to understand and group human factors in crash analyses.

[Rating: 3] Good proposed research to include driver behavior factors into crash prediction models.

This research would help quantify and account for one of the most impactful and varied inputs into determining the relative safety or crash occurrence rate for a transportation system. Accounting for Human Factors and behavior is an area that really needs additional review, understanding and consistent application into project specific decisions.

Don't see this helping in the very complex analysis of predictive crash data, just making it more complex

This project attempts to bring in consideration of the driver into safety analysis. This has value given the fact that driver action are a contributing factors in most crashes.

Adding consideration of driver behavior may not be a sustainable effort for our small agency. The additional data may add unnecessary complexity for questionable benefit.

Safety - #2 and seems to have high support from FHWA and NCHRP

Research Advisory Committee

So far the models in the Highway Safety Manual do not consider socio-economic variables into regression models even
though these variables are probably the most significant variables in the models.

- There is a need to include more factors related to driver behavior in crash prediction. It could provide recommendations for engineering solutions to contributing factors where enforcement and education provide correction (i.e. speeding, OUI, etc.) High probability of success and great return of cost if successful.

- Incorporating behavior into the SPF's and other models could be valuable.

- Incorporating behavioral factors along with engineering factors (traffic and site characteristics) into the safety performance of infrastructure is very challenging and requires several years of data and creative statistical methods.

- This would be a high priority need which impacts Ma since many crashes involve a driver behavior component.

- This research goes with the above by taking these behaviors and incorporating them into our existing safety models.

- This research would seem to be quite difficult to produce results that would affect roadway design.

- NDDOT is getting more and more pressure to consider the short-term safety impacts of various options being considered (both permanent and temporary options).

- Assessing driver behavior as part of the HSM approach to safety would be a much needed effort to advance safety in the US.

- "Adding human factors is interesting. I think that there are a lot of questions how this would work and how we would get the data to incorporate in our analysis."

- I think this work would be very interesting, especially if incorporate the result of naturalistic driving study data.

- This project attempts to bring in consideration of the driver into safety analysis. This has value given the fact that driver action are a contributing factors in most crashes.

**Item #31: Secure Information Environments for Collaboration and Knowledge Sharing: Guidance for State DOTs**

**Special Committee on Research and Innovation**

- A primer on cyber issues relevant to transportation would be beneficial. Data classification is of particular interest, as DOTs have much data on critical infrastructure. Any study for best practices must consider that state DOTs often have to follow state policies or other NIST-like standards.

- Past due and wholly necessary.

- Valuable but not pressing?

- [Rating: 3] The proposed study seems to be premature in that it is difficult to assess the need for this topic before the completion of NCHRP 20-59 (51). Security 101: A Physical Security Primer for Transportation Agencies. Additionally, the likely unique systems and processes of each State DOT would hamper the potential success and usefulness of the product of the proposed study.

- Most DOT’s are currently working on solutions or are starting to see a need for KM to preserve and document institutional knowledge. There would be nationwide interest in the results of this research that would benefit many agencies.

- Could be beneficial to interagency collabotation, and this needs to be dealt with from a transportation perspective to be successful
Summary of Comments

Reviewer | Comments
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- objectives and outcome not clear
- It is very important, we just have not seen this type of sharing work very well.
- NCHRP review suggests some hesitation. No AASHTO committee review. No specific feedback from MN other than lower priority.

Research Advisory Committee

- We know what is needed but having a hard time getting resources for Statewide IT structure. Too high tech
- It will be good if the final product provides best practices for developing and implementing strong cyber resilience within a DOT organization where business units understand that cybersecurity is everybody responsibility and not only Information Technology responsibility
- This work will establish fundamental baselines for DOTs to work towards a unified management and sharing of information and corporate knowledge of the transportation industry. This work will establish best practices for all to build upon.
- Abundance of information resources and lack of oversight on those, big risk with information security and this research could help determine how big this risk is and how to address these issues and prevent security breaches but the need is very state specific
- Again, cybersecurity is an important topic, and we can always learn from newer techniques. MDOT has a pretty robust software tools for data sharing and collaboration, so that’s why this is not considered an "absolute need". (From our CIO). From a KM standpoint, this would be a good project (Cindy Smith)
- Cyber security and related practices continue to be a priority for MoDOT.
- This topic is important, but seems to dependent on the specific needs of each agency to be very useful.
- This is one year which is good. My concern here is that we have existing policies, controls and standards that we must follow. I do like the harmonization across DOTs. This is a be careful with what is already layed out in this space. We want to ensure value and tie to what we already have to know. The scope is very broad based thus need to ensure the key focal areas are being addressed vs. broad brushing.
- Knowledge management is an emerging topic that needs focus
- Guidance on risk management for data is an important topic that most (perhaps all) DOTs are ill-equipped to deal with.
- This project is distinctly different than but related to A-04. This project seeks to address cybersecurity related to collaboration and knowledge transfer. A-04 addresses cybersecurity related to operations and infrastructure. The two projects could be combined to ensure guidance is aligned. The budget would need to be combined to provide the needs assessment, literature review, and guidance for both objectives. State DOTs often collaborate (discussions, remote meetings, file sharing, threaded conversations) across the country but it can be very difficult to find collaboration tools (Slack, Google Docs, etc.) that all agencies have permission to use. This project seeks to understand the need, evaluate the risks, and provide guidance for selection that balance cybersecurity risk and effective knowledge collaboration and knowledge transfer.
## Summary of Comments

<table>
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<tr>
<th>Item #32:</th>
<th>Guide Construction Specifications for Cold In-place Recycling (CIR) and Cold Central Plant Recycling (CCPR)</th>
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### Special Committee on Research and Innovation

- [Rating: 4] This project complements other pavement preservation guidance, as developed by AASHTO and NCHRP. A guide of construction specifications and best practices is an essential next step to further development and deployment of these technologies.
- At UDOT we have done our own research with CIR and CCPR and would benefit to compare with a national study.
- Supported by Materials Program.
- Improvements to CIR specifications are needed for future WSDOT projects.
- disagree with need, but may provide useful information
- We are using CCPR more and more and better understanding of the materials and construction aspects will help us further refine our specifications and materials and candidate selections
- Higher support from MN.

### Research Advisory Committee

- Would provide useful insight and could influence potential revisions to our CIR / CCPR specification.
- MoDOT doesn't specify much CIR.
- We have developed our own specifications.
- Growing interest in these processes in other states. NC may be a little behind here. Gaining interest in NC. Could be beneficial.
- "It should be noted that guide construction specifications are being developed within AASHTO Committee on Materials & Pavements (COMP) Technical Subcommittee 5b - Bridge and Pavement Preservation. The reason this is not a '5' is because there may be some duplication between what's occurring in the AASHTO Committee on Maintenance and AASHTO COMP."
- The proposed topic is very timely and would greatly aid in advancing the use of pavement recycling methods nationwide.
- Improvements to CIR specifications are needed for future WSDOT projects.

## Item #33: Guidance on the Selection and Use of Flow Resistance Values in Two-Dimensional (2D) Hydraulic Models

### Special Committee on Research and Innovation

- EDC 5, not sure how much more research is needed
- This is needed research to further improve the benefits of 2-D modeling for riverine bridges. The boundary conditions selected for a model will vary between designers; therefore, investing more research into these parameters could potentially provide better guidance for more consistent use these variables.
- To gain full benefit of using 2-D modeling, calibration of "n" values needs updating.
Summary of Comments

10-Jun-19

Reviewer | Comments
--- | ---

- [Rating: 5] "Extremely important and badly needed research! Aligns well with EDC-5 CHANGE initiative as well."

- This is a new technology that NH is getting into

- Important problem/approach to address a critical need in 2D hydraulic modeling. Strong support from AASHTO/NCHRP evaluators and supports FHWA EDC. COD TCHH strongly supports.

Research Advisory Committee

- FHWA is visiting the idea of a national repository for modeled structure to allow for BMP and structure calibration examples. ADOT is doing these already thru 2-D and our USGS Partnership - possibly a smaller effort but not $500K - too much real world examples already underway with FHWA stewarding BMP guidance.

- Coincides well with implementation of the “Collaborative Hydraulics: Advancing to the next Generation of Engineering (CHANGE)” innovation under the FHWA “Every Day Counts” program to increase the use of 2D hydraulic modeling. Research should consider any regional differences.

- As we utilize 2D modeling, further guidance would be helpful.

- Good Research. KDOT will be doing more 2D Hydraulics in the future.

- There is a lot of research going on in 2D models, so I think new proposals should be evaluated with how they fit with existing efforts.

- Improved accuracy of hydraulic models will prevent unexpected problems in the future.

- This could be useful for bridge, culvert, and drainage ditch design.

- Proposed project is timely given that 2D modelling initiative from FHWA through the Every Day Counts program. Consideration should be given to different regional/topographic differences. A wide range of models will be required.

- The selection of flow resistance values for 2D models is a current and urgent concern, especially with FHWA's efforts through EDC-4 & 5 to promote more usage of 2D modeling.

- SCDOT is involved with a FHWA initiative to use 2D modeling for most bridge replacement projects. This study will be very beneficial in the hydraulic design to improve their accuracy and dependability.

- This is a pretty high priority for hydraulic modeling of bridges

- Vital research will aid in better design of infrastructure to withstand flood events through the transition from 1D to 2D hydraulic modeling.

- WSDOT is trying to move towards the use of 2D Hydraulic modeling to aide in our project decisions such as structure locations and scour countermeasure designs. There needs to be better guidance on the selection of roughness values so that we can adopt 2D modeling for other processes such as floodplain modeling and FEMA map revisions.
Summary of Comments

Item #34: Improvement of Certification Method of Inertial Profiling Systems for Network Data Collection

Distribution of Ratings

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Special Committee on Research and Innovation

- Timely and much needed endeavor. However, the effort must focus on both network and project level smoothness testing. One would argue that certification of smoothness testing for construction quality still needs improvement. AASHTO R56 repeatability and accuracy requirements are mostly impossible to meet for open graded/textured sections with an IRI of approximately 50 in/mile or less. The overall certification method needs to be reviewed/improved or develop different requirements for both network and project level testing if necessary. Further, AASHTO R56 and supporting referenced AASHTO methods refer to inertial profilers. New technology such as 3D systems that measure pavement distress may be able to report IRI as well. However, these new technologies will not meet the requirements in AASHTO R56 since they are not inertial based. A new certification method should account for other measurement methods. The proposed funding may not be sufficient as it stands.

- [Rating: 5] AASHTO Standards to report the pavement condition metrics need to be updated to comply with Data Quality Management Program requirements for Data Collection Equipment Calibration and Certification under the MAP-21/FAST Act Legislation to carry out a performance-based approach. One of the pavement condition metrics is the International Roughness Index (IRI) collected by a Inertial Profiling System.

- It is a good idea to improve the certification method of the AASHTO R56 for the Inertial Profiler as needed. There was no mention of the FHWA ProVAL software, developed for certification purpose as long as there is an established ground truth reference site.

- WSDOT will benefit from improvements to certification methods and updates are needed.

- This would help us establish regional certification sites for DQMP and network level data collection.

- Needed to properly comply with MAP-21 pavement performance measurements. Has strong multi-state support as well as FHWA.

Research Advisory Committee

- The repeatability and accuracy measures of the AASHTO R56 method for certifying inertial profiling systems is only suitable for project levels analysis and for sections with IRI less than 150 in/mi. These measures much be extended so they can be applied to network level measurements.

- no comments

- Definitely a good project. I imagine this would be applicable to vendor collected data as well.

- Compliance with MAP-21 pavement performance data collection will require uniform inertial profiler certification procedures to ensure reasonable agreement in smoothness results between different states.

- We have just started doing this in Nevada, based on CalTrans method.

- Definitely needed. Further refinement of R56 is warranted.

- very important and should be funded

- NCHRP Synthesis 526 on Certification of Inertial profilers was recently completed.

- Important stuff, but there are two very relevant (and well supported) pooled fund projects that can address this research need - TPF-5(354) and TPF-5(399).

- WSDOT will benefit from improvements to certification methods and updates are needed.
Item #35: Best Practices for Steel Bridge Coating and Recoating
C-03 Warranty Contract Requirements

Special Committee on Research and Innovation

- Explores use of warranties for coating projects, possibly resulting in improved durability and service life for bridge coatings. To make Warranty Projects work for Steel Bridge Coating and Recoating projects, measurable performance measures need to be developed (e.g., color gloss, retention) that accurately predict the service life of the coating system, so this language can be placed into the RFP. Appropriate financial penalties will need to be developed for the RFP, such that the contractor will have the incentive to meet specification requirements, but not so high that it will significantly increase the bid price.

- [Rating: 3] This project sounds like it will touch on, or seek out, similar information that was covered under a recent NCHRP Synthesis, Number 517, Corrosion Prevention for Extending the Service Life of Steel Bridges. It seems like there is likely some overlap, although this proposed topic will be specific to warranties. It sounds like this tasks information will be done mainly through surveys of best-practices. This along with the examples of necessary contract wording seems like a useful guide. The cost, $150k, seems a bit high, since this will mainly be performed through surveys and conversations. The time to complete seems reasonable.

- This would align with UDOT's goal to update and improve our steel coating specifications.

- Needed in the industry.

- Some states already use warranties, typical 3 years. We haven't experienced issues, but would still be useful to know if warranties actually improve the quality of the recoating of steel bridges and if it can be of some benefit to the MaineDOT's bridge recoating program.

- coating life is a concern

- COBS believes it has value but it is unranked. Should be a synthesis

Research Advisory Committee

- no comments

- There are a number of steel girder bridges in this state that are requiring painting or coating due to age. A steel coat warranty would provide a much better quality of work.

- This could be useful in our contracts.

- Developing contract language for steel bridge coating and recoating warranty contracts would be beneficial to improving the quality and durability of steel bridge coatings and for determining contract performance measures that will fairly and accurately evaluate the longevity of coatings systems.

- Viability would need to be assessed by legal/financial professionals

- "VTrans struggles with the quality of painting on our structures. We are being asked to relax manufactures specifications on many jobs. We have even received letters from the manufacturer stating different curing durations under different temperatures. We have yet to contract with a warranty and are very interested in this concept."

- Rescope as synthesis.

- This could be contractual item rather than a bridge specific topic.
Summary of Comments

10-Jun-19

Reviewer | Comments
---|---

Distribution of Ratings

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Item #36: **Emerging Issues: Impact of New Disruptive Technologies on the Performance of DOTs**

**B-12**

Special Committee on Research and Innovation

- Would be good to have more guidance and research on the mobility as a service w/ uber, lyft, and other non-traditional shared services.

- This is a critical project that can be leveraged at all levels of DOTs. Every DOT is deadling with, or will have to deal with, products of the 4th Industrial Revolution which will create challenges and opportunities in the business of transportation. Mapping out the key variables that will affect performance on transportation networks is a good strategy.

- [Rating: 4]

- This is an important problem to explore, particularly the idea of looking for “leading” measures that can be indicators for public transportation agencies.

- This should be an every 3 year topic, we need to make sure there isn't one going on. Technology is changing so fast we need to systematically look at the world. However, the problem statement is probably too broad.

- This topic is too expansive. I cannot see any tangible links to work at NHDOT.

- This seems ill defined and there's a reason the gap in literature exists. Seems like a proposed misuse of performance indicators. Level of effort to create a novel approach compared to proposed scope seems mismatched. This is a huge emerging area. While it was ranked #2 coming out of the committee on performance based management, I have to score it a 5. AASHTO CPBM's #2. NCHRP favorable

Research Advisory Committee

- Yes, this is a current problem with nationwide interest

- Technology and innovation need to be embraced at the department.

- Will provide a framework for addressing the many changes brought on by disruptive technologies; This will support MDOT's need to develop and implement an IT strategy that supports transportation innovations.

- My primary concern is that the outcome(s) of the proposed research seem very broad and vague. This is certainly an area that is quickly changing and warrants research. With clear deliverables, it could be good research.

- This takes more than AV/CV into consideration such as AI, big data, Internet of things, shared economy, etc. Unsure if there would be any immediate practical use.

- Developing leading indicators of innovations' impacts on a DOT are critical to understanding how to deal with these innovations from a strategic perspective.

- submitted by Committee on Performance Based Management

- The only concern here for me is the 24 months. We already have quite a bit of research and studies done with disruptive technologies, so will need to stay focused on performance measures as it relates to disruptive technologies.

- Planning for and dealing with these technology disruptors are becoming increasingly complex. Even identifying the common challenges, possible solutions and workforce adaptation will be very helpful. Suggest tightening scope and reducing period to 12 months and budget to $200,000. Those involved in this study should take care not to get distracted by hype. Rather than seek to identify performance indicators to help us see how disruptive technologies are being disruptive, could we instead identify ways to shape the outcomes to meet policy goals? If this proceeds, VDOT's Workforce of Tomorrow initiative ties into the “workforce adaptation” sub-topic.

35
This research is of high importance to WSDOT as the performance measurement and management approaches implemented are based on high level measures which might have been effective so far. However, with the advent of new disruptive technologies it is imperative that agencies like WSDOT gain a better understanding on how these disruptive technologies are bound to impact performance measurement/management techniques, decision support systems, and an ability to quantify the evidence for performance results clearly impacted by disruption and how they are linked to agency strategic goals.

Item #37:  
**Trade-offs for Cross-sectional Reallocation on Urban and Suburban Roads**

**Special Committee on Research and Innovation**

- [Rating: 3] This statement likely needs to be clearly focused on less dense, higher speed urban and suburban areas. The stated research objective includes this statement: “The enhanced guidance should consider the volume of traffic individually within each mode for the combination of modes being considered in both the before and after conditions.” Does the data exist to get bike and ped volumes for before and after conditions with any confidence? Before data is particularly problematic since a roadway cross section that does not accommodate pedestrians and bicyclists likely does not have significant “before” traffic. In addition, many agencies do not collect this data. If the cross section can accommodate pedestrians and bicyclists, but there is little or no connectivity to pedestrian and bicycle traffic generators, the cross section may be underutilized.

- Current design guidance does not reflect the complex trade-offs transportation professionals must consider for roadways in varying contexts. This research will significantly help with our local culture shift to “quality of life” and “moving people rather than vehicles”.

- Enough has been published

- This is a high value project for the Design Committee and would be helpful for the understanding and implementing change within the next update of the Greenbook

- This is a current challenge; pavement space reallocation is the most efficient way to consider immediate improvements to the accommodation of non-motorized modes.

- COD endorses but not ranked. FHWA suggests combining with G-14. Med. priority for MN.

**Research Advisory Committee**

- I agree this will help us use guidelines for urban multi-user design.

- Additional guidance and data would be helpful in decision making and design.

- Key research like others that would support decisions made as part of PBPD

- This could be relevant to our bike/ped/ADA guidance.

- Roadway cross sections have become a hot topic in ND. Also there is a national push for "Complete Streets". This is a critical topic for meeting our customers' desired system. NDDOT and our local government partners are often asked to change posted speed limits to reduce prevailing traffic speed; this is ineffective & often not safe.

- The topic is interesting. However, I find the problem statement, as currently written, to be so general that it is not clear to me what the final product/deliverable will be. The intended work needs to be better scoped. The effort as described relates to ongoing research in Virginia on road diets (which has some more up-to-date literature not listed in this problem statement). Economic trade-offs are mentioned briefly, but that could be a whole separate study from the safety and operations aspects - likely not possible to cover safety, ops, and economic analysis with the requested budget. Also, the objective mentions considering volumes by mode before and after, but for modes such as bike, projecting after volumes
may be a real guessing game if there were no facilities in the before condition. G-14 is better-defined.

- You need to pick either this one or G-14 they are pretty similar. Because of the focus in G-14 I think it has a higher chance of being useful in the end this one is a little broad.

**Item #38: Applications of RFID and Wireless Technologies for Highway Construction**

**Special Committee on Research and Innovation**

- High Priority for region for asset management and tracking of assets

- The technology is readily available and implementable but the how to connect it and with what materials to use it have not been really fished out. Asset management is a huge question mark nationwide and how to accomplish it. This research would help to provide further insight.

- [Rating: 4] This research project is timely and would serve as a follow-on to current NCHRP 20-5 Synthesis Study 50-07: Electronic Ticketing (e-Ticketing) of Materials for Construction Management. Although the primary focus of 50-07 is to gather information on e-Ticketing technologies and practices, data on uses of RFID/barcoding technology is also being collected. NCDOT and Ohio DOT consider lead states in the use of RFIDs. This project should be grouped under “D - Materials and Construction,” and the research objective needs to be clarified. Expand use of RFIDs in roadway construction.

- There are likely a number of easy-to-implement applications for RFID. Finding uses for RFID could enhance projects delivered digitally as well.

- This project seems to have value but the implementation specifics are not clear

- AASHTO COC #2 priority - E-ticketing would be very helpful to track quantities. High priority area

- Worthy research but highly depended on resources. Definitely going to be a bigger deal in the future.

- Comm. on Construction's #2. FHWA and NCHRP also support

**Research Advisory Committee**

- It is unclear what the objectives of proposed research are.

- If applicable to Work Zone safety we are all for it!

- A private sector approach would more efficient.

- The research statement says that the research is needed to get "buy in". We don’t need that as we are looking for ways to implement modern technology, such as web based tools, 3D models, e-tickets. We are currently working with IRMCA to pilot a project utilizing e-tickets. I don’t see this research will provide any benefit to us.

- This projects was sponsored by MDOT and is one of the top ranked projects for Michigan.

- Missouri is currently piloting utilization of e-ticketing in the area of asphalt paving. As written it appears the research objective doesn't address real deliverables so that would need to be addressed.

- NCDOT is at the forefront with this. While some of this research will be a re-hashing of obstacles we have already overcome, development of tag, sensor, and scanner technology standards will be very beneficial to DOTs.

- There is tremendous potential for the implementation of wireless technologies in transportation. The proposed study appears to fit that need. It would be helpful to define deliverables more precisely and focus on example applications. The
study should cover more than just the basics of wireless technology.

- This project seems to have value but the implementation specifics are not clear

**Item #39: Manual for Incorporating NDT in Quality Assurance**

**D-10**

**Special Committee on Research and Innovation**

- Several studies have or are being currently conducted including NCHRP 626 (NDT Technology for QA of HMA Pavement Construction) and SHRP2 Technologies to Enhance Quality Control on Asphalt Pavements. At this juncture, the proposed RNS may be more appropriate as a synthesis.

- GDOT is using NDT methods; however QA is still based on coring (destructive method); this research is crucial.

- [Rating: 4] The document resulting from this study would be very useful and would be the first step toward developing guidelines and manuals for different applications of NDE technologies. This project was supported by TRB committee AFH20 and is supported by AASHTO COMP. Questions are being raised by States as to how to incorporate NDE into the QA program and this project would provide technical guidance to advance implementation.

- Development of NDT QA processes is a desirable goal.

- The research is low cost and could potentially remove barriers for using NDT methods more frequently in highway construction.

- Not clear what this would address or what is the need

- Directly relates to several technologies we have implemented within the asphalt paving program. Some support for this, including MN via AASHTO COMP

**Research Advisory Committee**

- no comments

- Suggest this work be folded into research looking at applicability of all new tests for Quality Assurance (not just NDT).

- Missouri has been a strong proponent of incorporating IC/IR procedures for AC construction. We work very closely with FHWA and the other states to provide adequate QA methods for use during construction. Currently doing about 25 projects per year.

- Probably needed but seems too expensive for developing a manual.

  Would like to see this Problem Statement further expanded to list specific proposed NDT methods. State DOT's have a lot of in-house experience with various methods - both positive and negative. Without a listing of proposed methods, it is difficult for us NCHRP voters to determine if the researchers are using viable NDT methods.

- This is important for the future of material acceptance and complying with FHWA regulations

- "VTrans currently does not have NDT specified for asphalt mixtures. Ground penetrating radar (GPR) was looked at as a possibility based on what Maine DOT was doing, but they reported it's necessary to calibrate the GPR device(s) with roadway core results; what's the point then?"

- It appears that the scope is intended towards NDT use in asphalt and concrete pavement materials, but the initial scope is ambiguous and needs refinement. The concept should be of great interest to agencies interested in improved quality and consistency of materials, as NDT methods can offer benefits over currently used destructive methods. Agree that the scope needs to be refined but the topic would have great benefit to agencies in furthering QA practices
The research is low cost and could potentially remove barriers for using NDT methods more frequently in highway construction.

**Item #40: Reliability and Quality of Service Evaluation Methods for Rural Highways**

**Special Committee on Research and Innovation**
- It is important to develop nationally accepted capacity and quality of service reliability techniques for rural road facilities accounting for the new context and functional classifications. It's important to investigate the performance of Rural Highways going through small towns with lower speeds. Also, it's important to investigate long-distance bicycle travel in rural areas.
- [Rating: 3] The problem statement is right to note the vast rural highway extent; that these roads serve a variety of purposes, and the methods for their evaluation is not consistent with current practice. Existing methods use a single-period average condition that prevents a discerned understanding of operational conditions across time. Methods and data already exist for the evaluation of past performance. At issue is the prediction of future performance using HCM methods. The project would require extensive data at the facility and traveler level, along with comprehensive data regarding incidents, response and clearance times, weather, and demand variation. Due to the low-volume nature of rural roads, collection would need to occur over a very long timeframe of potentially 3-5 years. Unfortunately, this exceeds the proposed research period of 24 months. A more realistic study approach and schedule is needed.

- Wyoming has been struggling with this.
- This would be an important capability for NH due to our preponderance of two-lane rural highways.
- Supported by the Council on Active Transp.; NCHRP favorable.

**Research Advisory Committee**
- Based on the problem statement there is a significant gap in the Highway Capacity Manual (HCP) for facility analysis of rural roads.
- This is touching on the importance of our rural routes. Better ways to measure their significance are needed. We might not be in a position to implement it out of the gate.
- Updates Green Book to provide specific functions for rural roads.
- Could be beneficial for rural states.
- Main justification is that over the last few years, the department has become very good at using probe data, HCM methodologies, and other measures for evaluating the operational quality of service on our Freeway network. As such, we have now begun focusing more on expanding these measures to include the Non-Freeway trunkline system as well, and frankly there are a lot of missing pieces there. In order to develop more robust methods for evaluating the service of the Non-Freeway network, there are certain key gaps that first need to be filled in with the HCM methodologies to make that possible. The goal of this research is to address some of those more glaring gaps, as well as develop a more practical mechanism for evaluating the quality of service on our state’s many two lane highways.
- It would be beneficial to include a new HCM chapter for rural roads which are limited now in the HCM.
- This research is absolutely imperative if NDDOT is going to implement the multi-modal, context-based project scoping that our customers are demanding. There are few, if any, needs greater than those described in this problem statement with regard to multi-modal project delivery in ND.
This NCHRP problem was submitted by Texas, Arkansas, Michigan, and Oregon DOTs.

Important topic for VDOT also - e.g. reliability/resilience of detour routes parallel to I-81. Reliability of rural interstates is another sorely needed research. Budget and timeline are appropriate. This project would fill the gap for rural highways operational analysis, and the developed methodologies would be very useful for VDOT.

Quality of service in rural and rural town center is not as high a priority as urban situations where multimodal is more critical and there is more opportunity to grow the multimodal share.

Item #41: Valuation of Permitting Utility and Communications Installations in Public ROW

Special Committee on Research and Innovation

This is very high priority but most likely will need additional funding.

[Rating: 5] This is a hot topic right now, especially considering the EO’s on Broadband, the Mobile Now Act and the FCC’s new Rule regarding how much ROW owners can charge broadband companies.

There is real value in supporting this research. It may help State DOT’s more successfully transition towards cost-neutral regulatory programs, which allows for additional opportunities to keep highway-specific funding targeted towards highway development.

A compilation of state utility accommodation practices and policies would be useful in evaluating Iowa’s policy. Understanding how other states approach fees and accommodation would help us to evaluate our structure and update our practices. While I support this problem statement I feel that the efforts in C-07 and C-08 are more pressing and would offer a greater benefit.

The legislature has expressed interest in this - see energy infrastructure corridors.

High support by AASHTO and general support by all.

Research Advisory Committee

Change would require legislation; not sure the cost of research would get new information. Manual of actions and successes would be helpful; but would require more than one year of study. Also, the problem statement needs to address not just what state fees are charged; but, how the utility is managed. (the utility sells their empty conduit and conductor for profit; not to state). What happens when owner changes; who takes over, etc; these should be evaluated along with leases.

no comments.

This is timely and significant to our DOT and could provide guidance in establishing policy and how to create a revenue stream, like Utah DOT has done.

 Doesn't appear to be much of an issue in our state currently but could be of interest.

This would be better addressed on a case-by-case need basis. There have been no legislative concerns with permitting this session.

In ND we do not promote locating utilities in the right of way. Agree with comments that a national standard on this is unlikely.

This would be a very important piece of research whereby TxDOT could address a pressing issue and come to learn of
the practices used by other DOTs to generate revenue from use of the highway right of way.

- "Recently a state statute was passed requiring/allowing VTrans to seek compensation through lease or rent from broadband communication providers occupying highway rights of way. This, to my knowledge, is not taking place yet, but with the number of broadband providers occupying our right of way along with the increasing interest from small cell tower owners looking to occupy the right of way, this research could be incredibly useful to the Agency in the very near future."

- "To me it looks promising. VDOT Property Management staff felt VDOT could receive some benefit from participating in this. Needs to incorporate reference to wireless installations and recent FCC actions with regards to allowable charges.

- We would give this a 10 if that were an option. This would be immensely helpful to WSDOT and many other DOTs particularly if it results in creating actual valuation methodology that can be adopted nationally.

Item #42: Combining Compost and Phosphorus Sorption Media into a Homogenized “Mix” for Stormwater Treatment

Special Committee on Research and Innovation

- This research would provide another Bio-sorption Activated Media (BAM) to consider for stormwater treatment. The real concern is the longevity of the BAM mix and the efforts required to maintain this design approach. Similarly, it would be helpful to know the environmental permitting aspects of this product as part of the research work. This work would be beneficial to the Florida Department of Transportation.

- [Rating: 1] This project is another example of creating another form/type of BMP by changing the composition of another existing BMP. $400-$500K for a research project of this sort is not a high priority when some State DOTs are not utilizing any form of basic BMP properly.

- Phosphorus adsorbing material for stormwater treatment could be very valuable for impaired waterways and those that suffer from toxic algae blooms.

- Would allow for increased treatment of stormwater runoff and have value to most DOT

- Utilizing compost amended soil mixes on inslopes, or basins/underdrain systems have been one of the most cost effective practices we have. I have always suspected and has recently been verified that compost will degrade and become a source of phosphorus. We need this study to amendments to mitigate this impact. I would hope that as they do this they test for the effect these amendments on fertility. Sustaining a viable vegetative cover, especially on inslopes is critical.

- Agree with NCHRP Eval - opportunity to develop innovative and useful approach but likely to require considerably larger budget and longer study duration. Hydrology is very supportive

Research Advisory Committee

- May be helpful in other states. Not currently an issue for ADOT. Phosphorus is not a key pollutant at this time.

- No comments

- Soil amendments have numerous benefits and help reduce right-of-way acquisitions for large traditional SWM facilities. Quantifying the benefits of phosphorous sorption soil amendments in swales, fore slopes and other green tech BMP’s will provide significant SWM cost savings in the future.

- This is a good idea, however its applicability in an urban setting will be limited

- Great study idea, well needed and should have a wide impact. Would be nice to have an accepted DOT mix.
Summary of Comments

10-Jun-19

Reviewer Comments

Distribution of Ratings

- It is not clear this is an important issue.

- Phosphorous is a major target nutrient affecting waterways in Massachusetts. It is challenging to remove from the environment. Proven technologies for improving phosphorous capture would be useful. Many questions remain as to feasibility, costs, life-cycle, and potential environmental effects would want to be addressed.

- Cost effective storm water treatment is in high demand.

- Question the proposal (does it make sense to introduce one toxin to clean another and then have to clean both). Also too much maintenance is involved.

- This seems to have merit if it can result in a compost treatment material that can be used in areas where currently prohibited due to Phosphorus TMDL limitations. Important topic. Will help NCDOT gain an additional BMP through economical means

- The main deterrent for the use of compost is nutrient loading so a mix that prevents that would help tremendously.

- Numerous studies done in the past

- This seems like an interesting topic. Assuming states are in need of finding a way to reuse their compost, a material like this could provide a cheaper alternative to the media that is currently in use. That being said, you would be placing a large source of nutrients directly into a system that is designed to treat it. Even with an adjusted mix of material this could decrease the service life of the material.

- Compost effectively treats stormwater for many pollutants and can increase infiltration on highway embankments, but it also exports phosphorus so compost shouldn't be used if discharging to a phosphorus impaired waterbody. This research seeks to find ways to continue to use compost, which is an effective and inexpensive BMP (Best Management Practice), that will minimize the export of phosphorus.

**Item #43: Crash Modification Factors for Intelligent Transportation Systems (ITS) Applications**

- Would be helpful for ROI for ITS; some B/C info already exists.

- [Rating: 4] The research should also include a global scan to synthesize and more completely frame issues that will assist in future efforts to develop CMFs for a broader set of ITS and traffic management applications. There are examples from Iowa and Colorado where there are serious attempts to develop safety performance functions for connected and automated vehicle technology implementations. There are already some ITS items represented in the CMF Clearinghouse, but those are often regarded as low confidence. However, the proposal might underestimate the budget and schedule to develop CMFs for the set of ITS strategies listed.

- This is very much needed in the industry. Of several topics presented to the AASHTO CTSO committee last year, it was selected by them to be moved forward.

- Needed

- Much of this research has been previously completed

- Would allow us to have better understanding of ITS benefits. Submitted and supported by CTSO; increase funding

**Research Advisory Committee**
Summary of Comments

Reviewers' Comments

- It will be a challenge to tie a safety impact directly to an ITS device.
- No comments
- While worthy of research to (1) have a central repository of the information and (2) make more ITS centric projects eligible to utilize different fund sources (i.e. Safety) it's not an area that I'm very familiar.
- Should include queue detection systems as well
- Distinguish between location specific systems and network systems such as RWIS.
- Developing CMF's for improved B/C's is good for directing safety funds to the more deserving locations.
- I think there are too many variables involved that reliable CMFs would not be realistic especially for ITS applications.
- This would help us look at our ITS investments using more of a safety first approach.
- There is a high need in VA to have CMFs for many of the more common ITS treatments listed (DMSs, CCTV, RWIS, etc). This is a frequent question we received from TED and Operations, and right now there is no statistically reliable data that can be used to estimate the benefits of proposed projects. I agree with reviewer comments that budget and timeline may need to be increased to make this more useful. CMFs for the “commonly deployed ITS applications” listed in the problem statement are generally lacking. The project will address an important need.
- WSDOT and other agencies are looking to ITS as the first tier approach to solve safety problems. This research will inform the safety benefits of ITS by quantifying the reduction in crashes. This will help justify decisions to fund ITS or not (specifically looking at speed cameras, red light cameras, RWIS and dynamic message signs). Credible CMFs don't exist. This research will focus on this and report results to the CMF Clearing House.

Item #44: Organizational and Operational Models used by State DOTs for Emergency Response

Special Committee on Research and Innovation
- [Rating: 3]
- Would assist in more consistent and effective emergency response.
- The proposal is strong but the cost may be too high for the value/need. TSSR's #2 priority.

Research Advisory Committee
- No comments.
- The models would ensure a standard across the country and assist in providing a starting point for new programs.
- This would use the elements in SP-01, to develop protocols/procedures and the subsequent training and exercises to best position all responding entities, including DOT, to be best prepared to address future threats and to continually update their protocols/procedures to stay as current as possible. As with SP-01, the result would be saving lives and money.
- Maryland has researched how to optimize Emergency Response Team patrol routes. However, additional research on best practices, case studies and enhanced models would aid in better incident management strategies/methods.
- The research could help provide guidance on structure and processes that would benefit MoDOT by providing best practices and options related to internal operations and ESF-1 functions.
■ Clear understanding of other organizations and interactions between everyone.

■ Moderate interest in this subject. TxDOT regularly reviews and updates Emergency Management Plans. Communication with other state DOTs on this subject is already occurring regularly at various meetings.

■ ‟This study tries to evaluate the practices implemented by state DOTs and could be a supplement to NCHRP 20-59(51)B. The funding requirement seems high for this project.
The topic is important and the results would augment the purpose of related NCHRP projects, however, the $6000,000 for 18 months is a high price tag for a survey and case studies of best practices.

■ Much of this work has already been done. They will be takeaways that we can use, but we know that every state is organized differently and has different legal requirements and oversight.

Item #45:   Facilitation and Coaching Support for the 50 States  
20- 59(49)  Exercise  

Special Committee on Research and Innovation
■ More locally focused and may be hard to address all 50 states
■ [Rating: 3]
■ With some new leadership in place, this could be an area we may want WYDOT to focus on. Why isn't this under 20-44?
■ Important next step to support Council on Active Transportation.

Research Advisory Committee
■ High scores from our Maintenance rep
■ Continue funding.
■ Providing a process to test transportation response capabilities is always a benefit. Being able to use scenarios that are already developed is a big benefit as well.
■ This project looks to have more applicability to local governments. Over the last one or two years, this subject has lost some momentum. I think this project will have a difficult time delivering the product to all 50 states.
■ MoDOT is already strong in this area and does not see a major benefit from this project.
■ Transit has a big piece of any emergency response program. No issues with how this is written.
■ Learning in exercises comes during the development of the exercise. The out of the box exercise provides participant with limited learning and does not force them to take a hard look at their capability that having them participate in the planning process does.

Item #46:   The Efficacy of Emulsion-based Rejuvenating Seals  
D-04  

Special Committee on Research and Innovation
■ Florida has studied the effectiveness of pavement preservation technologies at the life cycle cost analysis level, and with a few exceptions, can demonstrate that they are not as effective as the mill & resurface for longevity, the current standard for RRR in our state.
■ Supports FHWA TAMP requirements.
Summary of Comments

10-Jun-19

Reviewer | Comments
--- | ---

■ [Rating: 1]

■ If this can be done efficiently, then it would be very important to our pavements.

■ Supported by Materials Program.

■ Considering the relatively higher cost.

■ not clear how researcher will quantify ability to rejuvenate pavement

■ Not used by Department

■ Low priority for MN

Research Advisory Committee

■ no comments

■ This work might result in a good, cost effective way to preserve our asphalt pavements.

■ This is needed!

■ We already have plenty of information on this.

■ Could be used more if this research is productive.

■ NCDOT has limited experience with these. Could be beneficial. Budget seems high.

■ This research is of interest to M&T. We are also funding a similar project at the NCAT test strip. There are many of these products but very little information on how to test their effectiveness, so this is needed.

■ “Rejuvenators in general are a controversial topic within VTrans due to conflicting scientific evidence on whether they are truly effective in slowing the aging rate of our asphalt pavements. With the current amount of recycled materials, it’s likely there would be no net benefit based on most literature that is available.”

■ Comprehensive information about the effectiveness of rejuvenating seals is lacking, while the number of products on the market continues to increase. A non-biased review of these products to determine if they actually work along with purchase specifications would be beneficial to agencies.

Item #47: Impact Performance Assessment of Barrier

C-13 Performance at High Speeds

Special Committee on Research and Innovation

■ A trend towards higher operating speeds nationally suggests a need to evaluate traffic barriers that can perform at high speeds (i.e., greater than 62 mph). It is also apparent that W-Beam Guardrail, which is the most popular barrier option, has reached it’s apparent design limits under MASH-16 TL-3 and that a new generation or modified version would be needed for more severe impact conditions. This project would help identify possibilities for the attributes of this next generation system.

■ Although Georgia’s posted speeds on rural interstates are 70 mph, in most cases the majority of vehicles will exceed the posted speed. The C-13 abstract and preliminary data from new NCHRP 17-43 crash collection analysis indicate that the new 85th percentile impact speed is 77 mph for posted speed limits of 70 mph and up. MASH tests are based on a 62.2 mph impact speed (85th percentile) obtained from NCHRP 17-33 crash data collection from the late 1990’s-early 2000’s. This number may be getting obsolete and a higher impact speed for testing required. Research data based on higher
posted speeds would help determine if barriers are performing adequately for current posted rural interstate 70 mph speeds (and possibly future higher posted speeds) and associated vehicle fleet characteristics.

■ [Rating: 1] This would need to be in association with a proposed update to MASH.

■ Wyoming has adopted many speed limits of 80 mph. It is important to evaluate whether current barriers will function at those high speeds.

■ The sixteen states should consider a pooled fund

■ testing at 62 mph should cover additional speeds being noted here; we have not raised our speeds to 75 mph

■ #3 by Committee on Design. #2 on TCRS’s list. Suggestion to include development of a new MASH Test level.

Research Advisory Committee

■ Not relevant to CT. Max speed limit is 65 not 75.

■ The cost of creating a 70-75 mph crash test standard and developing hardware to meet it would be disproportionate to the number of roadway miles that operate at that speed. Analyzing the impact of higher speeds on current barrier systems will provide additional information on ways we can ensure we requiring the correct roadside hardware.

■ The point is valid that our existing speed limits do exceed the current testing requirements for barriers.

■ Not applicable to MO. We don't have 75mph facilities.

■ Concur the speeds required for testing are not representative of travel speeds in many applications. It would be valuable to understand the performance of barrier systems at higher speeds

■ An analyses should be conducted to determine if there is a need for this research. Crash Testing covers such a small portion of real world scenarios, the states that have higher speed limits should review if the crashes involving barrier and other roadside devices are performing adequately before trying to develop new crash test

■ ND is a high speed limit state and knowledge of performance beyond the 62mph MASH design impact would be of interest to us.

■ This is a fundamental issue with MASH and we need to know the effects of higher speeds.

■ Perfect timing for this research

■ Very important research needed in this area because many roadways nationwide have higher posted speeds than the maximum speed currently crash tested at under MASH; i.e., 75 mph and 80 mph.

■ Current testing standards are meant for 62 mph speeds. The objective of testing the structural performance of barriers at the higher speeds is welcome, and the funding amount and period of time seems adequate. The proposed work address an important gap in barrier system design. The project has potential to greatly enhance safety on higher speed roadways in several states.

■ The decision to raise speed limits has not been uniform. We are already testing the physical limits of current systems with MASH. The potential in increased cost of implementing more robust systems is not a reasonable allocation of scarce resources and has not been well thought out.
Item #48: Structural Design Methodology for Cured in Place Pipe (CIPP) Liners in Gravity Stormwater Conveyance Conduits

Special Committee on Research and Innovation

- Research would be good, as this is very supplier dependent now

- The need for this research is well presented and we concur is a very valid need. This is a common drainage rehabilitation technique that has been implemented due to the lower cost and ease of installation but more structural information is needed. Budget seems high.

- [Rating: 4] This research recognizes lack of guidance for an increasingly used rehabilitation technology. CIPP allows reuse of current drainage conduits and culverts without associated loss of traffic volume or (when compared to other methods) environmental impacts.

- There are many rehabilitation products claiming structural strength yet go beyond what is listed in ASTM specifications. Data is needed for pipe diameters of 18-48 inches.

- Design methodology is a need across the country. Like other DOT’s Washington is experiencing more and more culvert lining needs and the ability to use the latest and greatest technologies are increasing. Having a consistent design methodology including performance based approaches are essential for long term success.

- Comm. on Design’s TCHH is supportive.

Research Advisory Committee

- This Research Needs Statement is identified by the Connecticut DOT as a high-priority and high-interest research need that we see as an excellent fit for addressing through the NCHRP Program. The result of the study should be to provide AASHTO LRFD Bridge Design Specifications (the creation of a section within Section 12 – Buried Structures for CIPP Liner Design or capacity determination). The specification should address longterm material properties of the liner to be used in design/capacity equations (similar to Thermoplastic Pipe). The pooled fund study that Ohio is doing for sprayed cementitious linings in pipes should also be identified as a reference. Perhaps the new section in AASHTO could address both types of cured in place liners.

- Overall, the proposed study will help address anticipated research needs of interest to MassDOT and could benefit DOTs and other transportation planning communities around the country. The proposed study is appropriate for NCHRP. To my knowledge, this study is not going to duplicate the efforts of others and there is a high probability that the research study will produce a well-defined, implementable product.

- Specified design standards would benefit the state with repairs.

- Not widely applicable.

- Would recommend inclusion of verification of new design methodologies for non-round shapes that is expected to be published in June 2019 in an ASCE Manual of Practice for CIPP. Soil box testing of pipe treated with CIPP liners would be expected to be a significant component of this research combined with finite element modelling.

- Improved national guidance on this would be helpful. It does seem to be an urgent concern for NCDOT’s efforts to rehabilitate cross-drainage pipes statewide.

  We are implementing a new SP and this would be timely research as we start to see effectiveness/deficiencies and further needs

  Budget is way too high for testing only one technology. Let Florida do their own research.

  A national standard is much needed. We have LOTS of aging pipe in the state.
Pipe infrastructure is aging and this would probably be of use to most DOTs.

More of a maintenance item, but Hydraulics Section should be included in the mix.

Design methodology is a need across the country. Like other DOT’s Washington is experiencing more and more culvert lining needs and the ability to use the latest and greatest technologies are increasing. Having a consistent design methodology including performance based approaches are essential for long term success.

Item #49: Guidelines for Incorporating Maintenance Costs into a Transportation Asset Management Plan

Region Priority, tracking of assets and cost is very important for DOT future activities and asset management.

Better as a synthesis.

[Rating: 4] Some related research work has been done by FHWA on this subject, but not specifically addressing maintenance. As the requirement of TAMPs mature, and states develop their own to include more than roadways and bridges, and advanced asset management systems (such as BIM for Infrastructure) are used, research efforts such as this one will be useful to stakeholders.

Iowa agrees with the AASHTO Staff recommendation that this effort should be combined with the 08-109 (TAM Guide Update) effort to provide some general guidance on this important topic. There is so much variety in how states use their force-account maintenance and what data systems they have that it seems unlikely that any research could provide more than high-level guidance about best practices. Therefore it would be better to add this funding to the existing TAM Guide project.

This is premature, there are already several studies of the existing TAMPs, let us see what they develop.

This would be helpful in the development of TAMPs and STAMPs

NHDOT struggles to incorporate maintenance costs into lifecycle analysis. This would be helpful.

A needed step towards making holistic transportation investment decisions and tradeoffs. I feel as though this is a fairly straightforward concept, but of course I would welcome any additional guidance on the TAMP. It states it was the highest ranked problem statement by the Pavement folks with AASHTO Committee on Maintenance, which gives it a pavement focus. I would like to see other assets as well to make this valuable. Strong AASHTO support; if selected combine with the TAM Guide update.

Research Advisory Committee

This study could provide a valuable framework of how to incorporate maintenance costs into the TAMP.

Connecticut struggles with capturing maintenance work by individual assets never mind maintenance costs. We are currently pursuing a Maintenance Management System that identifies work by asset id. We have an idea of how we want to incorporate costs but guidelines for such would be beneficial in our MMS setup.

the concept is definitely something that needs to be developed, but I don’t see the findings from the study as being more than “we need more research”. States with more advance data collection and integration will be on the cutting edge, but I think they are still in the development stage so I don’t see much, if any, benefit coming from the first 4 tasks that couldn’t be determined in a quick survey or a discussion at the annual asset management meeting. I think there is a lot of potential benefit in using maintenance costs in prioritizing projects, I think a “what to collect and how to use the information” study would be more beneficial than the objectives listed.

Research is needed in this area for maintenance costs but the research objectives need to be revised. State DOTs need
best methods and practices to identify, allocate, and track maintenance costs associated with various assets. Until that is accomplished, learning how to include that in TAMP cannot be achieved. Another challenge is the source of maintenance funds. It is always state funds. Research that looked into limiting factors for federal funds for maintenance activities, would be helpful.

- With MDOT’s implementation of TAMS, maintenance data is linked to a location making it easier to track maintenance applied to specific pavement sections or bridges.; This is one of the top ranked projects for Michigan.

- This would create standardization between states on how asset management and maintenance costs are incorporated. We would like to see more examples to assist us in our internal efforts.

- Would be interested in participating in this effort. Tracking true maintenance costs is an issue nationwide, and NCDOT is interested in improving our efforts in this area.

- Concerns about time frame and including in TAMP

- Clearly important but NCHRP reviewer identified related work that is currently underway. Perhaps modifying the scope of that effort is a more efficient approach.

- WSDOT is currently struggling with including Maintenance costs into long term planning models and as such we are missing the opportunity to communicate the total investment needs of the agency. This guidance would be very beneficial in our effort towards State of Good Repair.

### Item #50: Experimental Implementation of Big Data Analytics for Traffic Incident Management

**G-06**

**Special Committee on Research and Innovation**

- Suggestion that this could possibly be combined with G-06, G-16, and G-23

- Budget seems high. Objective is stated as, “feasibility and practical value of the Big Data approach to improve TIM.” Why only TIM? The concept applies to all aspects. Tasks are clearly stated but data on Big Data are quite challenging, especially with TIM. Initial Lit. Review should focus on practical items out there to see where the datasets exist. Implementation support should extend beyond peer exchanges and workshops. There is a need to mainstream the collection of uniform data, consistently to get maximum ROIs.

- GDOT looking at similar work; concern re: implementation.

- [Rating: 4] This project will take advantage of emerging data science techniques. It also draws from needs found in several states and their data. It will also be sensitive to diverse data sharing issue, inherent in video footage. This could be a future cost-saving approach and should dovetail or be the next generation of tools produced with Exploratory Advanced Research support.

- This would have been rated higher except it seemed too much reliant on DOT storage of data.

- Understanding what sources are available and how to potentially work with them would be very helpful.

- We need data scientists at MnDOT who know how to handle all the information that is being generated. This seems to be an area that MnDOT needs to use more. Some interest but not a high priority. Starting to use big data by purchasing 3rd party data. Submitted by CTSO and TRB TSMO; good support from FHWA and NCHRP

**Research Advisory Committee**

- Developing a consistent and collaborative environment for TIM data will be important, as there are so many agencies collecting data during an incident. Transparency and security of sharing data will be of concern to all stakeholders.
Summary of Comments

10-Jun-19

Reviewer

Comments

■ No comments

■ we recognize the benefits of big data but we do not currently have it available. We still wait over 1 yr to get data and have paper copies

■ MDOT has a large amount of data that is siloed in nature which could be better leveraged throughout the Department. Some of this data purchase or receive 3rd party data that is just used by one business area. This would be interesting to see what data sets are integrated to meet different use cases. This could also tie into the SLRTP performance measure activities; Leveraging TIM data ideally could save in data collection costs

■ Rated low because incidents in ND do not trigger massive backups/congestion.

■ Crowd Sourcing, weather, and other data sources are becoming more critical.

■ Two years is too long. This is a heavy IT/information management initiative that is already being worked throughout several disciplines in the nation/DOTs. This topic is too complex and will differ pending the existing data environments. There are several initiatives underway that focus on advancing in an already existing space.

■ "Provided the report defines specific and relevant improvements this could be very helpful. In rural states, the majority of travel unreliability is due to incidents, so improving TIM is the best approach to greater travel time reliability."

■ "It's not that critical topic to me because anything can be put on XXX ""The objective of this project is to demonstrate the feasibility and practical value of the Big Data approach to improve XXX."". It's just Big data project. The demonstration of Big Data approach could be useful for the future implementation by state DOTs, but this effort looks like it will have significant overlap with NSF TIMELI project. The budget seems high for this project.

■ There is a need for this type of research but the objectives seem a bit vague to me. TIM operations can be somewhat improved through the analysis and application of big data but I feel the greater gain is identifying how the associated congestion management is addressed as opposed to solely focusing on incident management. It is unclear if that is what the proposers have in mind. Also, successful TIM practices are all about partnerships with other responders. It is unclear if this project will work to enhance those partnerships.

Item #51: Protocols for the Continuous Pavement Deflection Measuring Devices: Calibration and Structural Assessment

Special Committee on Research and Innovation

■ There is a very few service providers, all using different and still evolving approaches and technologies. As such, the proposed RNS may be a bit premature to be of value.

■ [Rating: 5] There is significant interest and need among State DOTs on the use of traffic speed deflection devices for network level pavement structural assessment (17 have already signed up for recently initiated VA DOT led TPF) but there is lack of guidance/protocols for equipment calibration, data collection and quality assurance. This effort should focus on filling that need. The Phase I duration is too short. There are questions to be had with respect to implementation planning. Should the potential Contractor be asked to provide a demo project plan, which will be a critical implementation piece.

■ Developing standard procedures and protocols would be great for CPDDs, TSDs, RWDs, etc. data collection, calibrations, etc. This will be very useful for roads pavement management and may also be valuable for airfield pavement management.

■ Deflection measurement could be another tool for evaluating roadways on the network level.

■ objectives not clear
Summary of Comments

10-Jun-19

Reviewer | Comments
---|---
Not currently used in pavement evaluation by Department
Suggestions for a reworked scope. Med. priority for MN

Research Advisory Committee

- no comments
- support with agreed changes
- This research fits in with the TSD pooled fund project our DOT is in. It would be good to have a set of protocols to follow for the data collected.
- Already involved in similar work under pooled fund with VTTI.
- Important topic, but there is a Virginia led pooled fund study looking at a lot of these issues already. . .this may duplicate some efforts.
- Agree with FHWA to focus on TSDD instead of CPPD.
- TSDD pooled fund is also looking into this, great if we join forces.
- Eventually continuous pavement deflection measuring devices will replace falling weight deflectometers, because of the vast improvement in data collection rates and increase in safety of operation (no temporary lane drops). So developing calibration and structural assessment procedures will be necessary.
- Not widely used, but will be in the future.
- There is a current pooled fund project related to traffic speed deflectometers, but it is geared toward giving states a chance to try out the technology. A more systematic approach to defining accuracy and analysis tools is needed and could be provided by this project.
- I agree with the FHWA comments, there have been several studies by SHRP-2 and pooled fund studies. The scope should be changed to standard procedures for QA/QC of TSDD for highway agencies.
- "We are participating in the pooled fund study 5(385) for this."
- The topic is highly valuable but the approach taken by the developers of the research statement make it low priority. They should not be tying it to FWD testing.
- Deflection measurement could be another tool for evaluating roadways on the network level.

Item #52: Utility Conflict Impacts During Highway Construction

C-08

Special Committee on Research and Innovation

- Utility conflicts are a costly item for DOTs, this research would be valuable for capturing accurate underground data
- This is an issue that has needed to be addressed for many many years. We have SUE but nothing is being done to improve utility record keeping and information management. Old systems, old methods, and therefore poor and unreliable data. The opportunity exists with technologies and modern management systems to do something better and sustainable that will build ROI.
- [Rating: 5] Potential to combine with Problem No: 2020-C-06. Developing a catalog of best practices for managing utility conflicts during construction by including and leveraging usage of emerging technologies (RFID, location data
Summary of Comments

10-Jun-19

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<td>capturing, and BIM/CIM data) would provide value to the construction industry. This is of high priority and will help DOT's build a business case to improve their utility programs.</td>
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<td>This research is important because: 1) Utilities are considered one of the top causes of cost increases and time delays for highway projects. 2) It covers several gaps listed in the FHWA’s National Utility Review report. 3) Better data would show that utilities are not one of the top causes of cost increases and time delays, even though they are being reported that way.</td>
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<td>The Iowa DOT has developed a guide to help manage the utility coordination process during project development, but not during construction. There is a lack of guidance and tools available to assist with managing utility conflicts during the construction phase and I would support the development of a “Best Practices”. This effort fits well with Problem Statement C-06.</td>
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<td>With our agency in maintenance mode, conflicts are limited. Larger states will have more issues. If these do go through, combine C-06, 07 and 08.</td>
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<td>This research has been done a number of times</td>
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<td>dealt with in precon or constr phase</td>
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<td>Most of the anticipated conflicts should be addressed prior to bid. After bids it all depend on the specific situation for resolution. Not sure any research is going to change that.</td>
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<td>High support by all.</td>
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<td>Research Advisory Committee</td>
<td>Agree that this is a current and continuing problem that has high construction impacts nationwide. Of particular interest is point of delivery inspection and how that impacts schedule.</td>
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<td>This is a hot topic but needs to be a local effort.</td>
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<td>This Office would like to Risk Sharing where the utility pays for the LD’s or the states take credit from the agreement balances for all time overruns.</td>
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<td>Managing underground utilities is the most difficult task of the assets in our ROW. Knowing where underground utilities are located offers perhaps the best return on investment for design, construction, maintenance and operations activities. Developing methods to capture the data during placement of the utilities is the most cost effective way to locate and attribute the utilities for asset management purposes.</td>
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<td>Of great interest and potential benefit</td>
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<td>Utility relocates are probably single biggest cause of construction delays. If this research can come up with a solution(s) or ways to reduce the impact it would be extremely helpful.</td>
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<td>Utility conflicts are a part of our business process. New and better ways of dealing with these conflicts can lead to more efficient project delivery. Utility companies are generally not getting utilities relocated before construction starts so more often the relocations are being done during project construction.</td>
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<td>A best practice catalog for managing utility conflicts during construction would be useful information. This is a pertinent issue with projects in ND.</td>
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<td>We have many issues with utilities on current projects. This issues delay projects and cost the state more dollars. This topic would benefit the state greatly.</td>
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|          | Seems to highlight the issues brought to light with the Damage Information Reporting Tool (DIRT) report, and takes
lessons learned from SHRP2 and R15B. Could be combined with C-06.

- "This could be useful but we have started developing procedures to better record new and relocated utility infrastructure associated with VTrans projects."

**Item #53: Handbook for Sustainable Roadside Stormwater Infrastructure**

**Special Committee on Research and Innovation**

- There is a lot of guidance on types of BMP, but not much guidance on maintenance and operation.

- [Rating: 1] This seems like another effort of having a stormwater BMP handbook. There are many such handbooks out there that don't just focus on “conventional piped drainage and water treatment systems.” Green Infrastructure is also now defined in the current Federal Water Pollution Control Act.

- What is needed are standard details and specifications that DOTs can use for construction documents.

- Design standards are needed.

- This could be done as a synthesis project.

- The Background has all the buzzwords; climate change, resilient and sustainable, and Green Infrastructure. It is assumed from this that it is stormwater quantity that is the focus, yet most of the literature cited addresses quality. Those of us that have to address stormwater quality have more than enough handbooks, were all set. I agree with FHWA, Santiago's comment. As for quantity, a national handbook is of little use given the wide variety of hydrologic conditions.

- Supported by 2 AASHTO Committee and NCHRP evaluators and TRB AFB40 but not FHWA evaluator as a need. A useful problem and approach. CES's #3; CoD TCHH also supportive.

**Research Advisory Committee**

- No comments.

- This is an area where we are very much engaged and would like to see FHWA participate in the retrofitting of our existing roadways with GI.

- Valuable proposal that should be useful to all DOTs. Similar manuals/handbooks exist for municipalities but a DOT specific version would be useful.

- There is considerable interest in sustainable roadsides.

- MDOT is working on updating it's stormwater BMP guidance. This guide could help. Resilient stormwater systems will continue to be an issue.

- There is already a lot of information out there on green infrastructure especially in urban areas but research for methods on all roadside situations could be helpful.

- A wide range of climates and topography will have to be considered to be an inclusive handbook.

- This seems to duplicate what the above Climate Change Information to H&H Design study has already addressed and nearly completed. Important topic. High cost no doubt for testing. NCDOT's practice is to place these items outside of clear recovery areas. If develop to full research proposal, also include pedestrian protection for open-ended pipes such as slope drains.

- This subject is not a focus ND, at this time.

53
Summary of Comments  

10-Jun-19

Reviewer | Comments
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Could help to lower maintenance costs in pipe drainage systems.

The development of a handbook like this would be useful for designers, however, there is still work to be done to evaluate the effectiveness and service life of many LIDs currently in use. Also, there are many region specific factors that must be accounted for when selecting which LID to use. Because of this many states already have handbooks similar to this.

WSDOT stormwater supports this research but our Highway Runoff Manual probably fills most of this need in WA.

**Item #54: Construction Specifications for Pavement Treatments – Slurry Seals and Tack Coats**

**D-05**

**Special Committee on Research and Innovation**

- Supports FHWA TAMP requirements.
- [Rating: 5] This is much needed work to go along with related chip seal and microsurfacing specifications recently adopted by AASHTO.
- Improvement in this area could help us and other states.
- Supported by Materials Program.
- The cost is low, but the treatments are popular.
- disagree with need for national spec
- We don’t use slurry seals but tack is very important for our thin HMA overlays
- Not strong overall support and lower priority for MN.

**Research Advisory Committee**

- no comments
- it has been observed that lack of specification in this critical pavement treatment method has caused issues and problems for industry and agencies.
- Currently Missouri does very few slurry seals, but this research could improve the quality of the preventative maintenance treatments.
- We have these specs, is "Tack Coats" a typo in this title? Maybe Seal Coats
- I believe most states have these. It is not clear to me than national standardization is needed. Needed. These specs need to be update and brought to full standards. Reasonable budget.
- I don't see that this issue needs much research spent on it. Pretty much all states already have specifications for this. Nationalizing them is a nice goal but there are other priorities.
- This seems to follow in the steps of recently completed work on chip seals, microsurfacing, and fog seals, and would be complementary and useful work to continue improving pavement maintenance techniques.
- The cost is low, but the treatments are popular.

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Item #55: Guidebook for Identifying and Implementing Forecasting Techniques for Effective Target Setting

Special Committee on Research and Innovation

- This research would fill a gap in the current process.

- This is a critical project that can be leveraged at all levels of DOTs. Every DOT is dealing with, or will have to deal with, products of the 4th Industrial Revolution which will create challenges and opportunities in the business of transportation. Mapping out the key variables that will affect performance on transportation networks is a good strategy.

- [Rating: 5] This is a high priority as transportation organizations need better guidance on forecasting different investment scenarios in order to effectively establish targets. There is a new 2018 NCHRP 02-27 project "Making Targets Matter: Managing Performance to Enhance Decision-Making" that is in the RFP/source selection phase. There is overlap and synergy between this proposed effort and 02-27 and we suggest this be closely coordinated with and complement NCHRP 02-27.

- Now that all DOTs have been through one round of target-setting for the TPM measures, it would be good to better understand techniques to set targets in the future. I would like to see the resulting guidebook specifically address the concepts of temporality and especially uncertainty.

- This has wide-ranging applications

- Because state DOTs have different approaches to target setting this research seems to have limited value. In addition, the cost seem high for this type of effort.

- States have already completed the first round of TPM (October 2019). This also would have been more useful earlier. It is difficult to tell if the project will tailor the techniques to the TPM measures or provide broader practices. This would be most useful tailored to the TPM measures.

- May be of value to the MPOs. This research is focusing on short term target setting given federal requirements. I'm not sure this much rigor needs to be given to short term targets since even though they are required, I feel they are not useful compared to mid and long term targets. AASHTO CPBM's #3. COP's #6

Research Advisory Committee

- The proposal is fairly broad and open ended. More definition of the specific performance targets that would be focused on would make a better proposal.

- This Research Needs Statement is identified by the Connecticut DOT as a high-priority and high-interest research need that we see as an excellent fit for addressing through the NCHRP Program. TRB Committee ABC30 (Performance Management) voted overwhelmingly to list this project as its No. 1 RNS at the mid-year meeting. The AASHTO Committee on Performance Based Management likewise highlighted this RNS at the AASHTO Meeting in Atlanta. There is a high potential for an implementable product that the CTDOT can use in the short term but that at the same time has high long-term value in the Performance Management Field. With National Performance Measures and associated target-setting responsibilities to DOTs, being able to forecast performance is fundamental to setting achievable and reasonable targets. (In the interest of disclosure, CTDOT developed this research needs statement through participation in TRB Committee ABC30 and the AASHTO Committee on Performance Based Management.)

- Support review comments from FHWA and NCHRP on broadness of topic and overlap with other work

- Very relevant to TPM needs. Identified as a gap in TPM the process.

- Might be helpful in identifying performance forecasting
Summary of Comments

Reviewer | Comments
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- I don't feel like this is necessary from the NCDOT perspective. The processes used to set our PM targets as straight forward and repeatable year of year.

- Forecasting future performance is extremely important, because of its impacts on both public relations federal funding flexibility. However, under the current regulations, one method to mitigate the risks is to choose targets that are easy to reach, which may not always be an option and can carry its own public relations risks.

- This problem statement was developed based on research needs identified in the AASHTO Transportation Performance Management Research Roadmap, and through regular member feedback on the need to develop greater consistency across the transportation industry with respect to forecasting performance targets.

- The topic is very important. VDOT is struggling with target setting and forecasting of the new Federal performance measures, especially in the reliability area. But the scope/description is not tight enough right now. $500K for 2 years seems very high. Agree with Pete Stephanos' and Lawrence Goldstein's comments. Important and timely topic. It could be a supplement to NCHRP 02-27. “A procedure that can be applied to any performance measure” seems too broad. This problem statement seems to want to offer something to everyone who has ever forecast anything. Unless it focuses on a more specific “stovepipe” within transportation, I fear it will be a systems engineering exercise that no one can easily adapt and apply.

- This research should specifically relate to forecasting techniques relevant to measures required by recent federal mandates and consider data issues that have been identified by the state DOTs. FHWA guidance on how state agencies implement forecasting techniques for effectively setting futures targets is of key importance to WSDOT and other transportation agencies and MPOs. This last round of target setting has been more of an art than a science given the fact that the FHWA provided data for the system performance measures was procured from two different vendors. Lack of consistency in historic data sources, formats, and information from emerging new technologies are challenges in setting targets. This guidance document (product of this proposed research work) would make an effort in the positive direction to help state agencies and MPOs with the evolving target setting needs.

Item #56: Supporting data-driven decision making through an expansion of the Human Factors Guidelines for Road Systems

Special Committee on Research and Innovation

- Deliverables/implementation needs to be solidified.

- [Rating: 1] The Human Factors Guidelines for Road Systems (NCHRP 600) represents a successful series with a Third Edition due out in 2020. The Fourth Edition proposed suggests new tools and practices across a broad spectrum of issues to include roadway users, infrastructure design and traffic operations. Further, the list of ten suggested activities proposed appears to be a series of activities to develop processes and procedures, define issues that need addressed, and identify the partners and stakeholders that should contribute to the Fourth Edition. Suggest the Third edition be completed before committing funds to the effort that remains relatively undefined other than to identify what research and products are needed. By the time the Third edition is published, requirements proposed may have altered considering the projected introduction of new technology into vehicles and the infrastructure.

- This research would help quantify and account for one of the most impactful and varied inputs into determining the relative safety or crash occurrence rate for a transportation system. Accounting for Human Factors and behavior is an area that really needs additional review, understanding and consistent application into project specific decisions.

- Process should continue

- This is a top rated project for the committee on safety and adds to the current HFG guidelines. The value of Human Factors in decision making is increasing in the current environment of data driven decision making

- HFG is very valuable tool for safety analysis; continued expansion of the state of the knowledge is vital
Summary of Comments

Reviewer | Comments
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Safety - #1: FHWA and NCHRP do not support at this time (next year may be better). Med. priority for MN.

**Research Advisory Committee**

- As bicycle/pedestrian crashes are a rising trend, incorporating bike/pedestrian facilities and roundabouts into the HFG would be an important research problem. High probability of success and great return of cost if successful, given safety emphasis toward bikes/pedestrians and increased use of roundabouts.

- Incorporating human factors guidelines for road system is necessary to develop an accurate and data-driven approach to road safety.

- Roadway agencies struggle in this area. See this as a tool that can go hand in hand with the Highway Safety Manual.

- Useful research, but not most pressing.

- Human interaction with the highway system varies with various age groups - good research

- As indicated in the proposal, human behavior is the major cause of most serious crashes; therefore, it follows that our crash prediction tools should consider the human factors in their computations.

- Both of these concepts have proven helpful in the past. Further expanding the support of this effort would help address behavioral issues as well.

- This project will expand the HFG to include “chapters on transit, older road users, etc.” These will be important additions. However, considering that the 3rd edition is not yet available, I’m wondering if work on this proposed 4th edition should be delayed until after the 3rd edition has been in use for a while?

- This is a top rated project for the committee on safety and adds to the current HFG guidelines. The value of Human Factors in decision making is increasing in the current environment of data driven decision making

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**Item #57: Development of Business Case and Communication Strategies for a State DOT Resilience Program**

**Special Committee on Research and Innovation**

- [Rating: 5] Resiliency is a major concern today, and should be at the forefront of transportation communications and business planning, as identified in the background. Integrating resiliency into the project life cycle is essential, and part of that is educating both leadership and the public, consistent with the NCHRP 20-117 recommended action. The Urgency/Benefits section clearly notes the lack of past research. As one of FHWA’s Resilience and Durability Pilot Projects, Caltrans is currently developing a statewide communications plan to disseminate data and results of their vulnerability and risk assessments within the agency. While the results of this research would have been helpful for their efforts, Caltrans' work could help inform this research.

- This effort should be combined with B-15. Communication and stakeholder engagement are part of the planning process.

- Communication strategies often are not accepted by practitioners

- Making transport system more resilient is a technical and messaging challenge. Strong support from FHWA. Supported by AASHTO/FHWA/NCHRP evaluators to address communication needs for building public support for SDOT resilience-oriented activities. Support from AASHTO with some question on overlap.

**Research Advisory Committee**

- Topic is State DOT specific and can be politically sensitive to achieve a national standard BMP guidebook. In addition - messaging is in its infancy - this effort may be too early following RISE conference.

- The resilience topic is becoming oversaturated with academic research, and not much practical emphasis.

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57
Summary of Comments

Ensuring that State DOTs are able to document and circulate best practices and lessons learned is a process that all successful organizations do on a regular basis. Having this process in place would save lives and money. Resilience will become an important issue in the future.

This topic is extremely important to implement now and applies to all states. Currently resiliency is seen by many states as an extra cost on projects and not the lower long-term cost as it should be. All taxpayers should want DOTs to consider resiliency on every project. However, it is tough now to make the case for decisionmakers looking at budgets in the short-term rather than the asset life cycle. We have less than 20 years before we'll see significant impacts from sea level change in MD so our time to adapt is already too short, this is critical to include now.

This is not a bad idea, but the research does not appear to address the risk based approach to resiliency, but rather a communication plan to inform the public.

We believe we’re already factoring resiliency awareness into our communications. We have a crisis communications plan in place, which is basically what this proposal would provide. In addition, best practices in communications crises are often shared among the states at the annual AASHTO TransComm conference. However, it might provide beneficial guidance related to integrating resilience into our planning and recovery processes.

Seems to be a marketing effort instead of a research effort

Important topic; but cost very high for synthesis (12 months, 150K is more appropriate); agree with Matt Hardy’s concerns (probability of risk should be used to keep costs affordable; possibility of overlaps with other ongoing projects)

To better address these issues at the national, state, and local level, we need to develop strategies that support each other.

Item #58: Upgrade Existing Traffic Control Devices for Connected and Automated Vehicles

Special Committee on Research and Innovation

Interesting topic but have concern about success.

[Rating: 2] This topic is very similar to an existing project funded by NCHRP 20-102 (15). In addition there is a project currently funded by FHWA Office of Operations IDIQ that is looking at similar elements called out in this proposal. Suggest looking at the reports/outcomes from these projects to find if there are any gaps that this project can address.

This research statement is not clear. There is an existing NCHRP study considering pavement markings. This proposed project may address other kinds of traffic control devices, but the objectives aren't clearly stated. It also appears to want to create a forum for DOTs and SAE to work together, but we're not sure this is the best way.

Seems like this effort should be funded/supported officially by US DOT / FHWA and not be relegated to request for funding from the IDEA program. Tesla CEO Elon Musk has said they have little faith in the governments to have perfect traffic control devices EVERYWHERE, therefore they are developing better sensing and intelligence that will be EVERYWHERE the vehicle is.

Premature

This is an issue that might be better consider with the AASHTO CAT/CAV related activities.

No committee support? - 20-102? - I'm not sure that the technology is set in stone enough o know exactly which types of traffic control device upgrades are needed - this makes me think of the DSRC vs. 5G debate in particular. This topic would probably help to establish which technologies are leaders and the upgrades they would consider, but I don't think any concrete answers could come from it.

Not a need from MN.
Summary of Comments

10-Jun-19

Reviewer | Comments
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Research Advisory Committee

- This will also require the update of the MUTCD (change from the traditional traffic control principle).

- Investigating and developing minimum performance levels for traffic control devices for reliable operation of CAVs is the first step towards CAV deployment in large scale.

- no comments

- Seems to be ahead of itself, and by the time it's finished will be behind.

- This research would be invaluable to DOTs especially during the transition period.

- Helpful research to know what technolgies could be installed that would be used and not obsolete in a short time period.

- This study would research what devices are critical for the success of connected vehicles and how often they need to be replaced.

- Critical before DOT decisions can be made.

- Directly effects Traffic Ops Division current endeavors

- Fairly expensive, and should instead be looped into machine readable pavement markings and signage projects. Signals seem to be fairly easy for Avs to sense. The design of minimum performance levels for traffic control devices is a good idea, but the study seems miss the "connected" point.

- This is a necessary, yet very complex conversation that is better suited for the NCUTCD or a Standing AASHTO Committee and/or CAT Coalition Workgroup.

Item #59: Model Procedures for Post-Event Bridge Damage Assessment and Engineering Evaluation

C-23

Special Committee on Research and Innovation

- It appears that this should be a synthesis to just gather information of what current states are doing, keeping in mind that the process will vary depending on the event.

- This research will give agencies a framework for developing emergency response plans tailored to bridges using best practices.

- [Rating: 4] This topic is much needed for addressing the needs in improving resilience of the highway network with focus on bridges. A small scale action may be insufficient to complete the course of the research leading to final adoption because of the breadth of the coverage and depth of knowledge involved. Recommended action to address this is to add more coordination with various disciplines including structure, geotech, hydraulic, environment, and emergency response. Connecting with other ongoing effort, scope of this project can be narrowed down to a final implementation effort. This topic is diverse enough that likely $300 K will not cover all potential damage modes. So, this project likely overpromises the outcomes. Additionally, the types of hazards require distinct approaches related to that hazard.

- UDOT has a current detailed manual for post-event inspection.

- It is better suited for a pooled fund project.

- As more structures are damaged due to vehicles, or natural events, this information would be helpful for accurate assessments.

- This would be valuable, particularly in the context of third party damage events, maintenance closures, and emergency...
Summary of Comments

10-Jun-19

Reviewer | Comments
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declarations.

- NCHRP Report 833 appears to have covered most of this previously. NHDOT staff attended a national presentation on NCHRP 833 and came back with the opinion that it was not particularly useful for NH. This appears to have even less value.

- COBS - #4; NCHRP also supports

**Research Advisory Committee**

- Relevant to Alaska

- Creates a model that will be hard to implement at the DOT level.

- This problem outcome may be interesting, but not expected to significantly change present procedures.

- Researching design options to reduce the potential of vehicle and bicycle crashes will be very beneficial in reducing fatal and serious injury crashes involving bicyclists.

- Hurricanes, flash flooding, and tornados have had devastating results in the past. Having this program would be useful in a catastrophic event.

- This research would help formalize procedures related to current emergency response planning currently underway with multiple state and federal partners. However, we are far from being able to implement such modeling. It would require additional FTE’s to implement and maintain.

- Frequent issue in NC. Could be a useful tool.

- DOT’s likely have established bridge inspection protocol - might be better to do a call for ”best practices” and compile the results for a lot less cost.

- “Vermont could benefit from best practice in reconnaissance and reaction to disasters as they occur. This research will flesh out best practice as it relates to reporting and fixing damage after an event. ”

- Emergency response procedures in terms of bridge/structural evaluation are likely to be so specific to state (or even intra-state) organization/hierarchy, that it will be difficult to come up with a one-size-fits-all strategy for dealing with such natural disasters. While there may in fact be a need for states to establish a response plan for bridges and structures, that need may be less an issue of knowledge of how to plan and more an issue of devoting sufficient resources to address the need. Funding period and amount are a bit excessive compared to other problem statements.

- Not sure about the importance and the benefit of a model procedure for post-earthquake damage assessment beyond what we have in practice

**Item #60: Safety Evaluation of On-Street Bikeway Designs**

**C-25**

**Special Committee on Research and Innovation**

- We are very interested in how to design separated bike lanes to be as safe as possible. It is important this research look at crash rates as opposed to crash numbers. Also what level of access management, bidirectional versus one way, and intersection design are of interest.

- Combine with C-29.

- [Rating: 5] Bicyclists 'feel' safer in these facilities but they don’t necessarily provide the anticipated level of safety for all users. An objective study is needed. The safety performance of 2-way bikeways is particularly controversial and the
discussion could be informed by this effort.

- This has been done over and over again.

- Believe the data will either be sparse, or so location specific so as not to help.

- While more valuable in the urban setting, questions the degree for Maine.

- This would be most applicable for roadways under municipal jurisdiction.

- Good research that is limited in its benefit for MnDOT, but could be beneficial for local road authorities. CAT - #3; incorporate C-29 into this one.

**Research Advisory Committee**

- Can this problem statement be combine with C-29?

- Combine C-24, 25 and 29.

- Moderate need as CT is implementing more of these facilities. Author claims no current research in the US, however it has been done in Canada and Europe. More detail should be explained how findings will be different as compared to Canada.

- Please incorporate C-26 & C-29

- This is an important topic, especially as more design guides are recommending various types/widths of on-road accommodations. A guide to assist designers on how to create safe bicycle boulevards would be beneficial by showing the challenges and benefits of separation from traffic. This would be important increase safety for pedacyclists.

- This analysis may impact the future of our bikeways. Design of bicycle facilities is likely to continue to increase. Having good guidance on the safety effects of various bikeway treatments is important.

- Such facilities are new to Michigan. This could assist the department in the evaluation and incorporation of such designs with the greater interest they have.

- Might be beneficial to our bike/ped guidance

- More areas are looking to this concept as a solution. Even though we don't currently have substantial bicycle concerns it would be could research to have for discussing this issue with advocacy groups.

- "I'm not sure how many protected bike lanes we will have in VT, but I would support this research for national reasons."

- Based on FHWA's comments, an ongoing FHWA study should answer this question to an extent. If this moves forward, it should be coordinated with C-24. Maybe this one focuses on SBL segment design, and C-24 focuses on (signalized) intersections. I agree with all the suggestions to incorporate C-29 also. Literature search list is a bit dated.

- Important topic to further build out all ages/abilities bicycle networks and lower Bicycle Level of Traffic Stress on the network. Research design should include consideration of intersection design elements beyond signs and pavement marking, to include protected intersection treatments (http://www.protectedintersection.com/). Please replace "impact" with "effects".
Summary of Comments

Reviewer | Comments
---|---

Distribution of Ratings

<table>
<thead>
<tr>
<th>Item #61: Safety Benefits of Lane Reduction on Major Urban and Suburban Streets</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Special Committee on Research and Innovation</strong></td>
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<tr>
<td>■ Balancing the effects on all users would be of significant value in making decisions to reduce lane widths.</td>
</tr>
<tr>
<td>■ [Rating: 5] Because the Road Diet Informational Guide is 5 years old, and there has been more implementation, there could be new lessons learned. Consider a title change to Safety Impacts of Lane Reduction on Major Urban and Suburban Streets, so the outcome is not prejudged.</td>
</tr>
<tr>
<td>■ There is a significant amount of information related to this practice already available for roadways that are reduced by going from a 4 lane to a 3 lane cross section. Further research on reducing from a 5 to a three or a 7 to 5 lane cross section would be beneficial. Other research problems present larger opportunities for new understanding and impact on roadway safety.</td>
</tr>
<tr>
<td>■ Low priority research for Wyoming.</td>
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<tr>
<td>■ This project might be good to bring together with G-11 and combine funding to the benefit of both projects</td>
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<tr>
<td>■ Valuable research to support road diets etc.</td>
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<tr>
<td>■ COAT supports but FHWA and NCHRP have concerns. MN supports.</td>
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</table>

**Research Advisory Committee**

- Can see potential application of 3-to-2 lane reduction, but reduction of 2-to-1 lane would be an exceptional case with potentially negative impacts for operations along major urban and suburban streets.
- Data to support or refute the benefits of road diets would be helpful. Providing CMF's for roadway improvement projects helps to accurately fund HSIP projects in many instances.
- This would be a "4" because non-motorist issues are important to us but also because this relates to 03-112. Can they be combined in some way?
- With PBPD having such research would support DOTs to apply system wide lane widths with minimal impact on safety thus freeing money to spend on other safety treatments.
- There is a lot of research into this area - not sure if more research would gain more useful knowledge for practitioners.
- There is concern about site availability (sample size). This is similar to road diets with the option of multiple configurations). Note that budget shown on this sheet is outdated; it is now $400,000. Better-defined than G-12 on a similar topic. Ongoing VTRC road diets study could provide some data and Virginia sites, and revised statement lists several other places that could address the concern about site availability. As noted in submitter response, big data options could assist; one example is StreetLight.
- This has been a big emphasis area and it would be very helpful to speak to the safety improvements or treatments required to improve safety.

<table>
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<tr>
<th>Item #62: Effects of Automated/Connected Vehicles (AVs/CVs) on Freeway Capacity and Operations</th>
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<tr>
<td><strong>Special Committee on Research and Innovation</strong></td>
</tr>
<tr>
<td>■ High Priority for region, as not much has been done to research effects to capacity</td>
</tr>
</tbody>
</table>

| Item #62: Effects of Automated/Connected Vehicles (AVs/CVs) on Freeway Capacity and Operations |
It is true that “Limited work has been done to estimate AV/CV impacts on freeway capacity and operations.” That said, it is unclear how this work will address this issue. The research objective is quite broad but does not provide any detail on how these objectives will be accomplished.

[Rating: 4] The problem statement effectively recognizes anticipated interactions between connectivity and automation technologies, and the need to evaluate their variable integrated effects on traffic flow and traffic operations. The research objectives are broad and desirable, but it is unclear what specific products or tools the project would generate. G-04 and G-23 should be combined. A prospectively integrated single problem statement should address the potential coordination with USDOT’s Cooperative Automated Research Mobility Applications (CARMA) as well as the USDOT-funded CAMP LLC initiative to evolve a Cooperative Automated Driving System (CADS) research roadmap.

This is the future. Research on CAV is critical.

Iowa DOT has done work in this area through the I-80 PEL study. A recommendation from the automated vehicle analysis we completed in 2017 recommended that other Measures of Effectiveness (MOEs) in addition or in lieu of Highway Capacity Manual (HCM) LOS be developed and considered in planning of transportation capacity improvements. This research is needed to make those adjustments to the HCM and address the current requirements by FHWA.

Premature

This research might benefit mid to long term traffic analysis and modeling efforts. Would also be beneficial to understand potential impacts of different saturation rates

No Committee support? - 20-102? - I think this is a high priority topic as 1. there hasn’t been much research or data produced on the topic and 2. the results could affect how we approach projects today. As CAVs begin to take over the market, it is very important to understand how they will affect capacity and operations. I rated this as a 4 instead of a 5 such that the data from existing technologies might not yet be expensive enough to get the most thorough results from the investigation. Until we know for certain how AVs will work, I believe this topic would end up being oriented more toward connected technologies than autonomous.

This would need to be overly speculative on real-world interactions of many CAVs. Interest in learning how future CAV will impact RTMC operations. No committee endorsement but general support from FHWA and NCHRP.

Research Advisory Committee

Topic may be more of concern to transportation planning/modeling efforts. Research is also needed for the design guideline and operational procedures for CAVs.

This study will analyze the impacts of CAVS on freeway operations and its various parameters at different level of market penetration. The results can be used to improve methodologies related to freeway operation and congestion management.

no comments

Similar to G-05

Too soon. This will be studied again in 2030 probably

This NCHRP problem was submitted by Texas and Oregon DOTs.

“There seems a real chance this will be outdated before the ink dries.”

"Many studies have been conducted for this subject. Most of them suffer from the limitation of lacking behavioral model that actually built-in those vehicle. I don't see the value of conducting this research with lots of "behavioral assumptions"; I don't think it can bring realistic/applicable capacity value.
I think VTTI, MTI, UFTI are already doing similar research, only differences are "Bottleneck capacity", which hardly be experimented in the near future.

- Research proposal and deliverables are unclear. The research proposal also fails to recognize one of the most significant efforts in this area. USDOT Work zone Data exchange.

### Item #63: Traffic Signal Change and Clearance Intervals for Left-Turn Phases

**Special Committee on Research and Innovation**

- Much has already been done on this topic. The Institute of Transportation Engineers has published a whole volume on the yellow change and red clearance intervals; TRB has published as well thought nor specifically on left-turn phases. This scope discusses left turns specifically. While interesting, is this research required?

- Recommended through CTE committee; supportive.

  - [Rating: 4] This is important research that will be of immediate impact and inform the ITE Recommended Practice on Yellow Change Interval and All Red Clearance; vast majority of related research has focused on through movement, not turning movements. There is a critical link between signalized intersection crashes and red light running that this can address. PRT and deceleration rates applied within the kinematic equation to compute change and clearance intervals are typically based on through movements. This is critical research and would be relevant to current and future CV/AV applications.

- ITE is already moving ahead with finalizing the best practice report that will include how to set the yellow and red clearance for left turns. We doubt ITE will want to redo this effort regardless of the outcome of this proposed research.

- State Traffic Engineer sees this as high importance.

- Done multiple time

- There is some value in conducting this research as it would allow traffic signal operators to optimize time in a manner that more accurately relates to actual conditions; however, one could also argue that for driver expectancy, it is also valuable to maintain consistent clearance (yellow/red) intervals throughout a system so that there is little to gain by fine tuning the values as proposed.

- Med. support from MN.

**Research Advisory Committee**

- No comments

- Has important safety implications for signal timing - especially for higher speed facilities.

- For many years, ITE has provided the guidance on how to establish yellow and all-red durations for signalized intersections. However, a definitive process for calculating these clearance intervals for left-turn movement has never been formally established. This research could help provide definitive guidance, improve efficiency, and help reduce left turn crashes at signalized intersections.

- We already have a policy in place.

- This research could modify the timings that could reduce the number of crashes.

- This left-turn clearance interval study has value in the state-of-practice. The result has the potential to improve both safety (clearance time) and mobility (loss time) aspects of a signalized intersection. As the methodology focus on field
data, a comprehensive data collection plan should be elaborated to ensure nationwide applicability.

- There is value in the study, in an effort to provide a stronger basis for left turn signal timing decisions. However, the narrow scope of the timing elements, related to very specific aspects of left turning traffic, may not provide much of an improvement over existing and recently proposed practices (as referenced in the literature search summary). Likely benefits are related to efficiency, rather than safety.

Item #64: Methodology for Addressing Project Constraints in Early Construction Cost Estimates

Special Committee on Research and Innovation
- This would probably be of interest to many states. GDOT certainly struggles in this area. The estimated labor seems low for the amount of data that would need review.

- [Rating: 4] Establishing accurate early project cost estimates at the planning, conceptual, and preliminary stages are increasingly challenging. Establishing research based adjustment factors and methodology will help improve the accuracy and reliability of early project cost estimates. The goals of the research, tasks, and anticipated deliverables need additional details and need to be further developed. The research objective cited is not clear because it includes both the development of national factors but also includes development of State level framework for developing such factors. Should there be national factors if each State will most likely develop their own. Emphasis may need to be on the framework and guidance on development and maintenance of State specific factors in lieu of national factors.

- This project is aligned with the Committee on Design’s Strategic Goals. Specifically, this project will provide tools to better estimate the cost of construction projects while meeting the expectations of the end user and meet environmental commitment. Locally it will help with our issues in concept reporting and change orders.

- The earlier a DOT can refine requirements, the better the cost estimate. The topic is referring to Preliminary projects from what appears to be on the Scoping aspect of a project. I do not think at this time we are seeing the setbacks others states are seeing (cutting trees, night projects, limited movement and phasing,) on a very common basis. I would think we have more of a problem with Bald Eagle, or Sage Grouse than what is stated in the problem. By statute our State is no allowed to charge for ROW access for utilities.

- Endorsed by Committee on Design and general support

Research Advisory Committee
- Not sure that national adjustment/contingency factors for constraints can be successfully developed.

- The industry is shifting to BIM and 3D model based project development which allows better cost estimates and constraint identification.

- Better estimating is a priority, but we don't think this issue is the most useful to Missouri. Better defined scopes are more relevant than cost estimate factors.

- Good project to see early project cost estimates (Planning, Conceptual, and Preliminary Estimates) are used to develop and support the budget for the transportation project.

- It is so hard to get good cost estimates during the preliminary engineering phase, and such factors are likely a key reason as to why. One potential scope modification: it would be worthwhile to increase the budget by $50,000 if that would allow some type of prediction interval for the adjustment factors (i.e., we are 95% confident that the percentage increase in cost due to coordination with the railroad will be between 20% and 34%) rather than just an adjustment factor as a point value (i.e., 17%).

- Concerned that there is not enough funding but there is considerable value in moving the needle on this topic.
Summary of Comments

Reviewer | Comments
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**Item #65: Trade-Off Analysis: A Multi-Modal Guide for Rural Transportation Investment Analysis**

**Special Committee on Research and Innovation**

- S generic economic analysis project that mentions the lack of travel demand forecasting models for rural areas and a lack of methodology for ranking projects against each other. Seems pertinent to all local govt transportation decision issues and is not just rural. $500K seems really steep for what will be a simplified CBA product.

- [Rating: 5] This proposal addresses the issue of rural transportation investment by producing a guidebook for simplified analysis. The topic is aligned to department priorities. The proposed approach is realistic and local officials can readily apply the final product. One major part of the proposed activity is a comprehensive category of modal and cross-modal costs and benefits, as well as externalities. The guide would have a long service life if analysis parameters and assumptions are kept up to date and worked examples are provided, as suggested in the problem statement. The proposal also includes a component to support the usage of this guidebook and communication of analytical results through training to the public, which would help expand its impact.

- This is the holy grail, I don't know if we will ever get there.

- This would be helpful to decision making in rural situations

- Low interest because Department is currently engages in this initiative.

- MnDOT has recently developed a Project Selection process that ended up having a process that ranks projects across several dozen investment areas. The need for so many development areas is because we lack cross investment/cross modal tools. As MnDOT continues to become more multimodal, tools and guidance is need for trade-off analyses. This is also a continuing topic for TRB Committee ADA50 and efforts to improve decision making. We definitely lack tools in this area though skeptical the simplified techniques will offer robust enough results. Support by FHWA/NCHRP evaluators and meets a clear need and gap in MN for rural community multimodal trade-off analysis tools, resources and data. Supported by the rural research roadmap effort?

**Research Advisory Committee**

- Rural areas have so few dollars that the choices imagined by this proposal may not be relevant.

- Limited value to CT, given our small amount of rural area

- There are project rating/decision lens tools available.

- An interesting idea, but much of the information is already available.;Could be a very useful tool for funding multi-modal services

- There is a shortage of information/data that allows practical analysis to be readily done.

- A general guide will have limited use to Missouri due to funding requirements. A Trade-off Analysis may not eliminate the difficulties and challenges of budget decision making. This seems to position modes against each other versus recognizing the value in all modes working together to provide a safe and efficient transportation system.

- This sounds like a good idea but the funds seem high for this. NCDOT TPD should consider having a representative on this

- This is exactly what NDDOT should be doing for multi-modal investment decision making. However, the technical aspects of this task have been one of the major hinderances, which is what this project proposes to address.

- Worth doing if it can be done, but daunting; seeks to answer several questions that would be big projects by themselves.
May want to consider VDOT's Smart Scale process. This research will help rural localities address a longstanding need - guidance for modal/cross modal project analysis and prioritization. Important need.

- I especially like the inclusion of social, environmental, etc. benefits in the consideration. Not sure why the proponents called these “externalities”. There may be some current NCHRP projects that are trying to examine some of this, though not specifically for a rural context: e.g., NCHRP 19-14, 08-36 task 146, that I’m aware of, but maybe others.

**Item #66:** Analytic approaches to understand how freight transportation is influenced by land use context and transportation conditions

**Special Committee on Research and Innovation**

- Decisions from this research will make an impact on businesses.

- Worthwhile proposal that provides a tool to planners to account for land-use in freight mobility. The concern is that it seems to focus on local (MPO) impact only; however, freight has international significance in terms of supply-chain; local impact may add value to the supply-chain but it may not be to a significant degree to see benefit. Therefore, the test is to see if the focus is on benefit to the local network or benefit to entire freight network; this is not clear in this research.

- [Rating: 4] Promising proposal to understand how freight transportation and land use interact and influence each other. Would serve as a preamble to future guidebooks and outreach. This is travel focused though, and would be improved to add an economic analysis component regarding economic impact of freight transportation on land use. The economic aspect of these types of analyses are routinely ignored, and are critical to "investment decisions", as the proposal suggests as a potential benefit.

- This could be an important addition to B-25. We will need to make sure we can connect B-25 and B-29.

- Could have some benefit to the MPOs. Very little data exists

- I would consider combining with B-25

- Awareness of these issues became apparent in the development of the Freight Plan.

- special committee on freight supports, but not ranked.

**Research Advisory Committee**

- The relationship between transportation and land use planning plays an integral part of a sustainable system/community and more research is needed related to freight in the built environment. This appears needed and timely. Could help prepare for freight plan updates and potential new federal monies, as well. May be able to combine this with B-25.

- Lots of federal emphasis on freight so this could be useful

- Could be useful to better estimate freight delivery impacts with land use considerations. But unsure how impactful it is vs just academic

- Freight flows need to be better accounted for during the transportation planning process. This problem statement will help address that need. However, current NCHRP projects seem to address some of what is contained in this problem statement. If this problem statement is selected, it will be important that the final scope of work addresses these needs in a substantive and groundbreaking way and does not duplicate past or current efforts.

- Results can be used in freight modeling and in the updating of Quick Response Freight Manual.

- Supporting data is needed.
Summary of Comments

Reviewer | Comments
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- This might aid in our understanding of how freight is working in the urban areas in order to better design all infrastructure.
- Very important - research must examine first mile / last 50 feet challenges
- This topic is very important. However, this problem statement appears to have a focus on larger urban, mega-MPO areas vs. the typical urban environments we have in ND.
- This is very similar to B-25. If these two studies could be combined, and the money pooled, it would be something really helpful.
- Suggest modifying this in the manner as suggested by the NCHRP reviewers. As written, the proposal appears quite broad, but the suggestion of finding out how shippers make decisions--proprietary information that is not necessarily publicly available--would be helpful for a variety of efforts (such as rail/freight diversion). I do give a higher marker to B-25, but at least one of these needs to move forward).
- Many entities lack the resources or expertise to improve analytical methods, models and tools resulting from the research.

Item #67: Rational Tolerances for Fabrication of Steel Bridge Members.

Special Committee on Research and Innovation
- $600k for 30mos work seems high since the scope does not require testing or verification of performance for new tolerances. Any new, more liberal tolerances will probably need additional testing and verification. Might be better for industry to perform this work.
- $600k seems very high. Suggest lower budget.
- [Rating: 5] Performance-based specifications for steel bridge fabrication are needed. Outcomes of this project include leveled risk and increased economy. AASHTO COBS has plans to develop a new specification for steel bridge fabrication.
- Lack of adequate guidance on fabrication and erection tolerances can cause costly construction delays and claims. This research is needed to improve the current practice.
- Since the T-17 Technical Committee is currently working toward writing a unifying specification “Metals Fabrication”, I think it would be prudent and timely to revisit the industry’s steel bridge fabrication tolerances and improve upon them, if and where possible. I’ve personally experienced contentious situations where fabricators and inspectors battle over very small fractions of an inch here and there where in the big picture I highly doubted any effect on the overall structural capacity. Loosening fabrication tolerances, where structurally possible, has a high potential of saving fabricators and owners cost in the long run.
- Have not seen a problem with this issue so far
- COBS #3. Cost seems high.

Research Advisory Committee
- Relevant to Bridge construction but seems expensive.
- no comments
- Tolerance in fabrication of steel bridge members will assist in better understanding among designer/owner and fabricator.
- Tolerances for Steel Constructions sometime result in claims, it would be helpful to our DOT to develop rational...
tolerances for Steel Fabrications.

- It is understandable that constructability can deviate from the design. Reasonable tolerances would benefit contractor and designer.

- This may have some value.

- Do not see a problem with LRFD.

- A review of tolerance criteria for fabrication is needed to better understand what relates to performance and what is more based on aesthetics. Some criteria may be too restrictive or others not restrictive enough. This research will develop performance based dimensional tolerances for fabrication and erection of steel bridge decks and superstructures, both in the shop and field. In addition, supplemental tolerances based on visual aesthetics shall also be provided along with estimated costs to achieve them.

- "I beleive this would be a worthwile project to back. Tolerances have always been and issue and fitup of complex geometries at risk. It will be interesting to see how this would change current practice which is to accept the tolerances as provided due to workmanship. Seems like accuracy would be better these days due to the mechanical advances in tools used in fabrication."

- Having tolerance values for steel girders which are more rational would be useful, considering modern bridge fabrication equipment and knowledge has improved since these values were first conceived. However, it does not seem that a large number of steel members are being rejected due to being out of tolerance so this RNS does not seem to address an area of essential need within the steel bridge fabrication community.

- Girder fabrication should meet the design dimensions. I have not heard any related problem affecting our projects.

**Item #68: Advanced Modeling of Driver Performance on Horizontal Curves**

**Special Committee on Research and Innovation**

- The existing policy for geometry on horizontal curves is based on research from the 1930’s and 1940’s. In the 2000’s this previous research was validated. Any advancements in technology to improve safety based on tire design and manufacturing and pavement wearing surfaces should not be considered in geometric design. The industry has made these improvements for a reason, and the fleet of vehicles and the consistency of the pavement throughout the country should not be assumed. This research could lead to recommendation that could reduce the safety of horizontal curves.

- [Rating: 0] It is unclear from this problem statement how driver performance is going to be modeled. This is all about tire friction and vehicle performance on curves. Very little about human/vehicle/roadway interaction. Where is the linkage to safety, crashes, and driver performance?

- This research is important, because as our vehicular technology advances, so must our design criteria. We should use design criteria that is applicable to our current vehicle fleet.

- Changes in the design of horizontal curves has significant impact on cost. Often it is thought that there are correlated safety benefits with minor changes. Though these are not validated by research

- Med priority to MN. COD endorses but not ranked. FHWA does not support

**Research Advisory Committee**

- Agree they are out dated but due to it causing our designs to be a bit conservative, I don’t feel the urgency.

- Driver comfort and driver expectations don't always see eye to eye. We put drivers at odds with law enforcement when driver expectations are not met by posted speed limits. That makes them really uncomfortable.
Summary of Comments  
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- Could see our curve designs match the fleet our customers use.
- This could result in increased safety and constructability.
- Good research - this could modify how DOT's design and sign horizontal curves.
- I think this topic is of broad interest, but the human factors piece of the analysis is not clearly defined. The high cost of the project is not clearly justified in my opinion.
- Changes in the design of horizontal curves has significant impact on cost. Often it is thought that there are correlated safety benefits with minor changes. Though these are not validated by research

Item #69: Access to Jobs, Economic Opportunities and Education in Rural Areas

**Special Committee on Research and Innovation**

- Continued work on and better understanding of issues in rural areas is needed. Metropolitan areas benefit from information and research provided on rural sectors. Workforce issues are a focus area and driving the discussion in decision making for rural areas. Highlights the need to focus on suburban areas. Many employers have relocated from central urban cores served by transit to suburban areas outside of the transit service area. Also, many older adults are choosing to age in place in their rural and suburban homes. These things will change travel patterns and demand. The results of this study will hopefully help us react to these trends in our transportation planning.

- [Rating: 5] This research effort will support economic development in rural areas by linking identified methods and opportunities to link persons in rural areas with jobs, educational opportunities, and medical facilities. This is an important and timely topic. The scope should explicitly include highways (in addition to transit) and have as a goal the preservation of rural communities through connections to loci of high economic activity.

- Wyoming's rural areas are SO rural this does not apply.

- unclear of the transferability of this effort

- Would be interesting to see how this may relate to reverse commutes from Boston & northern MA to southern & central NH

- This is a customer-base whose needs MN transit systems would benefit from understanding better, to grow transit users and connect people to jobs. No AASHTO comments. Some support by FHWA and NCHRP. Med. support in MN.

**Research Advisory Committee**

- This topic is one of the reasons that our subrecipients received local funding. Economic opportunities in areas assist with financial supporting transit and expanding services.

- Limited value to CT, given our small amount of rural area

- Individual rural areas too unique to make this work.; Important regional considerations for provision and funding of mobility services

- Agree that transit is essential to the economic vitality of our rural areas, but not sure how this research study will support that goal.

- Would have given concept a higher vote if problem statement provided more detail as to approach

- Valuable topic but unclear research objective. A revised problem statement should consider work from the National Accessibility Evaluation Pooled Fund Study. The research component in this problem statement appears to be small.

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Summary of Comments

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Reviewer | Comments
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(The advocacy component appears to be large.)

- I was close to rating it a 4. Rural accessibility is an important aspect to address, especially as we are seeing greater economic disparities in rural areas. However, I have concerns that they don't include much of an emphasis on connectivity to medical facilities and I am doubtful that the research will result in actionable recommendations to address the issue.

**Item #70: Evaluation of Tools and Methods to Mitigate and Manage Utility-Related Risks on State Department of Transportation Projects**

**Special Committee on Research and Innovation**

- [Rating: 4] This is important and we need to evaluate the management and implementation of UIA, UCM, and SUE as a means in mitigating utility-related risks on state department of transportation projects.

- The Iowa DOT is in implementing a Utility Conflict Management (UCM) tool in the coming months and has performed Subsurface Utility Engineering (SUE) on selected projects and would support continued evaluation of the effectiveness and development of a "Best Practices" to assist in managing utility-related risk on highway development projects.

- If these do go through, combine C-06, 07 and 08.

- Research is similar to past efforts

- dealt with in precon or constr phase

- This may be part of the research by ASCE for their SUE standards.

- This has become a big topic in our local Institute of Asset Management (IAM) chapter. (similar to the C-08) Support by all is quite favorable.

**Research Advisory Committee**

- If this comes with case study and best practices to move forward; then a valuable asset to be used for coordination.

- This Office would like to Risk Sharing where the utility pays for the LD's or the states take credit from the agreement balances for all time overruns.

- Guidance evaluating those risks by means of SUE, UIA, UCM, etc. would be useful to our DOT. Could be combined with C-08.

- Managing underground utilities is the most difficult task of the assets in our ROW. Knowing where underground utilities are located offers perhaps the best return on investment for design, construction, maintenance and operations activities.

- Of great interest and potential benefit

- We are more interested in finished guidance.

- Utility conflicts are a part of our business process. New and better ways of dealing with these conflicts can lead to more efficient project delivery.

- This looks to be helpful research. The results may be useful to convince state DOTs to adopt utility coordination programs including Subsurface Utility Engineering (SUE), Utility Conflict Management (UCM), and Utility Impact Analysis (UIA).

- "The State has begun utilizing Subsurface Utility Engineering (SUE) on its project. The Agency is also utilizing the
R15B utility conflict matrix due to us being awarded round 7 SHRP2 funding.

**Item #71: Temporary Traffic Control at Driveways within a One-Lane, Two-Way Section**

**Special Committee on Research and Innovation**
- The inadvertent consequences that may occur from this proposal is of concern. The one-way operation (OWO) through a construction zone is a dynamic condition with many uncertainties. Drivers arriving to OWO from side street may enter the correct operating direction give the proposed DAD sign but way past the last vehicle in the platoon. The opposite direction traffic may start before reaching the clearance diversion point and therefore, a potential for a head-on collision. For roadway conditions that have many driveways, it is more reliable to have a human spotter with radio to flag, restrict, and avert collisions.
  - [Rating: 3]
- This is an interesting opportunity to research a solution for a specific situation. We feel there are other ideas that would return a great benefit to a larger audience.
- This is relevant to almost every project we do, it also plays a role in my two NCHRP research panel topics, where we have stayed away from this specifically as it is a topic all to itself.
- This is important research as the number of projects using alternating one way traffic seems to be growing and it is increasingly difficult to hire reliable flaggers to control work zone traffic (at times shutting projects down when scheduled flaggers do not show up). We have included the DAD's in projects as there is no reasonable alternative.
- Limited application.

**Research Advisory Committee**
- Can be an issue that is difficult and costly to handle especially in rural areas. This is also of interest but not limited to 6 states that are interested to evaluate this technology.
- No comments
- DADs are a new concept that hold potential for improving safety in workzones on 2-lane highways.
- MDOT has used these "DADs" as a pilot, maybe this one would help standardize the use of the devices on projects?
- Driveway Assistance devices will remove a lot of un-necessary temporary traffic signals at driveways.
- "This would be beneficial to VTrans on a few projects a year, but presents a very real benefit in those cases."
- There is interest in VA in deploying these driveway assistance devices, and I am aware of at least one pilot test. This project would help move this from an experimental device to one that is incorporated into the MUTCD.
- From a WSDOT perspective, not a significant issue. State highway segments typically are higher volume and demand limiting the use of the DAD strategy for temporary traffic control. Small benefits of the research realized may be national guidance on the use of this strategy in the MUTCD.
Item #72: Design of Geosynthetic MSE Walls Subjected to Vehicle Impact on Roadside Barrier Systems Placed on Top of Them.

**Special Committee on Research and Innovation**

- This is low priority. There has been a lot of effort given to this area and geosynthetic should perform just as well. This is just an extension of work that could likely be completed by the geosynthetic industry to make them more competitive.

- Need to make sure this isn't a duplicate effort.

- [Rating: 3] Federal Lands Hwy (FLH) has done some research and crash tests for w-beam guardrail on geo-reinforced MSE walls. They also have experience with guardrail-wall combos where the wall survived avalanches or rockfalls but the guardrail was taken out. FLH is currently working on reviewing the MASH tests they did as there was much discussion/disagreement over guardrail type and location of guardrail in relation to the wall in the original report.

- This would help improve UDOT's standard drawings and requirements.

- This research may have been a 4 or 5 several years ago when WYDOT had several reconstruction projects in mountain areas and was designing many MSE walls. It is still important research that would be valuable to WYDOT especially in areas where the roadway template needs to be minimized in landslide areas with the use of MSE walls.

- Crash barrier at top of walls is an area that could use additional study due to the design uncertainties of wall systems using geosynthetics.

- Not overly strong support.

**Research Advisory Committee**

- Limited application to our state based on our usage of this wall type.

- This will help in having barrier system that meets the current code.

- Research appears to be of great value when the option of geosynthetic reinforcement is to be evaluated for an MSE wall.

- We do install a lot of MSE walls.

- If they vote for this research, it needs to include a component that can be adopted by AASHTO. I am curious how the wall companies are addressing this issue at present if they are building them. There have been some issues with these walls in construction, so this research would be good to verify similar response as steel reinforcement.

- the empirical results may not translate to taller MSE walls

- “Looks like a very interesting project with quickly implementable deliverables. Vermont typically constructs MSE walls with metallic reinforcement, but as recent failures and concerns have been brought to light on the national scale, we'll likely need to put more consideration into geosynthetic reinforcement - and with that comes the need for barrier design meeting AASHTO requirements. Current state it isn't as applicable as I can see it being in the future.”

- There is definitely a need for this type of a study, focusing on geosynthetic reinforcement in MSE walls. This is an important safety issue.

- This is one that AASHTO T15 is promoting as well as another AASHTO Bridge technical committee. This will complete work through NCHRP that has been on-going. That work focused on steel reinforced MSE walls, which is very stiff. The proposed work will focus on MSE walls with extensible reinforcement, which will bracket the range of soil reinforcement types to give us a more complete picture of how traffic barrier impact forces transfer into the wall.
Item #73: Beneficial Reuse of Lightly Contaminated Material from Transportation Construction, Maintenance, and Operation Activities

**Special Committee on Research and Innovation**

- Emerging topic

- There is value in this research. However, this issue likely will remain a locally regulated issue. Establishing national guidelines will give all DOTs and road departments a place to start, but they will still need to address their state/local requirements.

- [Rating: 5] The proposed study would be of significant national interest, and the results would provide States with needed guidance on the reuse of lightly contaminated materials generated during construction, operations and maintenance of transportation projects and facilities. The study should receive favorable consideration for the 2020 research cycle; however, it is suggested that the Task I review include both State and any applicable Federal regulations.

- Would improve reuse and recycling of materials. Potential cost savings on projects.

- A growing issue for DOTs

- This topic appears geared more to highway maintenance, as materials from street sweeping, gravel shoulder cutting, ditch spoils and stormwater debris will be reviewed for reuse. We’ve had a tough time with this over the years. Might be opportunity to explore more options especially with natural resources shrinking.

- With DOTs generating increasing amounts of lightly contaminated materials and spending more money on their disposal, it is becoming an urgent need to implement reuse.

- This research was initiated in consultation with NHDOT BOE staff.

- A regional/national document would not have much use in MN because the MN PCA has a functioning beneficial use program and a desire to stay involved. FHWA and NCHRP favorable. No AASHTO Committee review.

**Research Advisory Committee**

- May not have too lightly contaminated material

- Difficult to develop a report that is directly applicable to all DOTs, and specifically Connecticut; and b) the CTDEEP would not likely be swayed by such a document.

- The landfill would be my first choice to partner with. At the end of each working period, landfill waste is covered with six to twelve inches of soil or other approved material. Daily cover reduces odors, keeps litter from scattering and helps deter scavengers.

- Interest in beneficial re-use of managed soil is increasing.

- Very relevant emerging topic.

- This isn’t a current problem in our state.

- MoDOT routinely disposes of street sweepings due to the potential for contamination. This research may help identify material that may be allowed to be used for maintenance while still lightly contaminated.

- With DOTs generating increasing amounts of lightly contaminated materials and spending more money on their disposal, it is becoming an urgent need to implement reuse. Industrial by-product reuse in many states has shown that proper reuse of lightly contaminated materials is a benefit because: 1) using lightly contaminated materials reduces the need for virgin
materials, and 2) using lightly contaminated materials reduces the need to use valuable landfill space. Due to the many different regulations across the country, DOTs do not have agreed upon standards, testing methods, or guidelines for the reuse of lightly contaminated transportation materials.

Cut the Budget to $100,000 and first identify what "lightly-contaminated" materials STATE DOTs have to deal with.

- The reuse of materials collected from maintenance activities may be financially beneficial to the Department.

- Don't feel this is a priority to TN at this time.

- Sustainability possibilities are wide ranging.

- This generated 8 internal votes, and the following: "We have been wrestling with this topic for over a year and having a broader research study would really help inform our decision-making."

- While a number of states have developed Beneficial Use Determinations for this type of material it is done on a case by case basis (in terms of both type of material and producer). Further, the screening levels used to determine if the material is hazardous can in many cases be very low and do not take fully into account how bio-available the contaminants are. This can exclude a lot of material that is most likely safe for reuse from a Beneficial Use Determination. A study like this could prove to be a useful tool for other state DOTs to use while developing a case for reuse to present to their relevant regulators.

- This issue has a potential fiscal and operational impact on WSDOT construction and maintenance projects, related to the disposal of soils that could be otherwise re-used. The new Solid Waste Handling Rule (Department of Ecology 2018) precludes the re-use of these soils.

**Item #74: Developing Endurance Characterization Curves for GFRP Reinforcing Bars for Structural Concrete.**

**Special Committee on Research and Innovation**

- Important research to support the use of FRP reinforcement for the 100 years service life. There is considerable interest from several DOTs on this project since fatigue values need to be determined prior to implementation for several applications (bridge components). Understanding the endurance limits for fatigue and creep is necessary for adequate implementation into bridge projects. Using FRP products will extend the service life of structures, however, this project is required to ensure efficient use of GFRP reinforcement.

- [Rating: 3] Completion of this research would be useful, but is not a top priority.

- UDOT does not standardly use GFRP reinforcement.

- Endurance characterization curves for GFRP is materials topic that could affect bridge service life.

- cost of GFRP have not made the use of product happen in NH

- Med. priority for MN

**Research Advisory Committee**

- Doesn't address current problem for our agency.

- Use of GFRP-reinforced concrete in CTDOT’s projects has been limited, and the majority of implementations have been on bridge decks, which do not require fatigue limit check. However, we are actively exploring the opportunities to use GFRP rebars in other types of structures as well, so the outcomes of this NCHRP research could be useful for us in the future.

- Design convenience and extended bridge service life are more than welcomed by the state.
Would be good for the long term investment of GFRP rebar.

GRFP is becoming more-widely used. What NCDOT gleams from the Harker's Island Bridge along with this research could be beneficial.

not relevant to DOT’s not using GFRP rebar

Endurance characterization curves for GFRP is materials topic that could affect bridge service life.

Item #75: Crashworthiness of Barrier Attachments

C-16

Special Committee on Research and Innovation

Is this research going to address all required test?

Creating a risk based approach to evaluating acceptability of non-crashworthy attachments to barriers conceptually is a great idea; however, the vast number of types of appurtenances the possible combinations and agency preferences seems to be significant hurdle in developing a meaningful analysis tool. Especially without knowing how to assign severity metrics to the system, which could only be known through crash testing or in-service performance data that does not exist (if it did the research wouldn't be needed). Therefore, the most objective approach would be to apply the ZOI principle, which is already being researched under Project 22-34.

Needed to develop guidance and to understand the crashworthiness of attachments to concrete barriers.

[Rating: 1] See existing and ongoing NCHRP 22-32.

Frequently our Traffic Program installs signs and other devices on barriers. This posses a significant concern that when a barrier is impacted, fragments or entire signs may penetrate impacting vehicles.

a high interest area and important component given the mix of systems that will be in the field

Important, but difficult to imagine that the testing would be comprehensive enough to cover the wide range of potential barrier attachments.

Low priority for MN

Research Advisory Committee

Data collection and in-service performance analysis is a requirement of FHWA.

no comments

Determination of crashworthiness for concrete barriers with attachments (i.e. signs, lighting, screens, etc.) is needed since no testing to MASH has been conducted.

Another key MASH type research but how will this address every possible situation where all tests are required.

We have already implemented MASH guardrail.

There is little to no guidance on this currently.

NCDOT would like a rep on this panel if not represented already. There should be sufficient crash data from across the country to determine if these devices are contributing to severity of crashes. Crash Testing is NOT a deterministic test, it is intended to be used in cases where insufficient data are available. Budget is way too high.
Summary of Comments

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Reviewer | Comments
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- This could provide very useful information for our state and for the AASHTO Roadside Design Guide. First we need to determine if this is a problem -- are we having a significant number of crashes involving these items? We may want to wait and see what is going to be added to the barrier in the future to accommodate the driverless vehicles or we may need to test again.

- The topic is important and timely. However, Bullet #c of the literature summary suggests that some similar work has already been done on the topic. If this goes forward, it would be important to ensure that existing work is not duplicated.

- Although a common application, this is a subcategory for which there are often alternatives. In the grand scheme of things probably not as important as others on this list. Work is being done by our pooled fund this cycle.

Item #76: Utilizing Connected & Automated Vehicle (CAVs) Data to Enhance and Optimize Freeway Operations Strategies, Algorithms and Performance Measures

Special Committee on Research and Innovation

- High Priority in region

- Premature. Need deployment on a wide scale to study in a meaningful way.

- Relevant to GDOT’s CAV work.

- [Rating: 4] There is a need for the project advanced by this proposal, subject to coordination with problem statements G-04 and G-23. Work proposed is related to an existing NCHRP project 08-116.

- This is the future. Research on CAV is critical.

- Objectives not clear. Premature at this point.

- This research is a bit early, and as penetration rates increase would be of more value

- 20-102?

- Already ongoing work in this area.

Research Advisory Committee

- CAVs have the potential to provide DOTs will real-time data on operational issues. It will be important to best utilize and develop the interfaces to achieve optimal outcomes and working relationships. Project may also want to address cybersecurity concerns.

- No comments

- Connected vehicle information is cutting edge and has potential to impact winter weather operations. I think anything we can do to stay up on the technology would be beneficial to the Department in the long run.

- This is one of the top ranked projects for Michigan.

- Data is limited at this point.

- Similar to G 23

- "I think what this project contemplates is so far removed from what VT currently has in place, it will be outdated before it's applicable to us."

- "Parts of this research have already been investigated in smaller projects (e.g. ramp metering), and the technology has not
advanced enough to look at integration. Cost is too high for a simulation project.

- The research isn't needed at this point in time. Once AV Penetration rates are higher and the shared vs personal vehicle model for CV/AV ownership is further underway, evaluating the benefits of using Connected Vehicle Basic Safety Message Data will be more valuable.

**Item #77: Methods for Short-Term Crash Prediction**

**C-21**

**Special Committee on Research and Innovation**

- I think this project should wait until the completion of project C-18 and then, build on its findings.

- Interesting idea but don't see as high priority.

- [Rating: 2] Methods for Short-Term Crash Prediction addresses the two biggest limitations in predicting crashes. Incorporating travel speeds into prediction models, and predicting crashes in short-term situations (work zones, using short term traffic counts). These limitations were noted at a national peer exchange on Applications in Performance-Based Project Development, and are of high interest to the FHWA Offices of Safety and Operations.

- This research would be valuable nationally because it would help quantify highway safety for short-term traffic conditions. It would also develop models to help understand better the relationship between vehicle speeds and safety. One concern is that the research will focus primarily on urban interstates, whereas we see a lot of value in looking also at urban signalized intersections. This research could also be very useful for evaluation of changes required by the traffic patterns for construction. Another concern is that the required data to run the model will be difficult to get accurate values. The real-time readers that we use generate a tremendous amount of data that often need to be scrubbed prior to effective use. We believe the research will do this, but will the processes be efficient enough to implement for regular use?

- This project has value to crash prediction in work zones and has the ability to significantly add to knowledge in the area of traffic control.

- The microscopic nature of analyzing short-term operations probably won't be sustainable by our agency.

- Comm on Traff Eng. Thinks it’s important.; FHWA supports; Safety - #5;

**Research Advisory Committee**

- no comments

- It is important to develop crash prediction methods using finite exposure measures and representing short-term roadway conditions to better account for variables and understand short-term fluctuations in highway safety performance without relying on the long term data needed for HSM evaluations.

- This impacts MA and is a high priority. However, the name "short term crash prediction" is misleading since it really involves things that occur only certain times of the day, year like work zones, peak hour restrictions, etc). this certainly applies to MA. It would probably score higher by others with a different name

- Could see this beneficial for evaluating the safety of MOTs and short term traffic operation changes.

- Sometimes it takes too long to collect safety data and construct projects to address the area of concern. This research would give some ability to address interim issues and concerns.

- "This seems to contradict all the concepts about crashes being random and that a longer term period is needed to accurately predict the crashes. ”
Summary of Comments

**Reviewer** | **Comments**
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- "This is essentially the same scope as a dynamic safety modeling project currently underway in Virginia. We have gotten very promising results from VA data, and it would be good to see this expanded using a national data set. A major challenge will be getting “good” data at the temporal resolution being proposed.

- This project has value to crash prediction in work zones and has the ability to significantly add to knowledge in the area of traffic control.

**Item #78: Regulatory and Policy Actions to Facilitate Truck Automation Technology**

**Special Committee on Research and Innovation**

- Agree with the recommendations by both FHWA and NCHRP that this be addressed in current NCHRP Project 20-102, State and Local Impacts of Automated Freight Transportation Systems

- Wait for 20-102(22)scope?

- [Rating: 2] The problem statement should be refined to better distinguish between issues associated with truck platooning, and broader policy and regulatory issues of truck automation. The problem statement may be more appropriately considered within the NCHRP 20-102 and the second iteration research roadmap for that initiative, which is under development.

- This would help to get the rules and regulations in place before the technology gets here.

- Both nationally and for WY - policy development is needed quickly

- FUND in 20-102? - There is a bill in to the transportation committee now trying to limit the use of autonomous commercial vehicles without a driver. It is important to promote safe use of these technologies and vehicles and not prohibit the use before standards and guidelines are released. This would effect Maine directly.

- Recommendation to retract?

**Research Advisory Committee**

- Likely that autonomous freight will occur sooner than passenger AVs. Finding the best practice for regulatory and policy will assist DOTs in moving forward most effectively. Concerned with 2-year schedule; Information on this topic is needed now.

- Truck platooning is a hot topic within the department that needs to be evaluated to understand the affects it will have on our system. Illinois has a lot of truck traffic and freight movement.

- Before being accepted, it should be confirmed that this will not be duplicating existing work.

- It is critical that the regulatory and policy analysis help to inform the discussions and implementation strategies.

- While truck automation is not as pervasive and has not deployed as rapidly as other technologies, it is imperative that regulatory bodies be as proactive as possible to prepare for the future regulatory framework. This could also be helpful by establishing a framework for interoperability between state lines.

- This is an extremely important topic. The only reason we didn't rank this higher is that the research methodology proposed seems too simplistic to get to the heart of this issue.

- "Vermont has a significant amount of pass through traffic coming from and to Canada (Quebec in particular). This project would be important to assess the effectiveness of automation for freight movement through the state."

- High value, but seems like it should be included as a subtask in NCHRP 20-102
Focusing the research topic would provide greater value and benefit.

Item #79: The Effect of Vehicle Mix on Crash Frequency and Crash Severity

Special Committee on Research and Innovation

- This could be part of C-18 project.

- [Rating: 2] This research would be interesting and provide insights for future safety predictions. This is a needed study considering increasing truck volumes on roads, and effect of truck traffic on safety performance. Worth noting is that an effort is needed to reconcile all these different SPFs/AFs, and re-evaluate the HSM and SPFs overall.

- This research would provide valuable information to help understand the effect of vehicle mix on crash frequency and severity. This study is key for helping to fight the stigma that higher truck traffic leads to higher crash frequency. Within the state of Utah, this stigma has led to legislative bills being proposed to restrict truck traffic several times within the last year or two. This stigma is likely a national issue as well because it seems like a number of states have attempted to restrict truck travel through local laws that seem to be based more on bias rather than information. None of the Highway Safety Manual algorithms address trucks, but it would be helpful to be able to accurately consider trucks and all vehicle types.

- The understanding of vehicle and other road user mix is important. I would recommend that this problem expand to all road users

- It would be valuable to know how vehicle mix affects safety performance.

- Interesting relationship, but not sure where this is going. Truck %’s are what they are. Safety - #6; FHWA and NCHRP support

Research Advisory Committee

- no comments

- This research has been identified through our AASHTO Committee on Safety and is of great importance with vehicle mix on roadways.

- Knowing vehicle mix is important but often our solutions apply to all vehicle types with minimal to offer to larger vehicles

- Not sure what the practical appication of this research would be.

- This is often raised in the safety community. Being able to quantify it would be helpful in deploying counter measures that target trucking.

- Skepticism on whether % truck is available on all segments

- Based on FHWA's comments, an ongoing FHWA study should answer this question to a great extent.

- The understanding of vehicle and other road user mix is important. I would recommend that this problem expand to all road users
Summary of Comments

10-Jun-19

Item #80: Methodology to Define New AASHTO Green Book 7.0
C-12 Context Classification Settings Implementation as Related to Active Transportation Infrastructure

Special Committee on Research and Innovation

- [Rating: 5] The Council on Active Transportation submitter and problem statement writers are assessing how this research needs statement can be coordinated with the Technical Committee on Geometric Design 2020/G-11 needs statement in order to complement efforts and we can work to address this request. Consider combining C-12 and G-11.

- Very important aspect for GB7 implementation

- Provide standards for all DOTs.

- Supports national effort to create more context guidance, similar to MnDOT efforts. Aligns with SMTP workplan. C-12, G-09 and G-11 have important complementary relationships to inform needed flexible and context appropriate revisions to the AASHTO Green Book. Has AASHTO support and NCHRP support. FHWA says there's some overlap with G-11

Research Advisory Committee

- I believe the Expanded Functional Classifications are valuable and selecting appropriate guidance for the new categories is needed.

- Functional classification changes often lag ADT increases and DOT projections in developing areas. ADT and vehicle mix need to be consider in selecting design standards.

- Not most pressing research need. May have limited use by MoDOT.

- The panel needs to be balanced.

- "Too academic to have value in on-the-ground decisions."

- Relevant project that builds upon existing NCHRP efforts at a reasonable cost. Peter (4): This sounds like necessary work to implement the Green Book 7.0, although exactly what is to be done wasn't clear to me from the Research Objective section. This could be a planning-focused complement to the design-focused G-11.

- The research describes a known shortcoming of the GB 7th Ed approach to context with respect to consistent diagnostics. This is only going to become more urgent as we move to GB 8th. The diversity across US contexts will be a challenge.

Item #81: Development of a Crash Data Collection Tool for MASH
C-15 In-Service Performance and Application Guidelines

Special Committee on Research and Innovation

- FDOT has already developed identification tools and inventory system. Possible synthesis.

- GDOT developed a process for on-site data collection. This has the potential to assist states in data collection; however, GDOT is concerned how this tool could be modified for each state’s needs. Also, some developers/consultants want to keep/store collected data for their own use.

- [Rating: 1] With so many ISPE efforts currently underway, and the possibility of the creation of a state led pooled fund group, this research project might not be necessary. It might be better to defer this project until other work is finalized.

- It is better suited as an addition to existing pooled fund projects regarding roadside safety.
Summary of Comments

10-Jun-19

Distribution of Ratings

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<th>Reviewer</th>
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<td></td>
<td>■ Data on crashes with roadside safety devices is hard to collect. Crash scenes are cleaned up very quickly. Developing tools that help maintenance and law enforcement in obtaining data while minimizing exposure times at crash scenes would be very helpful.</td>
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<td>■ Tools exists with some industries and this should be used as a starting point.</td>
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<td>■ fully support but being addressed in FHWA study and future pooled fund project</td>
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<td></td>
<td>■ Tool would be crucial for documenting the performance of safety appurtenances.</td>
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<td>■ Low priority for MN</td>
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Research Advisory Committee

■ Data collection and in-service performance analysis is a requirement of FHWA.

■ Information being developed by NCHRP 22-33. This will be a software tool. No discussion on how to get the tool into a usable form. NCHRP has not been very successful with software implementation. Hard to get end user agreement on who owns, who maintains, hosting requirements, etc. The tool may be needed but more planning is needed to explain how it will be used. There needs to be support from a DOT, FHWA or AASHTOWare to run program. Most likely this research will not be implemented.

■ Not sure if a standardized tool is needed. Each agency has its own data collections tools available based on their GIS/IT standards. The data model/database elements being developed by other NCHRP study should be sufficient for each state to easily implement data collection tool with their own technology.

■ Will be covered by the FHWA ISPE study and the ISPE pooled fund group that will be established, according to FHWA comment.

■ Do not understand to create another system. Use the existing crash data systems with asset management systems.

■ Relevant to developing MASH approval processes. This is in line with in-service performance.

■ This would be beneficial to analyze in-service performance of devices. This may be helpful developing guidance for replacement and installation of roadside safety hardware.

■ Not sure there is benefit here. There is so much going on with drone surveying of crash sites, maybe monies spent there would be more beneficial.

■ This is very important based on recent events with certain end-treatments and the new MASH criteria. The ISPE that PA participated in did not yield the information that was necessary to determine if there are any performance concerns with guiderail that states should be addressing.

■ A need for our state as we look for an easier way of performing ISPE. This may possibly help bridge the gap about how safety devices act in a controlled test condition compared to how they act during an actual crash on the roadway. Not sure it should be the first responders and the DOT maintenance crew collecting the data. The first responders are busy trying to save the injured and maintenance is trying to restore traffic.

■ Welcome research to make ISPE data collection easier.

■ A more comprehensive crash data collection tool and guidelines could be useful. Individual states have conducted many related studies. The scalability of the developed tool and the integration with existing agency data system should be addressed.

■ A consistent approach to a reasonable ISPE program has been an outstanding need for years. Without it, divergent results from different areas cannot be compared. Costly mistakes in the failure to track performance will be the result.
Summary of Comments

10-Jun-19

Item #82: Best Practices for Networking and Historical Data Collection for Traffic Signal Systems

Special Committee on Research and Innovation

- A lot of information already exists on this topic. It could be a NCHRP Synthesis Project. Budget is reasonable, but since work already exists and it may require industry participation it might need to be adjusted if selected.

- Nice idea but need more details.

- [Rating: 2] Best practice for selection of systems and devices is to utilize processes that systematically evaluate objectives and needs to develop requirements that guide procurement. Systematic process minimizes the risk of systems not meeting the needs of the agency and facilitates integration and interoperability. It also supports the design and implementation of communications, control, and detection systems in a manner that is not dependent on specific technologies that could change dramatically as the research is conducted. NCHRP is probably not the best venue for this research.

- We don’t see a need to research cloud based solutions since the private sector is doing a lot of that anyway. Also, detector configuration for the most part is pretty polished from agency experience. However, we can see some benefit to help put all of these ideas in one place.

- sythesis?

- Consistent with ITS strategies to improve traffic signal performance.

- Low priority for MN

Research Advisory Committee

- Traffic Engineering is looking at how to incorporate TSPM into all signals.

- Bluetooth Traffic monitoring seems to be where this is heading.


More guidance on useful applications for high-resolution data, how to interpret the high-resolution data and how to collect the data (i.e. detector configurations) would be useful.

- Scope is too broad, with both networking and data archiving. Not a clear need for this.

- Although the information would be interesting, the practice is going to be highly subjective based on agency type, agency policies, and associated records retention laws.

Item #83: Determining the Readiness and Effectiveness of Freeway-Based Corridor V2X Applications for Improving Congestion and Safety

Special Committee on Research and Innovation

- Interesting topic; but the research objective counts on “freeway-based V2X applications that are currently at various levels of concept development, proof-of-concept, or pilot stages.” There aren’t that many. Will the research produce anything tangible? Much of Objective 4 is already accomplished with the many simulation studies out there on vehicle penetration rates. Objectives 1 to 3 are interesting, in particular 1 and 2. The work seems to count on microsimulation.
Summary of Comments
10-Jun-19

Reviewer | Comments
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Premature. Need deployment on a wide scale to study in a meaningful way.
Relevant to GDOT's CAV work.
[Rating: 4] The proposal appropriately acknowledges USDOT's Analysis, Modeling, and Simulation (AMS) Program, but overlooks more recent related initiatives in cooperative automated transportation. Address the potential coordination with USDOT's Cooperative Automated Research Mobility Applications (CARMA) as well as significant research within the ITS JPO's Dynamic Mobility Applications program and through the Connected Vehicle Pooled Fund Study.
This is the future. Research on CAV is critical.
Seems premature, for example do we know what communications set will talk to the vehicles?
I am not sure how this will be done with little V2X in place
20-102?
Already ongoing work in this area.

Research Advisory Committee
V2X applications are coming, regardless of the DOTs being ready.
No comments
There have been informal conversations on where the Dept stands on when/where/what to deploy in terms of any CV application. The conversation envariably comes back to "what will be the benefit of any CV deployment?". This results of this research may start to answer this question. It may also help provide backing to any executive policy direction, either for or against.
Readiness isn't most pressing research issue.
"Focusing on the benefits seems worthwhile but not really sure this study gets far enough to make any difference."
Considering our interest on CV/AV environment, I think this work has lots of potential to save investment for VDOT.
WSDOT is actively engaging in CV technology. This research will help our agency better understand our readiness to adapt to future changes in transportation and help in understanding the infrastructure gaps to deploy V2X applications.

Item #84: Next Generation of the USLIMITS2 Speed Limit Setting Expert System

Special Committee on Research and Innovation
Support continued development of USLIMITS platform.
[Rating: 5] Updating the USLIMITS2 algorithms to provide decision support in today's environment is critical. The speed to fatality relationship is well explored through the referenced NTSB and NCHRP studies. An update to USLIMITS2 with the involvement of state DOT experts will help the future implementation of the tool.
This research is important to us to help build a better, more widely accepted practice of setting speed limits and understanding the impacts of setting those speed limits. Additional flexibility in our approach to setting speed limits assists us in the efforts to promote place making and eventually influence the operational speeds observed along highway and roadway sections.
Not sure that an algorithm based 85th speed setting tool is of great value to state DOTs. I would be helpful to understand
the current deployment of this tool.

- Speed limits are one of our most common issues to address; new research is vital to support this; While the existing product is very useful, I understand the objective of this research project will be to update the program and associated algorithm. This would be most useful.

- Using an expert system instead of 85th percentile speeds gives jurisdictions an opportunity to set lower speeds and improve safety for peds/bikes. No committee endorsement. NCHRP recommends increasing budget to $450K and time to 36 months. Lower priority for MN.

**Research Advisory Committee**

- This Research Needs Statement is identified by the Connecticut DOT as a high-priority and high-interest research need that we see as an excellent fit for addressing through the NCHRP Program. The USLIMITS2 program is a valuable tool to validate expert judgement in establishing appropriate speed limits that are derived with more uniformity. We would recommend the next generation of the USLIMITS program emphasize Urban street speed limits where operating speeds are difficult to obtain due to closely spaced signalized intersections and the influence of on-street parking and pedestrian movements can be significant and where pedestrian crashes are more frequent. More information should be available to the user of the program of the weighting factor for each piece of information entered in the application to arrive at the ultimate speed limit recommendation.

- Would have liked to see AASHTO comments on this.

- Do not see an impact on how we set our speed limits based on current laws

- Research would be helpful - if anything, this program could be used to verify result from the 'normal' way speed limits are set.

- We need help with this.

- Vehicle speeds have a large impact on the severity of crashes. Updating the USLIMITS2 may ultimately reduce severe crashes. his research is needed if NDDOT is going to implement the multi-modal, context-based project scoping that our customers are demanding.

- Good information to have but our current state regulations would make it tough to apply so this isn't as high of a priority for us.

- “The better-documented and defensible the process for recommending speed limits, the better.”

- Some VDOT staff use USLIMITS2 as part of a speed study. Updating and improving it may be useful. It seems like it's time to update this tool, since a lot has happened in the area of speed-limit policy since 2006.

- There is value in this study, the intended outcome is to update USLIMITS2 and further review other speed variable options, improve knowledge base, refine the decision rules of the algorithm and improve its credibility. The inclusion of the analysis of other states practices and procedures for setting speed limits will provide better insight in how other states are implementing speed zones. Our engineers take into account several considerations when setting speed limits, USLIMITS2 in the past has not necessarily supported our engineering decisions. An updated and managed decision algorithm and the identification of users’ needs will be a tremendous benefit.

**Item #85:** National Synthesis of Project-Level Programmatic Agreements for Expediting Section 106 Consultation in Project Delivery

**Special Committee on Research and Innovation**

- Most DOTs already have a process for this.
This project could be beneficial in the delivery of projects with complex or numerous cultural resources involvements. A streamlined approach as can be developed in a project PA is an effective way to expedite project delivery and control costs. As such, it would be a very effective tool for design build and public-private partnerships. This study would provide us some of the basic building blocks for developing such agreements in the future.

[Rating: 5] This research will assist in clarifying the role and importance of programmatic agreements to streamline Section 106 compliance. It will provide both an explanation for the utility of such agreements, as well as a variety of example agreements for application to new projects.

Would be beneficial to see a synthesis for project level PAs but there is not an absolute need at this time.

Should this compete in 20-05? Since this is for bigger, sensitive projects, it has limited application.

Better suited to synthesis program

submit to synthesis

NHDOT has a PA, but learning about what works in other states would be useful.

Very worthy problem/needed approach to address project-level delivery streamlining to expedite complex and very time consuming Sec106 processes. No AASHTO Review; FHWA and NCHRP are favorable.

Arizona has developed a guidance document for agreements, standardizing language to make it easier for agencies to create project specific PAs and MOAs with the necessary language. It has been helpful to agencies who do not do those kinds of documents a lot.

Send to synthesis program.

Programmatic Agreements are a tool that can be used effectively in the hands of an experienced Section 106 practitioner. Understand where and when they are appropriate is a matter of experience and familiarity with circumstances at hand. National Highway Institute and the national Preservation Institute provide classes on "Agreement Documents" that provide guidance on where and when Programmatic Agreements are appropriate. This research could become an extremely laborious exercise in trying to classify all sorts of project specific programmatic agreements, and facing methodological problems in evaluating whether individual documents were successful or not, and the reasons for such assessment. Research could result in some useful guidance, it is not clear that such would ever improve upon the simple knowledge, experience, and intuition of a seasoned Section 106 practitioner teaching a course on Agreement Documents.

This is an area that has slowed some of our projects, so more information might be useful

This is an interesting concept, but implementation could be problematic.

Synthesis...

In Michigan we have unique programmatic agreements that govern this process.

MoDOT is already developing one but would be good to know what they want to do at the national level.

Not research, if 20-05 funding is not enough, try to submit as a 20-07 topic

Absolutely needed to share these resources to address expediting Section 106 consultation

We don’t often have the need for a project specific PA, but there are times one may have been useful. Although I’m not
Summary of Comments

Reviewer | Comments
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10-Jun-19
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convinced we would have had an expedited or more effective process, but some people/agencies may have ultimately been more satisfied with the result. Regardless, it would be useful to have a synthesis that discusses advantages and disadvantages as well as highlighting pitfalls and providing examples. I suspect this is a much bigger deal for larger, more populous states but useful for all, regardless.

- Could this be done as a synthesis project?
- Important to support. Narrow scope, but of national value since many DOTs want to learn about this approach.
- This project is likely of nationwide interest, but I'm not sure that such a synthesis will be successful in actually expediting project delivery, given the project-specific requirements of many Programmatic Agreements.

**Item #86: Synthesis of Recent Active Transportation Related Research and Creation of Research Roadmap for Council on Active Transportation (NCHRP 20-123)**

**Special Committee on Research and Innovation**

- Previously approved off-cycle?
- Recommend more specificity re: research goals and deliverables.
- [Rating: 5] The FHWA Strategic Agenda for Pedestrian and Bicycle Transportation has been substantially implemented and the time is ripe to recalibrate a national research roadmap that has significant stakeholder input. The FHWA liaison to the project can bring lessons learned from producing the Agenda and administering the Fostering Innovation in Pedestrian and Bicycle Transportation Pooled Fund. Also by sharing US DOT efforts related to the Safety Data Initiative and the Mobility Innovation Workgroup we can ensure close coordination.
- This is a good 20-123 topic, however the price tag is steep.
- I believe that this was funded as quick research by SCORI
- submit to committee support panel
- Important next step to support Council on Active Transportation.
- Consistent with SMTP direction and complete streets policy. With our desire to be more multimodal and new focus on active transportation, it seems a research roadmap for this area would be helpful. Council on Active Transp's #1.

**Research Advisory Committee**

- This research is crucial to the effectiveness of the Council on Active Transportation. The field is changing fast, and having a recent literature review will assure that the work the Council does is both relevant and timely
- Send to synthesis program.
- Active Transportation Planning is another emerging hot topic
- It is not clear this is an important issue.
- Synthesis...
- (NCHRP 20-123)
- Might be beneficial to our bike/ped guidance
- This is the top request of the Active Transportation Council

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Active transportation is taking on a new focus both nationally and locally. Additionally, the topic is new enough to our industry that the research needs are unclear. Having this “plan” available would focus the limited resources on the most important topics.

Critical to jumpstart this new Council from AASHTO.

Each State is a member of the Active Transportation Council, a relatively new council set-up by AAHSTO.

Valuable, but "$250k for 12 months of 1 professional staff” sounds pretty steep to me. Incorporating connectivity/accessibility, performance management, the importance of active transportation in complete trips and the impacts of automation on active transportation into the White Paper is desirable and will be completed per submitter. Timeframe and budget within reason.

A priority for AASHTO's new Council on Active Transportation. Much (most) transportation research of the past did not address active transportation use and did not even note the omission, meaning that driving-focused conclusions, metrics and decision frameworks were put in place as if they work for all modes. We need to evaluate and prioritize gaps and identify research on which agencies rely that is problematic because it didn't include consideration of active transportation. With many emerging issues such as micro mobility, and urgent issues around serious injury and fatality rates, active transportation needs research that makes up for past lack of investigation.

Item #87: Accessing America’s Great Outdoors: Understanding Recreational Travel Patterns, Demand, and Future Investment Needs for Transportation Systems.

Special Committee on Research and Innovation

[Rating: 5] There is a need to address a modal shift to biking and walking when entering the Federal estate, where this is a viable option. A modal shift might not be practical for Federal Lands in remote locations where the infrastructure is not in place, and terrain and climate conditions are more extreme. Also consider the aging demographic who are not physically capable of walking and/or biking. This proposal is timely to address the accessibility needs and look holistically to accommodate everyone visiting the Federal Lands. This research should acknowledge the Planning factors for Statewide (23 CFR 450.206) and Metropolitan (23 CFR 450.306). We haven't had much discussion of the "new" 10th factor "Enhance travel and tourism". This could help fill in part of that gap.

These parking and recreational access issues are a national problem with very little research being done to understand it. This is particularly true for parking lots with direct access of federal and state highways that have no gates or controlled access points to restrict the amount of tourist entering the park. State is already struggling with these issues. Example I 93 trail head/facilities parking issues.

This would be good research and it's true we don't have much emphasis on recreational travel. But I'm not sure it rises to the top need at this time. Submitted by AASHTO COP/T. Henkel with MnDOT/MN National and State Scenic Byway program and community needs in mind per proposed objectives. COP's #2 (or #7?) and part of the rural research roadmap effort

Research Advisory Committee

Could help identify summer travel patterns versus typical weekday patterns.

Our state has a large percentage of state GDP from tourism. We could benefit from understanding the travel needs for tourists and residents engaged in outdoor tourism.

Would provide data on recreational travel to national and state parks and federal lands that is currently not available. Would help in developing travel forecasts in these areas.

Not a pressing need at this time
Summary of Comments

10-Jun-19

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**Reviewer** | **Comments**
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I have troubles seeing how this impacts peak traffic conditions. The growth rates of traffic seem cherry picked from the worst of the great recession to current times to inflate this. |  |
Tourism is becoming more a factor in ND and there is a significant knowledge gap, as this problem statement notes. However, as big as tourism is in ND, it has a very small demand impact on ND's transportation system. |  |
Could be of use when developing Bike Routes |  |
Due to the lack of data on recreational travel patterns, demand, and future investment needs, as well as the growth in the recreational economy, this project has promise for producing a valuable deliverable. In agreement with FHWA, the proposal should include a component of mode shifts to bicycling and walking as potential mitigations for road congestion. |  |
Strengthen the modeling/forecasting approach for applying methods (v. academic discussions) and basic data collection. Include concepts such as Big Data and Internet of Things. |  |

**Item #88:** Best Practices in Coordination of public transit and ride sharing

Special Committee on Research and Innovation

- With the rapid changes, it may be outdated before study begins.
- This topic could be incredibly beneficial to rural and small urban communities. Mobility as a service is pretty targeted toward certain urban cohorts, but we need to make sure we provide equitable access to all transportation options for all our citizens, urban and rural.
- Emerging topic. Emphasis on rural transit addresses a gap in current services.
- [Rating: 4] In the implementation phase consideration should also be given to local and grass root organization in communities who may have an outlook on challenges when it comes to coordination of public transit and ride sharing as they seek opportunities between ride sharing companies and public transportation. Will this be a case study of apps used in rural areas or a log of apps used in urban areas and their applicability to rural needs? We must also identify broadband/cell phone service accessibility in less densely populated areas to determine feasibility of apps outside urban centers. A better understanding on how to use these lower cost solutions to serve the mobility gap in rural populations is a very beneficial line of research to improve rural access to jobs, doctors, schools and other basic needs.
- Little to no value for very rural areas.
- This would be helpful in the context of first and last mile
- synthesis
- How to integrate Uber/Lyft/etc with public transit and integrating accessible (ADA) component is very timely. This topic has been of recent interest to NHDOT staff and several NH transit providers
- No AASHTO comments but FHWA and NCHRP are supportive.

Research Advisory Committee

- Not of great deal of ride sharing options in rural areas of Arizona but the issue and discussion is relevant for the future.
- There are always gaps in service. Can ride-sharing fill them? I'm concerned that the ecosystem is still in flux and the study may be outdated before the study is done.
- This would be a helpful solution to B-18 problem statement but the lack of non-accessible vehicles, high cost of service,
non-existence of ridesharing companies in small rural areas and willingness to specifically assist with transportation for disabled individuals are barriers we have encountered in MDOT-PTD.

- Ridesharing is becoming a mode of choice for some and coordination with public transit is a very important way to help stretch transit dollars.

- Documenting available online apps at a given point in time doesn't seem like it should require a $250k research project. Title and objective should be clarified if the scope is limited to small urban and rural communities.

- I am not sure the supposition that small urban and rural communities lack these tools. Also, $250,000 to "identify what existing resources are currently available and if/ how the private industry is interacting and partnering with the public sector in coordinating mobility services," is too much.

Item #89: Incorporating the Demand, Capacity, and Operational Impacts of Incidents and Safety Treatments in the HCM Freeway Facilities Methodology

Special Committee on Research and Innovation

- Expanding the use of principles of the Highway Safety Manual (Crash Modification factors) into documents/process such as HCM should be highly encouraged. The knowledge gained from understanding the operational and safety impacts of a safety countermeasure will benefit HCM and HSM users.

- [Rating: 4] This is a valuable research project that would be of direct benefit to those involved with travel time reliability analysis. It also has the potential to produce meaningful information for enhancement of the HCM, and potentially to inform us on related safety performance implications. It would be valuable to note that the HSM freeway predictive methods can reflect the impacts to crash frequency and severity for a variety of countermeasures, as supported by many CMF’s/CRF’s. So in short, if the HSM is being used here, CMF’s/CRF’s can be used to adjust the predicted crash rates used by the reliability methods, and as a result, the reliability analysis today can benefit from CRF’s / CMF’s, at least in terms of the crash predictions going into the front end of the reliability calculations.

- This would be beneficial and might need to be expanded to multiple facility types

- The techniques involved appear to be more complex than would be sustainable for our organization.

- No AASHTO or FHWA review

Research Advisory Committee

- no comments

- Reliability Analysis is still very new, not required, and seldom done. There is no need to refine it at this point.

- We are always looking to minimize the impact of incidents when they occur on freeways. This will better incorporate incidents and strategies deployed in the HCM for freeway facilities to impact the frequency or duration of incidents at a segment level.

- In addition to the HCM there are also opportunities within the HSM update that this could apply to.

- This NCHRP problem was submitted by Texas and Oregon DOTs.

- While the problem is an important one, the proposed solution falls short. Reliability depends on the recurrent congestion and all the non-recurrent congestion causes, of which incidents/crashes form one. Perhaps they are trying to improve on the current methodology and this may be the next logical baby step in the right direction!

- The influence of occasional incidents has been identified as a significant contribution to congestion, and is likely for
reliability as well. Planning based on reliability will require better data about incidents.

Item #90: Impact of Traffic Speed on Perceived and Actual Risk of Bicycling

Special Committee on Research and Innovation

- This will be valuable if it examines crash rates as opposed to crash numbers and both current and potential cyclists (latent demand).
- Bicycle safety is a growing concern for GDOT, and this guidance could be helpful.
- [Rating: 3] Many factors impact bicyclists perceptions of risk – roadway conditions (surface and geometric), traffic conditions (volume, density, component, and speed), etc. these factors are correlated and impact each other in terms of their impacts on bicyclists’ perceptions. The scope of the proposed study is too narrow and would impact the results and usefulness of the study.
- There are so many factors other than just speed that affect a rider's comfort level. Facility type and rider skill level play a much bigger role. A 60 MPH road with high volumes might be perfectly safe and comfortable with a class I detached trail next to it. However, a Share the Road sign and striping on a low volume 35 MPH road with on-street parking would feel terrifying to most. Conversely there are skilled riders that will "take the lane" on a high volume, relatively high speed, no bike facility road and feel comfortable. It's an interesting study, but we don't see studying speed alone as having a major impact.
- Perceived risks of bicycling has not been researched as much as the actual risk (i.e., crash data). It would be extremely beneficial to study this further as a complement to the AASHTO Bike Guide and HCM’s new chapter on bicycle and pedestrian safety.
- Not worth that amount of money
- This project should consider adding funding for the development of data to be included in the HSM, particularly as it relates to the development of a CMF or SPF
- Similar work is already underway regarding 'level of traffic stress'
- Speed is everything. Med. priority for MN. COAT supports; FHWA feels it's a low priority

Research Advisory Committee

- Research statement is not clear on the variables to be studied (or if there even is a problem) since the literature review process hasn’t been completed yet. (authors indicated the experiment design “will address as many critical issues as possible”). Not sure how useful this topic will be or if it will affect the design and use of these facilities.
- This research would help to define the correct level of service that should be provided for bike accommodations. Which is currently a hotly debated issue amongst policy makers.
- While important do not see an immediate benefit at this time.
- Might be beneficial to our bike/ped guidance.
- "I feel like this has already been researched. We know that bicyclists perceive traffic speed as an indication of risk."
- A similar need on perceived safety of bicyclists and peds was identified as a research need in Virginia. Another complementary ongoing study is NCHRP 08-102, Bicyclist Facility Preferences and Effects on Increasing Bicycle Trips (it looks at facility types rather than speed). Some perception data could be gathered at a potentially lower cost/with less risk using virtual reality bicycle simulators, which have been appearing recently. There’s a chance that this study falls into
the category of "common sense that should not require research," but perhaps not.

- There is value in a study that’s outcome is to have a better understanding on how traffic speeds affect bicyclists perceptions of safety and comfort when sharing the road with motorists. However, more emphasis should be placed on field observation studies, focusing on alternative solutions to improve bicyclist security, actual and or perceived. It is unclear what the intended outcome is, if there are safety impacts of various speed environments on bicyclists, will the report provide added guidance when addressing bicycle safety on higher speed facilities through design or crash implications. The challenge will be what is considered a reasonable accommodation or solution.

**Item #91: MASH Performance Evaluation of Safety Grates for Culverts**

**Special Committee on Research and Innovation**

- This research would be helpful in updating clear zone slope guidance in the AASHTO RDG; however, I'm unaware of any data that suggests that the current practices are problematic.

- Needed to evaluate slope stability and safety grate design using the current fleet of vehicles.

- [Rating: 3] It seems like updated information on culvert grating designs (including consideration of debris handling) is needed. The rollover study could be incorporated into what can be done at culvert inlets and outlets.

- It is better suited as an addition to existing pooled fund projects regarding roadside safety.

- With the rush to get other roadside safety devices designed and tested to MASH, no work has been done on safety grates. Wyoming has used safety grates in many situations and it can reduce entire runs of guardrail.

- NH does not use safety grates on their cross culverts

- TCRS - #4; endorsed by Comm. on Design but not ranked

**Research Advisory Committee**

- no comments

- A follow up study should be required to evaluate cogging factors and the resulting hydraulic efficiencies of the safety grates.

- IDOT has a need for a traversable grate design that works with skewed culverts.

- Although relevant to developing MASH approval processes, we have much bigger problems. Drift would clog up culvert grates.

- Current evaluations of slopes would be very helpful analyzing design standards and supporting desing decisions for performance based practical design.

- NCDOT would like a rep on this panel if not represented already. There should be sufficient crash data from across the country to determine if these devices are contributing to severity of crashes. Crash Testing is NOT a deterministic test, it is intended to be used in cases where insufficient data are available. I don't see this as a significant issue of concern in NC, but there may be some limited applications for safety. However, debris clogging concerns would be an issue of concern with such grates. Not beneficial to NCDOT.

- Extending culverts beyond the clearzone is a common practice that is very costly in ND. If more cost worthy options are attainable this research would be very valuable to us.
We have had tort issues related to this area.

A high degree of interest for this research one in particular is the parallel drainage structures. These were tested many years ago at 50 mph. Time to get these updated. I think we have other road side safety devices that should be tested first -- such as guardrail, utility poles, sign posts, lighting poles.

Project will provide useful updates to the Roadside Design Guide and is of national interest. To my knowledge, this has not been a major safety issue with our roadway departure crashes in VA, though.

Although a common application, this is a subcategory for which there are often alternatives. In the grand scheme of things probably not as important as others on this list. The risk of hitting a culvert is less than the roadside as a whole. Not as common in urban states.

Item #92: Outdoor Advertising Control Program Reference Manual for State Departments of Transportation

Special Committee on Research and Innovation

Consistent National Guidance would be helpful

This project is important because it lays foundational ground work for consistency in the regulatory framework in Outdoor Advertising Control. Currently, each state has its own parameters for the regulation of size, lighting, and spacing according to their federal-state agreement and customary use, as well as different approaches for the regulation of nonconforming signs. As the Highway Beautification Act (23 USC 131) was passed in 1965, a lot of the requirements in the law and the rule implemented to enforce the law (23 CFR 750) are outdated and don't enable the states to be flexible and efficient in regulatory interpretation and duties. If there is going to be any possibility of positive change in the Outdoor Advertising Regulatory framework, this project is definitely the next step to get there. As this project is to essentially build a consistent, nationwide, Outdoor Advertising Regulatory Procedures Manual, it will be invaluable to keep the states consistent as federal changes occur, and one day, could be as important to Outdoor Advertising Control as the MUTCD is to Traffic Control Devices.

[Rating: 4] Inconsistencies in program implementation will continue to exist, based on the needs of the State. However, this project has merit and that SDOTs could benefit from the Reference Manual.

This supports the development of AASHTO-related product deliverables that are currently (largely) non-existent in the national billboard control community.

Limited benefits expected with national OAC manual. States are bound by their Federal/State Agreements, which can be more difficult to change than even state statutes, and are not identical across the nation. It appears the legislative intent may have been to allow for differing applications of the 1965 HBA according to the needs and environment of different regions (not one-size-fits-all). Library of FHWA issuances - beneficial perhaps - must be viewed in proper context with FHWA assistance.

Would provide a good and useful end product.

According to NHDOT OAC staff the manual is not necessary and there are nuances with each state application of the federal standards that are based on the characteristics of that state. In other words the application of the standards in an agricultural state may be somewhat different than an industrial one.

Worthy problem/approach to meet an ongoing unmet need for SDOTs in trying to effectively meet FHWA requirements mandated by HBA and CFR statutes. Some high support but some concerns about value to all states.

Research Advisory Committee

no comments
The Outdoor Advertising Control program (OAC) has been in place for over 50 years. Unlike areas such as Materials, Construction and Operations that have AASHTO developed manuals and standards, the OAC program is lacking an AASHTO reference manual. This project will help develop the manual. An OAC reference manual developed by AASHTO would be very useful nationally as there has been significant turnover in state personnel and the learning curve with the OAC program can be steep with the irregularities of the program.

- Needed due to inconsistencies between federal and state laws
- Missouri ODA has documentation explaining the ODA program. We provide pamphlets, letters, and EPG guidance to our customers. It is all available to the general public
- ODA is a continuous issue for NCDOT. Any document that can provide consistency in practice could be useful.
- Providing baseline terms and standards as a nationally accepted best practices for state DOT's to use is essential. The language in the CFR and Federal-State agreements was written in the 1970's and is outdated and does not relate to current industry practices. State DOT's will save considerable tax dollars by providing a baseline to operate the OAC programs.
- VT has a no-billboard law.
- Might be useful but not critical.
- There may be some usefulness in having a common terminology and examples on how the different state DOTs administer their OAC program. However, the variations in state laws make it difficult to create universal reference manual as suggested.

**Item #93: Benefit-Cost Analysis of Chip Seal Binder Alternatives**

**F-02**

**Special Committee on Research and Innovation**

- [Rating: 3] This work would add to the body of knowledge regarding emulsion-based pavement preservation techniques, and would be useful to stakeholders, especially those considered on the local agency level.
- We have tried hot applied binder with chip seals with poor results. We have good performance with emulsified binders.
- don’t use chip seals. 36 months to collect meaningful data may be overly optimistic
- NH has a small chip seal program but would be beneficial to have this study performed as we use both emulsion and hot applied chip seals
- Problem statement has support from COM PTWG but some concerns by FHWA and NCHRP

**Research Advisory Committee**

- No comments
- This is valuable research. A person from materials would be the best representative. It seems to focus only on the binder alternatives. With different types of chips, different binders may be more effective. It seems to miss the concept that the stone available varies significantly across the country, so will the optimum binder.
- MoDOT probably doesn’t have a strong interest in hot applied AC binder for seal coats.
- Need more data on pavement preservation strategies. Preservation will be critical to SB-1 projects
- A useful project, but that is a lot of money. We are unlikely to implement hot applied binders as part of our chip seals. This is a very expensive project as well.
Not beneficial to NCDOT. We have spent 10+ years researching chip seals and have a very good materials spec. for our Polymer-Modified emulsions.

"Chip seal is being discussed as a future pavement treatment in Vermont."

Agree with NCHRP. A methodology is more important than a result here, given the potentially high degree of variation in the inputs to a cost-benefit analysis, e.g., seal purposes, material costs and performance parameters.

This work needs to be better scoped to address a full life-cycle analysis to be more useful. The focus on only binders limits the applicability of the work, and disregards the many other factors involved in chip seal performance. Development of an approach for life-cycle analysis of chip seals would have much wider applicability. The budget also seems excessive.

This research would help standardize the use of binder alternatives based on science rather than perceived performance or personal bias.

Item #94: Guidebook for P3 Project Arrangements and Performance Metrics

Special Committee on Research and Innovation

Legal requirements vary from state to state, so not sure something can be developed for all 50 states

Concern is not with need/value but potential for success as approached.

Strongly believe this is needed.

[Rating: 3]

UDOT sees a big need for this in our state and nationally.

For Iowa, this is probably low need. Rural states seem to have less opportunity for P3 projects.

Little value to a lot of states.

Seems like this has been done a number times.

Since the Department is only looking at a very limited number of P3 projects, and they are limited to certain types like rest areas and bus service, I don’t think this research would be of much value to NH. P3 projects are only viable if the private sector thinks they can make a profit on the project, so it’s not so much about the consideration of performance metrics as the research states. The Department/State also has almost no funding for these projects, and it is unlikely that a funding source will be created, so few of these projects are expected.

Med. priority for MN. AASHTO Committees support. NCHRP feels it may be duplicative and confusing.

Research Advisory Committee

We don't expect we have many P3 opportunities

With the trend of fiscal challenges facing the states, the P3 model and this study will become key to delivery of certain projects.

This scan/guidebook would provide excellent best-practice information to DDOT that could be applied.

Personnel needs more training on P3 projects.

The development of this guidebook (Project Arrangements and Performance Metrics) would fulfill a gap that currently
exists in the industry. Highway P3s are gaining momentum in the US; however, there is little guidance, if any, when it comes to the development of performance metrics to ensure the state DOT’s goals and objectives are met.

- This research will be useful to standardize and discuss best practices for P3 arrangements and financing options; however, in Missouri there will be little opportunity to apply what the study learns.

- Good project to see DOT goals and priorities and assessed by performance metrics for P3 projects.

- NDDOT has a strong desire to move into the P3 realm. However, one of our major problems has been identifying performance criteria that don't make our industry partners shy away from the projects.

- "As pointed by the NCHRP review, a variety of state resources exist for performance monitoring of P3 projects. The answers to the five bullets could first be developed as part of a synthesis. I suggest reframing this as a synthesis topic, where the states' answers to the 5 bullets are the focus; then, a more targeted research effort could be done if warranted. (For example: the second bullet asks what key performance metrics are used. Virginia's answer (http://www.p3virginia.org/ppta-resources/) could be that two sets of metrics are considered: "'hard benefits'' (e.g., reduced costs of operations) and "'soft benefits'" (e.g., economic development). Thus a synthesis could collect this information. Perhaps a follow-up research effort would then be to identify measurable metrics-but such a targeted follow up effort needs to follow the synthesis. A decent amount of "'learning by doing'" is going on nation-wide. I fear this project's final report would be dated before it is published.

- Lightly supportive of this proposal, as it seems to tackle an extremely complex subject matter. There are guidebooks/tools already in existence - DOT's are well aware of the existing resources. I don't see this proposal advancing the use of P3's very much.

**Item #95: Effective On-Bridge Treatment of Stormwater**

**B-05**

**Special Committee on Research and Innovation**

- Very specialized situation and not a priority for our region.

- Initial focus needs to be on the big fish - road runoff. Bridges should come later, if at all. Bridges are likely to be too costly and maintenance intensive to be economically practical.

- [Rating: 1] On-bridge treatment form of BMPs are not a widely accepted form of BMP. Most state DOTs prefer reducing the runoff of water before heading onto the bridge itself and also any form of scuppers on a bridge system calls for increased maintenance. This form of treatment may be prioritized in the western states, but does not represent a problem nationwide. Furthermore, NCHRP Report 778 "Bridge Stormwater Runoff Analysis and Treatment Options" may address some of the issues presented in this problem statement.

- Various best management practices are utilized to address pollution from highways including low impact development (LID) controls that infiltrate and evaporate stormwater, yet these controls cannot be used for stormwater runoff from bridge decks. More treatment options are needed for stormwater runoff from bridge decks. Much of the stormwater is discharged directly to waters of the state.

- Good overall benefit for projects

- This is a big issue and needs addressing for the reasons identified in the Background. There are media available, mainly proprietary, so I hope they spend most of their effort on Objective 2.

- NC study examined this and found that bridge runoff is not a significant contributor to NPS pollution.

- This seems to be a problem statement that could be helpful for bridges near waterways where treatment area is difficult.
The problem is worthy of funding but not a highest priority need. It was selected by AASHTO CES as their second highest ranked problem statement. AASHTO CES's #2 proposal. Some concerns expressed by CoD TCHH amd FHWA.

**Research Advisory Committee**

- Not supportive of filtering media for bridge drainage due to maintenance concerns.

- Would suggest other non-structural alternatives to reduce the annual containment loads such as non-peak hour street sweeping.

- This is an area where there is little information

- On-structure BMP's do not appear to be a critical need.

- Seems like a specialized situation, such as especially large bridges, vs. taking water off the bridge for treatment.

- Wildlife and environmental concerns could benefit from the implementation of on-bridge treatment.

- This is an ongoing issue (not enough research) and one that will become an even higher priority for our MS4 program. There are concerns about increased maintenance.

- Not supportive of filtering media BMP's on bridge drains due to maintenance concerns.

- Our NC study in 2012 indicated bridge stormwater runoff is not a significant concern. The Stormwater Runoff from Bridges Final Report to Joint Legislation Transportation Oversight Committee In Fulfillment of Session Law 2008-107 states "The weight-of-evidence considered in this study indicates that bridge deck runoff does not have a widespread effect on receiving waters and that NCDOT’s current use of storm water control measures for the mitigation of bridge deck runoff is protective of surface waters"

- Currently, ND doesn’t have the water quality regulations and limits that would require this level of treatment. This may happen in the future though.

- Not practicable in most locations - adds more issues to the bridge than it solves for the environment - and not mandated at this time.

- Given the amount of bridges VDOT owns and maintians, this could have a large impact. The project could potentially turn a bridge into a stormwater BMP, beneficially impacting our TMDL credits. The only thing I would be hesitant of would be the development of another proprietary treatment device that would require qualified (ie. manufacturer certified or provided) personel to maintain them as well as proprietary filters or other parts. This could increase the cost of maintenance significantly.

- There are no options to treat stormwater on bridges so this research fills in that gap of knowledge. There is a very delicate balancing act between treating bridge deck runoff, bridge design impacts due to stormwater infrastructure, and maintenance & operations. This research will look at all three to maximize highway runoff treatment while minimizing impacts to bridge design and maintenance & operations. It should give us a realistic idea of what on-bridge stormwater treatment options are available using recent stormwater research results with filter media.

**Item #96: Cost Savings Analysis of Statewide Insurance Pooling for Public Transit**

**Special Committee on Research and Innovation**

- This could be useful and a beneficial cost savings for small rural transit agencies. There is not much known on this subject and this study could provide information on how rural agencies could pool together insurance to save money and improve financial efficiency.
Summary of Comments

10-Jun-19

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- [Rating: 1] The research topic of cost saving for transit vehicles is important to the services of public transit, especially rural transit providers. The problem statement lists 3 studies on transport insurance from different angles, but none of them are directly on the proposed research topic. It is recommended to expand literature research on the topic of pooling insurance among clients of all sizes for cost saving, including insurance for other public services like health and disability insurance. The proposed activities cover a wide range of activities, requiring substantial resources for data collection and analysis. A change of the research scope with more in-depth case studies for successful experiences can add more insight in this area.

- Why isn't this a TCRP instead of NCHRP? May be of some value to fixed route providers.

- Would like to see this from the perspective of large and small transit systems, and also cover the issue of transit safety requirements and potential impacts to statewide insurance pools

- This project would provide NH with a cost benefit analysis to consider as well as aggregate data for the entire nation

- Med. priority for MN. NCHRP and FHWA reviews are favorable. No AASHTO committee review.

Research Advisory Committee

- The majority of our public transit agencies are local governments that typically participate in an insurance pooling program in Arizona or are self insured.

- Sugest RAC and APTA scans first. As an example Delaware is self insured.

- Not sure how relevant this would be for IDOT as a self-insured entity

- MI has a transit insurance pool. We get questions from other states on it.; Insurance costs are a barrier to affordable transit services. Michigan has a successful transit insurance pool that we should suggest they study.

- The market for insurance companies that are willing to insure transit vehicles are shrinking and those who are willing to insure are offering coverage at excessive rates seemingly in spite of good loss rates. More options are definitely needed, for sure in MS.

- Insurance has been an issue for a long time. If this proposal is funded, it might be a good idea for the State Public Transit Associations to be involved.

- I believe ND already has such an option for public transit agencies (the ND Insurance Reserve Fund).

- TN rurals utilize the TML Insurance Pool, which is already a consolidated statewide insurance option

- This seems EXTREMELY worthwhile, provided it really hasn't been done before. This is a good research topic to look at analysis of Insurance Pooling, but it also should review the legal issues of pooling. Some transit providers have had problems to qualify for pools because of local or state laws. Maybe should look at what should be included in regular insurance packages and provide a comparison.

Item #97: Strategies to Maximize Vehicle and Equipment Resale Values to Optimize Fleet Total Cost of Ownership

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<td>This would necessitate legislative changes to state administrative and budget policies.</td>
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- [Rating: 4] NCHRP has, over the past 3 or 4 years, conducted several projects that involve fleet assets, and this present project would add significantly to that body of knowledge.
My scoring would have been higher if the NHDOT had direct benefit to resale values. As it stands, any funding obtained from sales has 12% taking off the top for Admin. Services and the balance goes to the Highway fund. Proceeds from sales do not have any direct positive effect to our fleet replacement plan funding.

This may be beneficial to MnDOT's fleet strategy. Has TRB committee support and would be of value for asset management.

**Research Advisory Committee**

- Very important effort, but would be difficult to replicate to DOTs as they have different procurement methods. Even if this research would be conducted it would have to be additional efforts to fit states individual state procurement methods.

- This should be studied by NCHRP and is a value to all public sector fleet operations

- This research has immediate impact upon our DOT's struggle to dispose of equipment while maximizing the disposal value. Our current process is not working very well.

- DOTD can benefit from this research, although any direct financial benefit from strategies would be mitigated due to the current arrangement for any proceeds from sale with Louisiana Property Association Agency.

- There are multiple factors that MDOT has no control over when dealing with vehicles or equipment needed by the agency. These factors are dictated by our State Legislators and include new equipment / vehicle budget monies, no purchase moratoriums, and higher vehicle mileage requirements before disposal. Since MDOT's vehicle fleet is controlled so closely adhering to a replacement schedule is problematic.

- Very useful to MoDOT.

- Interesting idea. NCDOT could do better to recoup more return from equipment sales. This data could be very useful to provide standards of practice.

- Since emanating from and being endorsed by AAHTO's Committee on Maintenance a research need exists in this area. The problem statement could have been better developed and $300K seems high for a survey of states, analysis of survey and developing a decision tree; hopefully the research is more involved than that.

- This research is a low priority for WSDOT. We are mandated to use DES for equipment disposal.

**Item #98: Capturing Low-Incidence/High-Impact Travel in Household Travel Surveys**

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**Special Committee on Research and Innovation**

- It will be important to identify new behaviors resulting from emerging technologies, and those technologies will be adopted by a small set of early adopters. Identifying important questions, or methodologies for DOTs to use in their surveys would be useful.

- [Rating: 5] The issue has been the NHTS's weakness from the program's inception. Both the method and data challenges to be researched will have significant positive implications to all household based survey programs including the NHTS.

- Unclear of the benefits for low incidence events

- Information in the overall scheme of the data, would most likely have limited impact on the analysis results.

- To capture emerging travel behaviors, a larger number of surveys are needed for correct estimation. This research would be useful. FHWA supports.

**Research Advisory Committee**
Research is needed on obtaining low-incident travel behavior information given that responses to telephone and mail surveys is declining precipitously.

Of interest due to new emerging modes such as UBER, green bikes, automated vehicles

Suggest a study using blue tooth tracking instead.

Will establish best practices for gathering data on long distance travel and on emerging modes of transportation.

Of little use to Missouri at this time.

This seems intriguing and potentially viable.

"Makes a good case for this being an unmet need and for now being the time to meet it, before the next NHTS. Doing all the potential research tasks listed might exceed the proposed budget. This topic is interesting and important. A successful final report would have high value for researchers and practitioners. I estimate the probability of success at under 50%.

Item #99: Evaluating and Improving Current Practices for Temporarily Deterring Bat Use of Bridges

Special Committee on Research and Innovation

[Rating: 5] A comprehensive guide to bat deterence methods will benefit the bridge reconstruction program and conservation goals.

Study is a lot of money but it may be useful if more bats are listed and consultation becomes part of project development

Problem co-developed by MnDOT’s Wildlife Ecologist and represents an issue of increasing concern for state DOTs inclusive of MnDOT. AASHTO CoBS says med. Priority. NCHRP says budget needs to be increased. FHWA says there could be some value.

Research Advisory Committee

Although not all bats are listed species, most DOT’s still include avoidance and deterrence methods. It would be good to have a national source of mitigation to pull from. It will likely aid in many highway projects.

Caltrans has information that could be of use to the project.

In CT we work closely with our State DEEP and are aware of the few hibernacula locations in the State. Our bridges have yet to be identified as habitat for any species of bats and we have not had the need to deter bat nesting on our bridges. If you can find a way to keep falcons off of our bridges, please let us know...that has been an issue for us!

New and improved methods of bat deterrence would be useful.

This research would not only aid in the preservation of bat populations, but also reduce construction delays.

It would be good to investigate this safety/stewardship/wildlife protection issue.

Synthesis first

Any methods to deter bat use from bridges would prove positive for DOT’s. It is likely that more bat species will become listed in the future so the issue of bat usage on our structures is just beginning especially if a bat is listed as endangered rather than threatened. Threatened species allow us to use the 4d rule such as currently with the Northern Long-eared bat.
Summary of Comments

A study to find potential solutions to exclude bats usage on our structures would be a positive.

- yields an unpredictable degree of benefit to a narrow benefit group

- Bats are certainly a concern in Virginia, and in particular, for DOT bridge divisions, given the impact on maintenance of existing structures. However, this project would seem to be a good candidate for a synthesis project, given that no new solutions are proposed for study, and it is likely that solutions in existing literature have been well studied. A reduction in funding is recommended. The proposed project includes field evaluations of select techniques, which is an important component in order to provide a comprehensive guidance document/website. Suggest that findings from the ongoing NCHRP project (Task 102) on artificial bat roost designs be incorporated/communicated in the final deliverables so DOTs have one source of information on effective exclusion techniques and roost designs. This research could be very beneficial to our T&E staff in negotiating with resource agencies.

- There are no listed bat species in Washington. However, bats are protected under state law. There might be limited benefits to WSDOT.

Item #100: Enabling On-demand, Multi-modal Trips to be Booked in Real-time in Rural America

B-24

Special Committee on Research and Innovation

- More interest in B-19.

- (Rating: 5) This research addresses a challenging issue for rural communities. The technical solution and approaches will be very valuable for all communities. From a practical standpoint, the implementation of such a system will be challenging.

- This topic is of interest to public transit systems in Iowa, and the Iowa DOT.

- Little to no value for very rural areas. Should stay away from research statements that say "working with one state…"

- NH lags behind in transit technology, woefully so in our most rural regions; this may provide real-time technology solutions for rural transit riders, but the benefits may have some limitations as regardless of the technology available, the number of transit resources (bus systems, etc.) is still quite limited in rural NH

- Part of the rural research roadmap effort.

Research Advisory Committee

- There is a lot of overlap on the rural transportation requests. None of which are holistic. There is an answer here somewhere that involves public private partnerships. There are at least half a dozen transit organizations trying to solve this and related rural issues. APTA being one of the more important groups. Research should be coordinated with them.

- Too few transit providers in rural areas to make this idea work.: Many tech firms are already developing such software platforms…this seems to be taking out competition and innovations found in the private sector, especially be start-ups.

- The evolution of multimodal trips as a meaning access solution must include the effective deployment of this type of technology.

- The problem is real, but the proposed study does not appear to fully address the issue.

- Rural transit providers in TN have expressed a strong interest in on-demand, real-time booking services.

- We are seeing a lot of interest in Mobility on Demand services/applications in smaller urban or rural areas of Virginia as well as reservation-based options so looking at best practices is of high interest.
**Summary of Comments**

**10-Jun-19**

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<td>At least in Washington State, there is a considerable difference between deviated fixed-route services (usually required to be within a mile or less of a fixed route) and demand response, which is usually highly subsidized and travel to a much larger range of areas. Most people who use demand response take it for the full journey and are not looking to save money or only use it to get to a trunk service. I also do not agree that much of the current transit-related technology has been for urban areas. Across Washington, all 32 transit agencies maintain GTFS data, from large urban, to small urban, to rural. Finally, I am not convinced there is a high likelihood this research will be successful. Integrating multi-modal trip components with a single source payment is challenging before adding in deviated fixed-route and demand response services. It is also arguably more useful. This proposal feels like it is trying to answer a question too far down the queue.</td>
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**Item #101:  Challenges, Gaps, and Solutions in the Deployment of Advanced Traffic Control (ATC) Systems**

**Special Committee on Research and Innovation**

- Seems like this could be a discussion for other AASHTO communities than R&I.
- [Rating: 2] The issue presented in the problem statement is likely an outcome of gaps in workforce capability at state and local agency levels. The proposed research would explore and document ATC technology solutions, but may not be timely and would quickly become outdated given the NCHRP research lifecycle. An alternative approach such as a pooled fund study, or improvements in systems engineering practices would provide more timely outcomes.
- ATC systems are rapidly expanding. Any collected data will be obsolete quickly.
- This is emerging in rural type settings and lower volume urban areas. Needed information.
- No clear benefit of research
- This might be a good study, but the problem statement is lacking in detail and would need to be further developed before I could rate it any higher.
- No committee endorsement; other reviews don't say that this is a strong 'need'.

**Research Advisory Committee**

- CTDOT investigating new ATC cabinets. Participation and outcomes of this problem will be useful in making informed decision. Concerned about lack of specifics in this problem statement regarding timeframe and other critical details.
- There is a lot of information about ATC systems out there. Having a document summarizing all of the information in one place would be helpful.
- "While I support the idea behind this I do not think this will produce an outcome of great value."
- Not clear on value here. There are already many surveys on signal control systems
- The problem statement would be better served to include hardware limitations and issues, such as a lack of standardization of hardware. There could be some benefit to the research, but most of the information isn't as complex as implied for basic operations - benefits would be more related to expanded use of ATC systems beyond typical traffic signal/ramp metering applications.

**Item #102:  Selecting the Appropriate Magnitude, Boundaries, and Methods for Value Capture Funding**

**Special Committee on Research and Innovation**

- Already EDC5 so not sure how much additional research is needed.
Summary of Comments

Reviewer | Comments
---|---

- [Rating: 5] This is a project of high usefulness to something FHWA is currently promoting. Value Capture is one of the EDC-5 innovations. The problem statement and subsequent materials coming from this project should acknowledge the EDC-5 Value Capture Initiative.

- As needs continue to far outpace traditional revenue sources, public entities are increasingly seeking innovative project funding and financing methods, including value capture. This research strengthens understanding of what is appropriate and valid when considering boundaries, methods, revenue, and benefits of a value capture project, reducing risks to the project.

- Will not apply to Wyoming.

- The State has decided not to pursue Value Capture (EDC5) because there are possible legislative barriers to implement and the DOT lacks the authority to implement any funding changes.

- Lower priority for MN. Some concern by AASHTO and NCHRP on methodology

Research Advisory Committee

- There are already studies (TCRP Research Report 190 and NCHRP Synthesis 459) that have captured information on this topic. The are other problem statements with higher priority.

- Currently a hot topic in transit corridor planning.

- The applicability of this research is likely limited to DDOT's context because: 1) it appears to be limited to auto focused projects, and 2) boundaries are almost certainly going to be set by politics, not by empirical research

- Very valuable. Will assist in setting impact areas for Value Capture projects.

- This isn't a current problem in our state.

- Research about the impact transportation improvements have and the resulting value are of merit. DOTs need to be aware how road improvements make a larger economic impact on an area and what benefits can be realized.

- More can be covered by GIS and tax boundaries reported to the state

- Not currently how NCDOT evaluate benefits but I could see the value.

- The 2nd highest research priority for the Committee on Funding and Finance

- Some Virginia case studies are available in VTRC report 15-R2, Local Government Funding and Financing of Roads: Virginia Case Studies and Examples From Other States. NCHRP skepticism notwithstanding, this is worthwhile from a practical standpoint and VTRC has at least two reports to offer to the effort. Decay standards that are universally acceptable might not be feasible for every VC tool

- The proposed study addresses a current problem, as existing revenue sources are being challenged by factors such as increased fuel efficiency, it is imperative that DOTs find new ways to diversify and strengthen their revenues. The proposed study is appropriate for NCHRP and is of nationwide interest. There are no similar efforts already underway elsewhere to our knowledge, however there seems to be a great interest in this subject. While we believe there is a high probability of the research being successful, the challenge will come from how the results are implemented by the various DOTs. There is no known anticipated return with respect to cost at this time.

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Item #103: Developing Cost-Effective Approaches to Site Selection for Wildlife Crossings

B-04

Special Committee on Research and Innovation

- Interesting work but many locals and wildlife agencies are also studying this.
Summary of Comments

Reviewers: Comments

- [Rating: 5] FHWA supports this project, but recommends a lower funding level.

- We helped develop this proposal. Would be useful for WY and other states. Could be redundant to current research we are doing. If other means are available beyond collaring animals, this could help.

- Proposal is short on background data but lit search should fill that in. $350,000 seems a little high for lit search and model. Work should review previous modelling Schilling, UC Davis, Steckler TNC-NH. Etc. to avoid redundant modelling. It will help MaineDOT figure to when passage is warranted and since increased safety is also a factor, it has value.

- Not a NHDOT priority

- Circuit theory has the potential to help prioritize wildlife-crossing locations at a large scale (regions) and reduce need for high-cost/time-intensive bio studies. Reviews seem mixed but the project could address some gap areas.

Research Advisory Committee

- Caltrans has information that could be of use to the project.

- While we can appreciate the need for this nationwide, we have only one wildlife crossing in the state thus far, which was on a section of relocated highway. With most of our projects consisting of state of good repair projects, and very few (no) highways on new location, this topic has limited value for our state. With state budget constraints what they are, retrofits or improvements are not in our near future.

- This is a nationwide issue. Road departuers and overcorrections in order to avoid WVC often lead to serious injury. Would like to a second phase to this beyond the search and summary.

- This research would be very useful our DOT. We currently are grappling with many of the issues that this research is targeting. The outcomes of this research would likely help us determine a path forward.

- It does not appear that wildlife-vehicle collisions involve many T&E species.

- With crossings so varied do not see a high benefit to MDOT.

- This isn't a current problem in our state.

- It would be good to investigate this safety/stewardship/wildlife protection issue but may not be practical for Missouri.

- ND motorists continue to have WVC conflicts, especially with increased road widths, increasing traffic, increased speed, and as bridges (provide natural corridor passage under the road) are removed and replaced with boxes or culverts (always in standing water and don't allow most terrestrial animals to cross). DOT needs to acknowledge this and needs to begin considering these effects to motorists and wildlife. Even though NDDOT has always expressed difficulty in locating crossing sites or knowing what is proven to work, there is already ample research and information out there on this subject. Since locating crossing sites is mostly data-driven, it would be in NDDOT hands to increase its data collection efforts.

- ditto

- STID staff have been involved in researching wildlife crashes and have coordinated with other agencies on this task. This research would be beneficial to our investigations.

- "This research is very timely and relevant as there is an increased push to incorporate compost on more VTrans projects, however there has been some hesitation due to concerns about phosphorus leaching. Based on conversations with compost suppliers, however, they are generally producing one basic mix and I'm not sure how likely they would be able to adjust their operations to provide a specialized mix, which is what I understand this research would hope to identify."

- Proposal is well written and fiscal benefit is clear. Would expect comprehensive efficacy-testing of siting models to be
time-consuming (30 months) but rigorously documenting the best model(s) could raise siting success at lower cost. This project would address a large gap in implementing a proven method of wildlife crash reduction. If the project provides guidance on optimal modeling method used, this could save time and resources for DOTs.

- WSDOT has been immersed in applying these methods for years and it’s unlikely this new research would provide new insights for us.

**Item #104: Predicting Urban Street Speed and its Relationship to G-20 Reliability and Level of Service**

**Special Committee on Research and Innovation**

- The establishment of a straightforward HCM methodology to estimate speed is expected to assist agencies and practitioners. There is a need to develop an enhanced method to predict speed and its relationship to reliability and level of service that can be implemented in the Highway Capacity Manual methodology for signalized intersections and urban arterials.

- [Rating: 2] The problem statement states that the HCM provides a reliable methodology to estimate urban street speeds and has been improving throughout it numerous editions. On the one hand, it states that some agencies have developed their own methodologies due to the complexity and data requirements of the HCM model. It also states that some studies have shown low values for the coefficient of determination of the HCM methodologies and further suggests that more research might be needed and nonlinearities and interactions should be investigated making the model even more complex. On the other hand, the problem statement states that it is desirable to keep the model as simple and straightforward as possible and the establishment of a straightforward HCM methodology is expected to assist agencies and practitioners that could benefit from the large effort and data background that were involved in the development of the manual. Not sure how developing an enhanced method would simplify the model and make it straightforward. If anything, it would make it more complex especially if nonlinearities and interactions are taken into consideration.

- Could have linkages to G-11 and G-13, and this seems like to low of an amount to provide for the objectives desired.

- Probably limited applicability to NHDOT jurisdiction roads.

- COAT supports but not ranked. FHWA gave it a low score; NCHRP recommends a budget of $400K and 30 months. Lower priority for MN.

**Research Advisory Committee**

- no comments

- Seems at odds with bed and bike concerns in urban areas.

- This NCHRP problem was submitted by Oregon DOT in collaboration with Texas DOT.

- "Limited applicability to VT, but actually correlating HCM values to real-world measurements seems like a worthwhile endeavor."

- Agree with FHWA, the problem statement filled with conflicting statements. With the proposed funding, I don’t think this research can develop a widely-applicable model with sufficient data.

**Item #105: Force Multiplier Toolkit for Rural Traffic Safety Enforcement**

**Special Committee on Research and Innovation**

- Not of high priority, but enforcement community may feel differently.
| Rating: 2 | This research will support the agency’s focus on rural road safety and provide actionable guidance for agencies to supplement LEO activities with infrastructure solutions. This would be a great addition to our rural road safety toolbox. The problem statement, however, offers little explanation on how this toolkit could be approached. Perhaps this should be considered as a synthesis project.

- This seems like a good idea, but the research is geared to apply information to Law Enforcement rather than a broader audience that could help small enforcement areas.

- Good question for law enforcement…

- Part of the rural research roadmap effort.

**Research Advisory Committee**

- No comments.

- The majority of traffic fatalities in our state occur on rural roadways. Guidance on ways to expand traffic enforcement would be helpful.

- FHWA seems to have this covered already. The safety page of their website has a lot of information including tools, guidance, and countermeasures for safety on rural and local roads.

- Suggest that this is probably more appropriate for GHSA’s research arm.

- "Relevant to Vermont given issues with lack of law enforcement manpower to enforce speed."

- "This is a useful topic that is best addressed as a synthesis. Places that have limited resources for enforcement would tend to have limited resources for implementing alternatives, so not sure how useful this would be.

**Item #106: Best Practices in determining rural transit fleet size – How to provide service for changing demographics of rural ridership (Right-sizing of rural transit fleets).**

**Special Committee on Research and Innovation**

- Right-sizing rural fleets is an issue that the transit program is trying to help subrecipients with. Focused research proposal.

- [Rating: 4] This research will be useful to rural public transit operators and State DOTs who have responsibilities for oversight or management of rural public transit programs. It will provide useful information to rural public transit operators and State DOT rural transit units on how to plan for rural transit fleets based on changing demographics, cost management, and the effects of limited budgets on vehicle procurement needs.

- The results of this research save funds by developing a tool to reduce the likelihood an agency will overspend on rollingstock with passenger capacities beyond what is needed. This research will also reduce the likelihood an agency will expend additional operational resources (dispatch extra drivers/vehicles), due to having more passengers at a stop than available capacity. We strongly support this proposal and intend to utilize it with Iowa’s twenty-three non-urbanized public transit systems.

- Little to no value for very rural areas. Does not apply to Wyoming. FTA and State funding for busses would not allow expansion.

- Demographics will be different in each state, as are the transit systems. May be of limited transferability.

- synthesis
NHDOT and NH providers are struggling with right-sizing their fleet and trying to plan for future capacity needs.

This is a huge need, especially with the sharing economy, decreasing and aging rural populations, etc.

**Research Advisory Committee**

- Arizona transit agencies are having challenges in determining fleet size and composition. This would be very helpful.

- Local transit demographics are so unique rural transit managers are on top of this issue. No need for study.; Although selecting the correct size and mix of buses is I think there are higher priorities for agencies.

- We have seen in the past years a decrease in the number of transit vehicle manufacturers that will even respond to our RFP’s. Also the process to procure vehicles has significantly slowed, to the disadvantaged of subrecipient agencies, due to changes in policies/regulations from the State and Federal level. Hopefully the study will provide and avenue for having more vehicle options to select from. One size definitely don’t fit all.

- With the two largest rural transit providers in the country as MoDOT subrecipients, this could be a very useful research to assist with appropriately sizing rural transit vehicles.

- This is a good research topic with changes in technology, guidance given to a rural provider for vehicle selection can very helpful; should also include other technology that is used on the vehicle.

**Item #107: Impacts of Color, Intensity, and Duration of Emergency Traffic Patrol Lights on Human Perception**

This research is of value and the need to investigate human behavior and response to color, intensity and duration of emergency vehicle lights. Agree with the FHWA recommendation concerning age and suggest studying younger, middle, and older (65+) age groups in the study.

Feel like this should be research for the enforcement community.

(Rating: 3) Good problem statement to understand impacts of colors and visual characteristics of lights of Emergency Traffic Patrol (ETP) vehicles, but the approach could also consider how these things affect people as they age.

We like the portion of this that captures the negative effects of the brightness of the lights. The blinding effect is a safety concern for "participants" in a traffic or law enforcement incident.

It is not clear that provides much value for the cost of the project

We have received many complaints over the years of very bright lights and or too many lights on projects. We also have talked about this on my other work zone NCHRP panels and it is a very real issue that needs research.

Some interest for FIRST vehicle lighting although we did some similar research several years ago. No committee endorsement. NCHRP suggests it may be better 'owned' by NHTSA.

**Research Advisory Committee**

No comments

There is a need to better understand the impacts of different colors, intensity and durations of emergency vehicle lights on human perception/reaction. Another important aspect of human perception to emergency response vehicle lighting (including police vehicle lights) is maintaining incident-scene safety for emergency responders. Hence, this research is highly important to the Maryland DOT State Highway Administration.

We've had emergency responders continue to increase the intensity of lights on vehicles and this has generated
complaints and concerns about blinding motorists as they approach.

- Would be nice to have research with recommendations on this topic.
- The intensity of some lights especially white lights have high glare and can blind drivers similar to those on Nashville's plow trucks.
- "Interesting project but this seems the wrong avenue to pursue it."
- The impacts of color, intensity, and duration of emergency lighting on human perception have been well studied for emergency vehicles (many studies by FEMA, IAFF) and highway construction & maintenance vehicles. Limited studies were conducted specially for highway patrol vehicles, but some results from those studies on emergency lightings for other emergency vehicles could be useful for highway patrol vehicles. Practical impacts of this study seem limited. At an incident scene, there are a number of different responders and the variation of lighting colors and pulse frequencies is something that would be difficult to analyze. Taking one vehicle's color and pulse patterns may be effectively studied but this typically isn't a real world scenario at incident sites.
- Human response to emergency vehicle lights is important to both the safety of the traveling public and the safety of our responders. But I do not see this research leading to substantive safety improvements any time soon.

Item #108: Guidebook for Safe and Effective Application of Bicycle Boulevards

Special Committee on Research and Innovation

- This is important research. Bicycle boulevards are a very cost effective way to decrease bicycle level of stress and increase bicycling in a community.
- [Rating: 4] Recommend that the Research Objective recognize the need to consider connectivity and access to destinations when planning bicycle boulevards, as well as designing safe transitions between bicycle boulevards and other connecting bicycle facilities.
- Enough has been published
- More of an issue for large metro areas.
- Yes, guidance on bike blvds is needed. Good research that is limited in its benefit for MnDOT, but could be beneficial for local road authorities. Not overly strong support.

Research Advisory Committee

- Lower priority on state routes but could be of broader interest
- combine with C-25, bike boulevards are on street bikeway designs. There appear to be at least two guide available.
- This type of accommodation is not compatible with a state highway.
- While important the above research would be more beneficial to MDOT.
- Might be beneficial to our bike/ped guidance

There should also be a quantitative analyses of pedestrians that use the same facility. There removal of the motor vehicle changes the dynamic of the cars being the problem to some one else being the safety issue. We see this on shared use paths, micro transportation devices on sidewalks, etc. I think the concept is good and may have it place, but it will also conflict with the interconnectivity of streets that planners like to create.
Summary of Comments

- This research fits well with our customers' desire for more active-transportation features and this one seems like a potentially cost-effective tool we could put in our tool box of options to consider.

- Likely of more interest to cities

- Bike boulevards are increasing in use but have limited applications on a large scale. Some guidelines do exist. Consider a synthesis. The cost-effectiveness assessment is especially interesting. Design treatments could consider the advisory bike lane concept, although that could also be its own study. Odd typo in 2nd Implementation Planning paragraph: this would increase, not reduce, the safety and effectiveness of bicycle facilities.

- Important topic to examine as low-cost infrastructure approach for an all ages/abilities network.

Item #109: Improving Traffic Incident Management in an Automated Vehicle Environment

Special Committee on Research and Innovation

- High Priority for region

- Is the proposal premature, especially since there aren’t enough ‘AV-pool’ of vehicles? While agreeing with “how automated vehicles react when approaching traffic incidents is not well understood among incident responders,” is there a way to get to reasonable results with minimal vehicle penetration rates? This could be an NCHRP Synthesis at this stage rather than a full Panel project. Both project duration and budget are reasonable.

- Has been of interest to TIM community in Georgia.

- [Rating: 5] NCHRP staff commented that G-16 has potential overlap with NCHRP Project 20-102(16). While FHWA agrees that overlap is possible, more likely a second similar and related project will enhance further study that will likely be needed as the technology and other research in this area advances. FHWA contends that additional research will be needed given the NCHRP Project 20-102(16) budget amount and the time separating the two projects.

- We think this is valuable research, but maybe a bit premature. Today's Level 2 systems have an aware human at the controls. We don't have Level 3 vehicles yet, and we're not sure how to answer these research questions without those vehicles in operation -- at least a few of them.

- Believe the first responder communication with AV during emergencies needs to be flushed out.

- It seems that this type of project is being done elsewhere.

- Already NCHRP project active on this topic.

- Be interesting to know how CAV will impact TIM. No committee endorsement. NCHRP recommends waiting to see what comes from 20-102(16). No MN support.

Research Advisory Committee

- As AVs join the vehicle fleet, there is high concern regarding how to interact with them during an incident. TIM involves many different agencies, operators and all need to understand and adapt to AVs.

- no comments

- This is one of the top ranked projects for Michigan.

- The research could potentially identify concerns that have not been identified or addressed by vehicle manufacturers, possibly minimizing the risk of injury to responders. We should confirm that the research is not duplicating vehicle manufacturer research.
Summary of Comments

Reviewer | Comments
---|---

- Good subject matter to research on how AV will react to stopped emergency vehicles along the shoulder of roadway.
- TRB recommends waiting on this based on ongoing NCHRP 20-102(16) results.
- "While this is an important topic, I am not sure the pace of an NCHRP project is a good fit with the rate of change of this technology."
- "This study may shed some light on how CAVs may behave when approaching incidents, by reviewing industry literature and interviewing industry professionals. I, however, don't feel this project can bring a solid/applicable result into the state-of-practice. A compendium of information produced by documenting existing literature and interviews seems insufficient to understand automated vehicle behaviors and produce training for TIM responders. Not a high priority for VDOT.
- Research proposal and deliverables are unclear. The research proposal also fails to recognize one of the most significant efforts in this area. USDOT Work zone Data exchange.

Item #110: MIRE Data Requirements Supporting Safety Improvements on Unpaved Roads

Special Committee on Research and Innovation

- Data analysis for unpaved roads is needed and can be applied in Florida.
- [Rating: 4]
- This idea is good, but limited in impact. The handling of MIRE FDE data requests remains a concern, but from a research opportunity perspective, we believe there are more impactful ideas to research.
- There has been many studies by the States on Unpaved roadway safety, and research conducted with tribal entities, that needs to be reviewed to enhance this proposal.
- This has limited value to WSDOT but could be of benefit to more rural communities
- Low priority for the Department but aware of issues for infrastructure planning for OHRV access.
- Submitted by SCORI. No other committee support or FHWA review.

Research Advisory Committee

- See very limited need for this due to the extremely low number of unpaved roads in the State Highway System.
- Within CT, where only approximately 2.5% of our public road network is unpaved, it might be a little less applicable. The proposal is 100% correct in that the FDE of MIRE were created to allow for network screening and safety analysis, and the low-level of attribution that is required on unpaved non-local roads does not allow for any robust analysis. The idea of attempting to develop specific attributes for unpaved roads, that would be unique from those applicable on paved roads offers a lot of potential as well for very specific types of analysis. This research proposal states that determining the feasibility of collecting this data is integral to any type of widespread adoption, and that would be where CTDOT has a lot of interest. Currently, meeting the MIRE FDE on unpaved roads is elective, but a lack of FDE makes those roads ineligible for HSIP funding. If additional attributes are to be required on unpaved roads CTDOT would want to know if they would be required or optional in order for those roads to still be eligible for HSIP funding. Adding elements to allow for more robust and applicable analysis on unpaved roads is a worthy pursuit, but including them as an optional supplement to MIRE, as opposed to a mandatory element (similar to the existing FDE) might unnecessarily burden our data collection efforts.
- While only 3% of all crashes occur on unpaved roads in our state, 9% of fatal crashes occur on unpaved roads. As we look towards funding safety projects at a statewide level, knowing what data will help identify systemic issues may be
Summary of Comments

10-Jun-19

Distribution of Ratings

Reviewer | Comments
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**important.**

- This provides data elements related to safety analysis.
- While this is important to many states, we have few unpaved roads in MA so this is not high on our list of priorities.
- MDOT does not own such roads.
- We do not manage unpaved roadways.
- We still maintain a relatively high volume of unpaved road. Maintenance funds available are minimal, so while this research could be useful, I'm not sure how much could realistically be invested to make improvements to unpaved systems.
- We have chosen to not collect this MIRE data as we do not invest HSIP on unpaved roads so PA would not get much value out of this effort.
- TxDOT does not have unpaved roads on-system. Primary benefit would be to county roads.
- Although data limitations are a big issue for unpaved roads, I would not list this as a high priority for VDOT at this time. VDOT's roadway inventory of those facilities exceeds the FDE requirements, so this is less of an issue in VA than elsewhere.
- This has limited value to WSDOT but could be of benefit to more rural communities.

**Item #111:  Best Practices for Project-Level Analyses for Air Quality**

**B-02**

**Special Committee on Research and Innovation**

- Would not be useful without accompanying regulatory revisions.

- [Rating: 2] This problem statement is not likely to produce a useful product because it is trying to do too much at the same time. It has asked the contractor to include all aspects of project-level air quality analysis from scoping to documentation and asked for the inclusion of all pollutants including CO, PM, MSATs, and GHGs. It would be more useful to focus on quantitative PM hot-spot analyses done for transportation conformity purposes, which the problem statement refers to indirectly in Section 7 "Urgency and Potential Benefits" when it mentions "much more complicated modeling requirements...introduced in 2010". A Systematic assessment of all of the quantitative PM-hotspot analyses conducted since the 2010 requirement was put in place would be helpful to get the big picture of the number and type of projects that these are conducted for and the best practices for conducting them as illustrated by a few case studies. The problem statement should be careful to only ask contractors to write best practices and not guidance, which should be left to federal regulatory agencies.

- Iowa Does not expect to have to complete a conformity analysis in the near future.

- Lead to improved and consistent project level analysis.

- Good project but high cost

- This is not major issue for MnDOT and won't be in the future… Proposal has good ideas/ suggestions and might be helpful for MN but not necessary as we have good air quality and don't have to do much modeling. AASHTO CES's #1 proposal. NCHRP thinks it may fit better under 20-44 or 20-123. FHWA not as favorable.

**Research Advisory Committee**

- Need help in Fairbanks area
Summary of Comments

10-Jun-19

<table>
<thead>
<tr>
<th>Reviewer</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Caltrans has information that could be of use to the project.</td>
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<tr>
<td>Particularly of interest for project requiring a MSAT analysis and any future required pollutants</td>
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<tr>
<td>There have been such tremendous strides for the auto industry in regards to Air Quality. LA is a great example of the success. Maybe the entire regulation should be revisited.</td>
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<tr>
<td>PLA’s are becoming more expensive, time-consuming and complex</td>
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<tr>
<td>Will provide a website and tools for best practices that could be utilized for all projects requiring AQ analysis. If funded would allow B-10 to focus only on regional conformity analysis.</td>
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<td>MPOs do PLA in STL (the only non-attainment area in Missouri).</td>
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<td>Time saving and standardization of processes across the US.</td>
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<tr>
<td>ND is a Non-Attainment state for air quality so limiting regulations aren’t currently in place. Obviously this can change in the future especially with more and more industry and development in the Bakken.</td>
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<tr>
<td>As described, the deliverables will be useful but this is a large undertaking and consideration should be given to combining with 2020 B-10.</td>
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<td>Streamlining and improving the processes for project level air quality analysis are much needed. We have had issues with consultants not properly completing analysis. Additional documentation to outline best practices would reduce the effort needed to complete WSDOT air quality analysis.</td>
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Item #112: Streamlining Transportation Conformity Processes

B-10

Special Committee on Research and Innovation

Good concept but similar to B-02, would require regulatory change to be useful.

[Rating: 2] How will this research help with streamlining the process without statutory or regulatory changes? The conformity requirements were prescribed in details in the Clean Air Act. Optioned to "streamline" the process would require changes in regulations (or statute) before they can be implemented. Also, if the focus is to collect information on time and resources that State DOTs and MPOs spent on conformity, AASHTO already has that information. On January 17, 2019, AASHTO submitted comments on a recent EPA rulemaking on transportation conformity information collection effort, in which they provided detailed information on estimated and actual costs for meeting conformity requirements.

Iowa DOT hasn’t done a Transportation Conformity analysis, this research may come in handy in the future by looking at ways to make the process more efficient.

Issue for large cities

Streamlining would help most DOTs

Agree with FHWA/NCHRP evaluators that effectiveness of the approach is too constrained by regulatory environment also not a big issue with MN air quality. No AASHTO Review; FHWA not overly supportive.

Research Advisory Committee

NEPA has allowed more types of projects to be considered CE’s and thereby not requiring air quality analysis. There is a disconnect with conformity. Likewise sometimes NEPA drives an AQ analysis when it wouldn’t be required under conformity, thus there is a need to streamline the two.
Caltrans has information that could be of use to the project.

Any streamlining of the transportation regional conformity process would save staff resources and time. The Connecticut Department of Transportation held a LEAN event in March of 2018 and determined that the process was restricted in time reduction due to a 30 day public review period, the addition of projects to the travel demand modeling networks, running the travel demand model times, as well as creating and running MOVES software. If the list of transportation projects eligible for conformity exemption could be expanded by EPA, this may reduce the number of times and overall staff resources spent conducting transportation conformity. As Connecticut acts as the MPO in conformity matters, Connecticut Department of Transportation has conducted regional conformity analysis as often as twice a year. We are attempting to conduct analysis to a once a year.

Conformity for the department is coordinated through the Bureau of Planning - it is overly complicated and time consuming with minimal consequences. It is time it is reviewed.

First step to finding better methods to achieve the goals of conformity. Will identify time and cost effective methods to streamline process.

Conformity is done by East/West Gateway in STL.

Research objective needs to be revised

ND does not have an Non-Attainment areas to which this regulation applies. However, greenhouse gas monitoring is becoming desired at several federal levels. So, this research could be beneficial someday.

The AASHTO Strategic Plan (June 2015) identifies conformity streamlining as a priority under the category of policy analysis and decision-making. It was also identified as a research priority for both regional and project-level analyses by the Project-Level Analysis Subcommittee of the TRB Transportation and Air Quality Committee (ADC20) at the 2013 annual meeting.

The problem statement provides examples of many issues related to the conformity process - especially in light of recent legislative changes. I agree with FHWA, that ""the effectiveness of the study in lessening burdens on state DOTs will be hampered by the constraints of current and future regulatory changes, actions of courts, and the acceptability of process changes to regulators, which can vary across the country."" Given the recent court case that re-imposed transportation conformity requirements in Richmond/Tri-Cities, Hampton Roads, and Fredericksburg for an ozone standard that dates back more than 2 decades (1997), and given the lack of environmental benefit this provides (i.e., none); rank this highest of all - especially that pertaining to regional conformity analyses. These analyses are very time consuming, take 5-6 months to get through the process, provide zero environmental benefit as we know the answer before we begin (we always pass), and no additional emission reductions are generated. This research is aimed at developing programmatic approaches to determining conformity, which ultimately (with buy-in by EPA) would significantly streamline project development and reduce project costs.

While there is room for improving the transportation conformity practices, this process is highly regulated and must follow strict requirements, so opportunities for improvement are somewhat limited.

### Item #113: A Comprehensive Evaluation of the Benefits and Costs of Railroad Quiet Zones

**B.30**

**Special Committee on Research and Innovation**

Railroad quiet zones are becoming a big issue in Florida with communities close to railroad crossings complaining about horn noise, especially in the middle of the night.

[Rating: 3]

This is a good study to help with this issue.
Summary of Comments

10-Jun-19

Reviewer Comments

■ Too late for WY; Extremely nebulous to assess quality of life benefits

■ This would be helpful to work with municipalities to explain the cost-benefits of RR quiet zones

■ CORT developed by not ranked

Research Advisory Committee

■ This is not a national concern. Regional and local cities generally already have their own ordinances in place to minimize noise as needed, this could be competing with local jurisdictions.

■ Desired by public to decrease noise in residential areas, what are the costs and benefits. Study needed

■ This research would be helpful for communities and the FRA more than MoDOT, as they are the ones investing in the implementation of Quiet Zones. MoDOT’s role in quiet zones is mostly to facilitate conversations with applicable partners and ensure safety is not compromised. As the referenced GAO report indicates, there are some gaps in the BCA of quiet zones that could be addressed with this research.

■ This research would be helpful to quantify using the B/C methodology so communities would have better justification to spend funds on these improvements.

■ a highly charged political issue

■ Quiet zones (QZ) are no longer a major issue in ND. However, this problem statement implies the GAO may suggest QZ’s be disallowed because of the lack research supporting their cost/benefit. If that occurs, we will have significant public backlash.

■ The probability of this research being conclusive is moderate. The research should include evaluation of near-miss and non-accident incidents to determine an impact on safety.

■ This has implications for quiet zones in VA - specifically Arlington and Ashland [PBO note: also Charlottesville]. It is vital for the success of public transportation/passenger rail for dense residential land use and transportation to be in close proximity. Figuring out appropriate noise mitigation that does not sacrifice safety will help to achieve this.

■ Results of the research may have limited applicability compared to the other research topics.

Item #114: Virtual and Augmented Reality for Integration and Effective Use of Heterogeneous Data from Visual Inspection, Nondestructive Testing/Evaluation, and Structural Health Monitoring

Special Committee on Research and Innovation

■ Could be a good tool for management of assets

■ Proposed idea will generate a product that will probably produce little guidance to bridge engineers. Intent is to integrate data and provide a better understanding of the problems. Too expensive for a proof of concept; will require more research to develop into a useable product and require future support of the end product.

■ Too complex to be practical.

■ [Rating: 3] The proposed cost is low for developing VR and AR software and hardware. I understand that there might be existing software or hardware, but they need to adjust to this specific application. Suggest descoping the effort.

■ The proposed product will have very limited applicability to the current practice.
Summary of Comments

10-Jun-19

Reviewer | Comments
---|---

- Seems to still have some questions on scope and software ownership. Unranked by COBS

**Research Advisory Committee**

- This would be a fantastic project to look at advanced data uses.
- Establishing automatic triggers when data reaches a critical level may be more practical in managing large data collection.
- Is there already a private sector version of this?
- We are piloting virtual reality for utilities and assets at the Blue Water Bridge. This research would compliment our activities. It could be powerful for managing, visualizing and storing knowledge about our big bridges, rest areas, pump stations….
- This research would benefit the state in assessing existing bridges.
- This could be useful information for a number of our projects.
- ND does not have a lot of big bridges and the use of this type of technology would have limited use.
- May not be universally compatible with the needs of all DOT’s
- "The project may have some value but I find it difficult to understand what the research will actually accomplish."
- Visual inspections are trending toward drone-assisted efforts, and a large emphasis is being placed on non-destructive evaluation and structural health monitoring in order to extend the life of the nation’s aging transportation infrastructure. One of the barriers to accepting these technologies is the extreme amount of data that is generated. Questions arise as to who is going to be responsible for maintaining and analyzing the data into the future, as well as maintaining the systems used to gather that data. This project could help address a sizable amount of those concerns. Suggesting funding for this research seems appropriate. However, testing stages should be a part of the original research, not built into the implementation of the research. As altruistic as it may be to use the results of the research for other types of infrastructure, the target audience should be focused on transportation-related agencies, given that this would be an NCHRP-funded project.

**Item #115: Methodology for analyzing noise and vibration impacts on different terrestrial species**

**B-07**

**Special Committee on Research and Innovation**

- Too many variables to yield useable results.
- [Rating: 0] The proposal is to develop national guidance for the analysis and mitigation of highway noise on wildlife (primarily birds) signed by multiple agency stakeholders. NCHRP research should not have as a goal developing final national guidance. Further, it would be unlikely to achieve for the proposed cost ($300k) and time period (24 months). Consider reducing the scope of tasks to a Literature review, a synthesis of methods of analysis, and a synthesis of mitigation strategies.
- Interesting study but having a hard time with the practical aspects of this study. What is the specific need?
- Information may be helpful- Currently, except with birds, we do not use noise alone in project impact reviews noise effects. Review of noise generated by Rumble strips used information from other states MI and MN- RB
- Noise has not been an issue for terrestrial species.
- A worthwhile endeavor but not running into it as much of an issue in MN and developing national guidance is beyond scope for NCHRP research projects. AASHTO CES didn’t provide feedback. NCHRP and FHWA think it’s not
Summary of Comments

Reviewer | Comments
---|---

appropriate for NCHRP to fund.

Research Advisory Committee

- CTDOT in coordination with our regulatory agencies (CT DEEP Wildlife) have developed (and are also currently developing) BMP protocols that address protection measures for various species. The proposed research report will be helpful with providing better data to help update and develop protection protocols.

- This is not yet a critical issue.

- Not a huge issue now but it could be in the future and something we know nothing about because very little research is available.

- There currently is no noise mechanism for determining noise impacts for different wildlife species – only human disturbance. While it is assumed that noise disturbs wildlife, including protected species, this study’s findings could better quantify what truly is an effect to a species. This is a study that we feel has some great merit.

- The topic and objective are very important for DOTs, and this issue has been raised in Virginia with regard to pile driving effects to aquatic species. But the approach needs reworking, as the proposal is currently bringing too many aspects into one project (lit synthesis, field research, and guidance development with regulatory buy in). Perhaps the scope can be reduced to a survey of DOTs and a literature review/synthesis is needed to determine (1) the species greatest concern to DOTs and (2) the research needs for those species (is there already sufficient literature with regard to the most effective methods for analyzing noise/vibration impact or does a research project need to be conducted to get that answer?). This approach, however, is more suitable as a synthesis project. Alternative comments - Strongly NOT recommended; Do not wake the sleeping giant. Not aware of any federal requirements that are being implemented by state and federal wildlife regulatory agencies to meet certain noise requirements for highway transportation projects (as stated within), defer any research in this area until the aforementioned federal requirements exist.

- WSDOT should support this proposal because having consistent metrics and methodologies on a national scale is important when evaluating noise and vibration impacts to species. It would be good to have mitigation strategies prior to and during construction that can be shown to be effective without creating a burden to the project and have an agreement with US Fish & Wildlife that these methods and strategies are to be used. The biggest challenge with this type of research is that at least some of the example noise and vibration impacts that are described in the proposal are behavioral impacts which are very difficult to quantify, to set up methods for assessing behavioral impacts and interpreting the results correctly. Even with these challenges it would be worth WSDOT support to provide consistency and guidance.


Special Committee on Research and Innovation

- Due to the many NDEs and HMS available it would be difficult to produce a good working document in this area. It would make more sense if the scope would identify specific conditions to be monitored and a minimum of NDEs and HMS to be included. Regardless the outcome of the document, a decision will still be made based on specific situations (needs), so knowledge of the NDEs by the decision makers (User) will still be necessary. This document will mostly help management that want to get familiar with NDEs. Needed just to avoid misuse of technologies

- [Rating: 4] After reading the tasks, there is too much included in this proposed study and $150k is definitely not sufficient. It includes both NDE and SHM and there are many tasks besides “procurement” tasks. FHWA's NDE Program is planning to start a new study in FY19 to document current practice in States, identify deployment-ready technologies and quantify Return on Investment. Suggest to narrow down the scope of this proposed study to focus on procurement guidelines for NDE technologies.
### Summary of Comments

<table>
<thead>
<tr>
<th>Reviewer</th>
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<tr>
<td></td>
<td>The more that structural testing and evaluation is incorporated in project selection and scoping, the more that there is a need for national protocols of this nature. It appears that several groups are currently working towards this goal independently, and it would be good to combine efforts.</td>
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<td></td>
<td>Not a priority at this time</td>
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<td></td>
<td>not a high demand in NH</td>
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<td>Appears to be a need by COBS; proposal has been restructured with an increased cost. Med. priority for MN.</td>
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<td>Research Advisory Committee</td>
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<td>This research would benefit the state in assessing existing bridges.</td>
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<td>This would be useful.</td>
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<td>Nevada DOT is doing a research project now for this practice.</td>
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<td>Needed. Don't see why existing DOT specifications cannot be balloted to AASHTO at a lower cost. (?)</td>
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<td>&quot;I don't see great value in this research and don't know there has been issues with procuring for nondestructive testing.&quot;</td>
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<td>&quot;This is a pressing and currently unanswered need. Procurement guidelines are needed for properly evaluating some of these technologies. The main problem is how to avoid the lowest bid that may result in accepting a vendor with subpar qualifications. This is especially problematic with new and emerging technologies.</td>
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It would be good to establish a set of guidelines for best practices of reporting field data collection methods and analysis of the results from testing and monitoring. On the one hand, establishing vendor qualification criteria would likely be state-specific. As indicated in the problem statement, it might be best to first see what the various other institutions (ASNT, FHWA, ACI, ASCE, and BAM) develop in terms of guidelines. With said, per the comments of Jeff Milton from CO S&B, there is keen interest in this topic. While VDOT has extensive knowledge about the technical aspects of non-destructive testing/evaluation techniques, we do not have extensive experience regarding the procurement of those services. A national guideline would improve and enhance our ability to do so.

<table>
<thead>
<tr>
<th>Item #117: Engaging the &quot;Right&quot;Players to Expand the Playbook of Workable Urban Freight Solutions</th>
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<tr>
<td>Special Committee on Research and Innovation</td>
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<tr>
<td></td>
<td>More MPO's or local focus</td>
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<td>The research shows an innovative approach to stakeholder outreach which is a critical part of freight mobility planning. The concerns are that the research doesn’t seem to offer a “How To” approach that provides a process for getting (and keeping) stakeholders to the table; and it doesn’t seem to speak of incentives or levers that public sector could capitalize on to attract private stakeholders.</td>
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<td>Combine with B-25.</td>
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<td>[Rating: 3] Cannot ignore the impact of &quot;non-urban&quot; freight to urban freight solutions. For example, the need for truck parking in metro areas as well as seamless local/regional truck routes. Also, need to incorporate the needs of economic development agencies and professionals, not just transportation professionals. Can be a helpful guidebook if also discusses encroachment of urban development on existing urban freight facilities and infrastructure.</td>
</tr>
<tr>
<td></td>
<td>This is duplicative of other problem statements.</td>
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<td>Could have some benefit to the MPOs, however, as is not a good research topic.</td>
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<th>Distribution of Ratings</th>
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Summary of Comments

10-Jun-19

Reviewer Comments

- NH is more rural/suburban than urban
- Submitted by MnDOT

Research Advisory Committee

- Lots of federal emphasis on freight so this could be useful
- I’m a little skeptical of NYC’s off-hours delivery program – it’s been in a pilot stage for years, and from my (albeit periphery) perspective, it hasn’t expanded much beyond the players who were already doing nighttime deliveries anyway. Maybe NYC DOT got the “right” stakeholders to the table to launch its pilot, but I don’t find it a convincing example to ground the different topic of vehicle downsizing. Yet vehicle downsizing is still very interesting – and also the subject of a recent NACTO report...
- I don’t see this as a stand alone effort, although it should probably be combined with another problem statement focusing on urban freight issues to make stakeholder viewpoints and knowledge are reflected in urban freight research and implementation.
- More MPO or locally focused. B25 includes this research as part of its objective.
- Aside from adding capacity, municipal restrictions on vehicle sizes and requiring/incentivizing off-peak freight pick-up and delivery are great options for mitigating urban freight congestion. This research proposal seems limited to organizing the partners in lieu of developing actual solutions.
- Urban freight input is critically important. However, this problem statement seems to be focused on seaport-style issues that beyond the scope of what we typically see in ND. Additionally, NDDOT has a Freight Advisory Committee that is helping us identify the important issues specific to ND.
- Great topic and a concern for the major cities in Tennessee. This would be critical for the economic prosperity of our major cities
- Interesting idea and good in theory, but spending almost half a million $ in engagement activities without a definitive product does not seem consistent with NCHRP's mission. I suggest making this an input to some other NCHRP work product. Perhaps as done in NYC, a smaller sum ($100,000) could be spent engaging the right people for a specific concern. In a way, this follow the Freight Advisory Committee guidance done at the regional level, although to the proposers’ credit the involvement of vehicle manufacturers is a novel twist.
- Urban freight solutions are reliant on many, often case specific, variables. Therefore a one-size-fits-all playbook approach may have limited benefits.

Item #118: Identify Effects of Flexible Pylon Barriers for Increased Bike Lane Usage

C-29

Special Committee on Research and Innovation

- I see the benefit of having flexible pylon Barriers and the potential of vehicular/bicycle crash reduction, however, a cost benefit analysis should be conducted to include construction, periodic maintenance and replacement cost compared to the existing buffer-separated conditions. Stray and distracted drivers will hit and damage these pylons and may lay down in the bike lane and therefore causing obstructions for oncoming cyclist.
- Combine with C-25.
- Similar to C-28: not much detail provided.
- [Rating: 3] NCHRP 22-37 is looking to develop a safety barrier to separate traffic from pedestrians and bicycles. In this study, part of the background research will include a survey to determine what kind of barrier the states are looking for.
Although the study will not determine if flexible pilons will increase usage it would give DOTs another option. Particular aspects related to safety are if we see a reduction of encroachments in bicycle lanes as a result of the flexible posts providing more positive traffic control.

■ Doesn't appear to be a treatment that we'd be ready to adopt in the foreseeable future.

■ References MnDOT study. Would this consider northern climates? Low priority for MN. combine with C-25

**Research Advisory Committee**

■ Can this problem statement be combine with C-25?

■ Combine C-24, 25 and 29.

■ no comments

■ Agree with comments to add this to C-25. Also see FHWA Separated Bike Lane Guide, 2015

■ Research is too narrowly focused, plus MnDOT is already working on it.

■ Might be beneficial to our bike/ped guidance

■ Most likely would not make it past the first snow plow passing over it.

■ Desire in TN to create more separated bike facilities, but one issue is maintenance of flexible posts.

■ "Flexible barriers probably have the most promise for creating separated bike lanes in Vermont because of their narrow profile and ability to be removed in the winter for plowing."

■ Seems redundant with C-25, recommend just incorporating that into the broader C-25 project. Jumping to a solution (flexible pylons) isn't the right approach; evaluating various SBL designs is.

■ This would be more useful if it included comparison to more permanent or impermeable separators in addition to flexible pylon barriers, e.g., planter boxes, raised curb, other separators, to position the flexible pylon findings within a continuum of treatment approaches. Negative findings would still be of value; if pylons are no better than paint we need

**Item #119: Evaluating the Completeness and Accuracy of Existing Utility Records**

**Special Committee on Research and Innovation**

■ Too broad to be useful.

■ [Rating: 4] Potential to combine with Problem No: 2020-C-08. It is unclear how the deliverables will be used and benefit the current state of practice (including a framework and implementation guide for estimating the quantity of incomplete utility records and range of inaccuracy with "associated guidance for application of best practices to maximize the return on their investment")? We know there are inaccuracies between the documented locations and actual field locations of many subsurface items; how will estimating or quantifying the inaccuracy help improve locating them? If the goal is to determine and provide guidance on available utility data as cited in the Research Priority section, it is unclear how the scope and task support the goal.

■ Poor utility records are one of the reasons for utility conflicts during highway construction.

■ While inaccurate utility locates are a definite problem, it is unclear how the research would be used to improve the accuracy of locates. I support this problem statement with further clarification of the deliverable and how it will be
utilized.

- See no value. Missing/incomplete records are an agency issue. Not certain what is expected to be gained with this study. If these do go through, combine C-06, 07 and 08.

- Has good benefits in the absence of sufficient data.

- Accuracy of utility records vary depending on the accuracy needed by the utility.

- Unranked by AASHTO. Comments seem fairly positive but no strong need

**Research Advisory Committee**

- Currently have incomplete information, however as this problem statement is written not sure it would provide needed information.

- no comments

- Of great interest and potential benefit

- We need other means of determining utility locations.

- This problem statement could be combined with C-08.

- "The State has begun utilizing Subsurface Utility Engineering (SUE) on its project. The Agency is also utilizing the R15B utility conflict matrix due to us being awarded round 7 SHRP2 funding."

- It is unclear how the project as scoped will result in improvements for DOTs.

**Item #120: Land-Use Development Guide for Hazardous Materials Transportation**

**Special Committee on Research and Innovation**

- The research is a good concept; however, the concern is that it doesn’t account for risk-reduction measures taking up by some of the transportation discipline (i.e. positive train control, and electronic logging devices, and hours-of-service). The research objectives should include conducting a risk assessment across the impacted transportation network, and produce risk-reduction measures for both public and private stakeholders.

- [Rating: 4] The case is adequately made for the need for the hazardous materials guidebook that would be the product of this study. Such a guidebook and the analyses conducted through the proposed work could be valuable planning and economic development tools for states and local communities. The general discussion about “high risk hazardous materials corridors” is of some concern, given that the three examples used were either rail or facility disasters. Hazardous material transportation on roadways pose as much, if not more, of an issue. Local and state governments have a great deal of control over designating, or restricting, HazMat on the roadways. Any discussion of a land use guidebook would need to include the need for identifying HazMat routes, connectivity amongst jurisdictions, etc. De-designation of HazMat routes due to encroachment of non-industrial land uses can pose a problem that has largely been left unanswered. This guidebook can help address some of those issues.

- This could be combined with B-25.

- Minimal benefit to WY

- Submitted by MnDOT

**Research Advisory Committee**
■ Should be a multi-modal effort.

■ This study will have legal implications as it will be consider a form of "taking" by land holders along any corridor who had their potential highest and best property use reduced by zoning changes.

■ This problem statement is much more focused on land use/zoning than the transportation sector, and as such is well outside of MassDOT's jurisdiction. And we in Planning do not typically have a need for this type of research.

■ Not a priority and conditions may change.

■ With the amount of hazardous materials we have being transported throughout ND, this topic is critically important to our local government partners who control land-use planning and zoning. Having a technical study to point them to, would be very beneficial for us in supporting our local partners' efforts.

■ Two items for consideration. One item: TRB Special Reports 281, 283, and 325 are examples of literature that relate to this topic; there is still a need for this work, but the scope (or the first task) should clarify which areas are well-researched (e.g., buffer distances from hazardous materials pipelines was covered, I thought, well in 281) and which areas will need greater attention, and hence the need for the guidebook. Second item--clarify this is for site planning purposes (e.g., it does not appear that the research considers risks beyond the specific site where the transportation infrastructure is placed. That's fine but a clarification is needed.)

Item #121: Application of Carbon Capture, Utilization, and Sequestration Technologies to Transportation Infrastructure Construction Materials

Special Committee on Research and Innovation

■ [Rating: 3] An interesting topic focused on potential benefits of CCUS-based construction materials. However, their application to highway construction has been very limited or non-existent and are largely based on proprietary products advanced by industry interest. An NCHRP study at this time is premature.

■ Air Quality is an ever increasing concern. Carbon capture utilization could provide an additional tool that could be used, and is showing a possible benefit in its utilization, though this specific method is not an absolute need.

■ This research (CCUS) is of nationwide interest and states have no or limited experience with these types of construction materials. Sustainability is being incorporated into Iowa DOT's strategic plan, and this research could add valuable information on how to incorporate materials into transportation construction that reduce greenhouse gas emissions.

■ Bigger problem than transportation

■ IDEA Program?

■ Concept is consistent with MnDOT GHG targets for construction but funding very high for what is basically a lit review... Ultimately a worthy endeavor but not yet likely to be feasible/ doable/ solvable or implementable through an NCHRP research project. Not ranked support, but seems to be a need, too.

Research Advisory Committee

■ The research objectives listed appear to be more appropriate to a synthesis. After that a larger study may be more appropriate. Not certain that this a national topic of interest at this time

■ No comments

■ Not a big concern in Missouri.

■ While the technology sounds interesting, this seems years away from producing a practical product for transportation
This issue of carbon capture comes up occasionally in ND, but is not a high priority, at this time.

The structural benefit of implementing this product is not obvious.

The topic is quite important but requires a synthesis first in order to narrow the scope. Resubmit as a synthesis topic, include both states/local transportation agencies and private industry in the survey, and then resubmit as a more tightly defined topic.

Carbon Capture Utilization, and Sequestration (CCUS) technologies have been starting to make limited appearances in areas such as concrete and has a potential to be used on other highway products. Of concern is the potential impacts to long term life cycle of materials such as concrete. For example, concrete naturally absorbs carbon dioxide over its life cycle, but this can also lead to carbonation in concrete which is one deterioration mechanism in concrete that reduces the pH of concrete surrounding the reinforcement and increases the probability of corrosion in embedded steel bars. This proposal is interesting, but further long term research would need to be done to determine long term impacts of this proposed technology.

Item #122: Effectiveness of Zero-Tolerance Drug & Alcohol Policies for Rural Transportation Agencies

Special Committee on Research and Innovation

* [Rating: 3]

This is a really small population we are targeting. We believe that there are other research efforts that would yield more effect on the problems we are facing consistently.

Congress won't listen anyway

SME does not feel this research would have any impact on federal requirements.

Interested in marijuana experiences in other states with implications for MN with potential law change. Part of the rural research roadmap effort.

Research Advisory Committee

* No comments.

Why just rural? The cannabis testing problem will become prevalent everywhere it is legal. My understanding is there are legalization conflicts with federal law, thus funding.

The requirements are based on federal law. Spending $400,000 to look at attitudes and feelings doesn't seem effective. It isn't going to change the law and it doesn't show a regard for safety. Putting someone that is under the influence of drugs in a truck that weighs 20 times what a passenger car does doesn't seem very smart.

Suggest that this is probably more appropriate for GHSA's research arm.

"I would not consider that we have a zero tolerance policy. I believe we have a one strike you are out policy, so this may be less relevant to us. Having said that, with the decriminalization of marijuana, drug compliance issues may increase."

Clearly an important issue but it is not clear how much of the focus of this effort will be on cannabis vs. the overall zero tolerance policy issue. The cannabis issue itself will require significant work (some is ongoing now for purposes of defining "intoxication" or "under the influence" limits.)
Summary of Comments

■ The proposed study does represent a current problem with many states legalizing marijuana and several others considering legalization. This also creates a need for identifying effective testing protocols and research on the levels at which impairment exists at respective THC levels. In addition, there is very little research on the effectiveness of zero tolerance polices and the study that were conducted were performed decades ago. Finally, the workforce drug positivity rates are at the highest rates in a decade, which includes those employees that are federally mandated in safety sensitive positions, according to the Quest Diagnostics 2018 Drug Testing Index data. With the rising workforce drug and alcohol positivity rates the public would benefit from a broader research study to include urban public transit systems across all modes. Safety in regards to public transportation is of interest for many nationwide.

Item #123: Development and Implementation of the National Intercity Bus Atlas

B-23

Special Committee on Research and Innovation

■ Proposes developing GTFS for all intercity bus routes; may be helpful for planning but could easily become out-of-date as private carriers modify schedules and routes.

■ [Rating: 5] FHWA attempted this research before with limited results. As new data sources emerge and new analytics are advanced, revisiting the work is logical and sound. It will offer great value to the transportation community and the general public.

■ Little to no value for very rural areas. Did not look like it was sustainable.

■ This would be nice, but not a necessity, plus if created it would need to be constantly updated by transit providers, State DOTs or consultants; not sure on sustainability of data integrity

■ Part of the rural research roadmap effort.

Research Advisory Committee

■ FTA mandates that 15% of our 5311 funds be set aside to connection to the intercity bus network. The atlas would help identify possible linkages and marked the availability of this service.

■ I believe this would be a useful tool. I don't believe that currently there exist a tool as described in the research summary.

■ This would seem to be more appropriate for the Intercity Bus Trade organizations to take on. After the research project concludes, who would do the updates?

■ Good idea but $600K ???

■ A GTFS feed for intercity bus will provide important information intercity travel information to the public. However, the project should look into the possibility of using this GTFS feed to analyze connectivity with local transit service.

■ I think completing the National Intercity Bus Atlas is a worthwhile endeavor and will benefit future applications in planning and research. Currently, there is no uniform, nationwide resource for intercity bus data. My main hesitation is the proposed cost, which seems high for what is primarily a data collection exercise. I also wonder what the benefit is for keeping this distinct from the National Transit Map. It would seem advantageous to house all of the nation’s transit data in one place, but maybe there are logistical reasons for keeping them separate that I’m not aware of.

Item #124: Best Practices on Transit Options for Discharged Patients from Healthcare Providers

B-18

Special Committee on Research and Innovation

■ Could fill a gap for transit
Summary of Comments

- Vitally important issue for improving access to and from medical care for transit dependent populations. Also is a very important topic relevant to FDOT’s Safe Mobility for Life Coalition. There is a good example of coordination between a hospital system and a transit provider with the relationship b/w Florida Hospital, PSTA, and the City of Tarpon Springs. https://www.masstransitmag.com/bus/press-release/21035642/pinellas-suncoast-transit-authority-psta-florida-hospital-psta-and-city-of-tarpon-springs-giving-seniors-healthy-hop-to-medical-services

Here is another link on how lyft is working with Acuity Link to provide non-emergency medical transportation: https://hitconsultant.net/2018/03/29/lyft-acuity-link-medical-transportation/#.XIZ75arfOiM

- [Rating: 4] The proposal may want to consider how automation may play into this effort if it moves forward. This is a complicated issue with multiple players (DOT, VA, HHS, State and local agencies, etc.) that are currently trying to address this problem with multiple perspectives (e.g., filling prescriptions on the way home). FTA has 2 grant programs that directly tie to this work - 1. Transit & Health Access (formerly known as Rides to Wellness): https://www.transit.dot.gov/ccam/about/initiatives; and, 2. Mobility on Demand Sandbox: https://www.transit.dot.gov/research-innovation/mobility-demand-mod-sandbox-program (this is helping transit develop partnerships with TNCs and utilize technology for on-demand service). See FTA’s FY19 SBIR Solicitation Topic Titled “Cost Allocation Technology for Non-Emergency Medical Transportation” Opened, Tuesday, February 19, 2019 and Closes on Monday, April 22, 2019 at 5:00 p.m. ET.

- Little to no value for very rural areas.

- synthesis

- This could or should be funded in conjunction with DHHS or hospitals/private sector

- Relevant now and increasingly important. Very little common ground/definitions/terminology between involved agencies/organizations. Needs defined and specific guidance depending on the situation. Possible related research TCRP b-45 on transportation for dialysis, discusses transit needs for ongoing patient care. No AASHTO review. Med. priority for MN.

Research Advisory Committee

- This could be utilized for our 5310 and 5311 programs where hospitals are located in their service areas.

- Is this paratransit? There are ongoing efforts and public outreach on how to optimize the system.

- Topic of interest in lowering MetroAccess costs & improving services for DC seniors.

- Discharged patients often don’t feel well enough to access standard transit options (Peterson); An important issue, but I think a more comprehensive look at the role differing shared use modes could play in this scenario would improve the usefulness.

- This is a significant ongoing problem that has been receiving much discussion nationwide, but not enough solutions especially in small rural areas.

- This is an issue, especially for rural Missouri. Some coalitions in Missouri serve as national blueprints for successful integration of transportation for health care.

- It would be beneficial to first conduct a study exploring the prevalence and locations of hospital discharges among transit-dependent populations when transportation is unavailable. With this information, a future research proposal might focus on best practices for meeting the need while accounting for socioeconomic and geographical differences.
Summary of Comments

Reviewer | Comments
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**Item #125: Evolving TMC Operation to Emulate a Video Game Environment**

Special Committee on Research and Innovation
- Have seen some TMC incident management simulators in the past, and they were of little use.
- [Rating: 1] There is no value of the proposed research to be conducted and products developed to be transferable and useful to other agencies other than the one system that may be used as an example for the initial development. The transferability and chance that it may be used by other researchers or public agencies appears limited. The policies, procedures, practices, capabilities, and user interfaces that operators use in traffic management systems varies greatly between public agencies. Many undergraduate and graduate programs include transportation planning or traffic engineering where similar learning outcomes are addressed without having to use a tool or resource as proposed, rather they use existing traffic simulation models with satisfy many of the needs identified in this proposed research. There is unknown demand, the ability for the software to be developed being open source (e.g., free for others to use), and practicality of others having the resources or capability (e.g., traffic management system or computer, data, or resources to use the software).
- This tool has potential as a great training tool and opportunity for operators to hone their skills for future emergencies.
- Sounds fun, but how does this apply
- Not sure why this is needed. No committee endorsement, and doesn't feel like a 'need' at this time.

Research Advisory Committee
- no comments
- have issue to giving anything but a zero to a study that contains “For example, the TSM&O Toolbox could be considered a bag of powers to be used in a video game where a player must know/decide which to use in any scenario to win.”
- Real-World scenarios that can be tested are important.
- Completely do not understand this..
- "Does not seem appropriate for the scale and volume of day-to-day operation in the Vermont TMC"
- This is a very innovative/interesting concept that some will like very much, and some will dismiss right off the bat (as not enough B/C, not that useful). Disaster/crisis management and defense industry have successfully used such concepts. If accepted, this project should (1) actually develop the game, not just stop with a report and recommendations, (2) include already existing technologies such as virtual reality and immersive/augmented reality, and (3) include online and multiplayer gaming concepts. The I-95 corridor coalition tried to do something like this with the UMD CATT lab some 13-15 years ago, and that was likely too ahead of its time.
- I do not see WSDOT going in this direction any time in the future. Nor can I imaging to many other agencies who would either. While I appreciate the desire/need to make TSMO and TMC operations a more attractive career to young engineers, I do not feel "creating a video-game-like environment could significantly improve TMC operations and make this occupation more attractive".

**Item #126: Quiet Bridges: Design, Construction, and Modification**

Special Committee on Research and Innovation
- May be better as a synthesis.
■ Need is questionable. Better return if the focus is on quiet pavements.

■ [Rating: 5] Quiet bridges refers to noise abatement to assist wildlife passage. End result will be guidelines for bridge construction at a small price and could be helpful.

■ There is no need for this research.

■ Problem and approach has usefulness but not much priority or need in MN. FHWA and NCHRP feel it's well written but no particular AASHTO support.

**Research Advisory Committee**

■ Doesn't address current problem for our agency.

■ I don't believe a vehicular traffic noise study specific to bridges would be worthwhile. Any noise study should have a wider spectrum, focusing on more general highway noise considering pavement type, vehicular engine exhaust noise, highway/bridge proximity/elevation, and noise barrier performance. Much of this type of work has probably already been done through NCHRP/TRB studies.

■ It is not clear this is an important issue.

■ With many bridges spanning hydraulic crossings, this research has a place in wildlife preservation.

■ We do not see this as a research need for us.

■ Synthesis topic

■ WHY?

■ yields an unpredictable degree of benefit to a narrow benefit group

■ Given the number of other complex and higher-priority design concerns, bridge engineers will likely be resistant to adding this factor into the design. Retrofitting existing bridges to address wildlife matters will be even more difficult. Also, are the impacts of bridge noise on wildlife fully understood (i.e., what decibels, frequencies, or patterns of noise affect various different species)? Lastly, the proposed amount of funding would likely fall short of what is needed to develop alternative design details and materials.

■ It's not clear how much benefit might derive from quieter bridges but it's a good tool to develop for potential benefits to wildlife attractiveness.

**Item #127: Attitudinal Study of Seat Belt Use in Rural Areas of Texas**

**Special Committee on Research and Innovation**

■ No benefit for our region

■ Could be useful if expanded to consider other states.

■ TX specific; why NCHRP?

■ [Rating: 1] This problem statement does not demonstrate an understanding of the considerable knowledge and skill required to develop, administer, and interpret a survey. Converting results into successful outreach will involve a multidisciplinary team with a different set of skills.

■ We achieved similar results within our area and within localized sub areas in our state by using focus groups, at much
<table>
<thead>
<tr>
<th>Reviewer</th>
<th>Comments</th>
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<tbody>
<tr>
<td></td>
<td>lower costs.</td>
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<tr>
<td></td>
<td>This is State specific. If it is to be of value to the country then it needs to expand to rural areas throughout different regions. May be hard to get good data on behavioural issue.</td>
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<td></td>
<td>I would like this to be more than just Texas</td>
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<tr>
<td></td>
<td>Because NH has no adult seat belt law, this study may have only limited applicability.</td>
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<td></td>
<td>No committee endorsement; FHWA and NCHRP do not support unless it's expanded to be applicable nationally.</td>
</tr>
<tr>
<td>Research Advisory Committee</td>
<td>Very specific to only Texas. FHWA comments do not support this effort, nor does NCHRP staff support. Would need to be written in more national effort.</td>
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<td></td>
<td>Only Texas.</td>
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<td>This study should be for more than 1 state</td>
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<td>This an important research topic since we know from the literature that among all behavioral variables, safety belt use is the most important and cost/effect factor in reducing motor vehicle related fatalities and injuries.</td>
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<td>This does not have as much value to us in MA.</td>
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<td>Texas only?</td>
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<td></td>
<td>This may provide good support for ND lawmakers considering primary seat belt legislation</td>
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<td></td>
<td>All states do seat belt surveys and this would be more appropriate for GHSA's research arm.</td>
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<td>&quot;Vermont also has a large percentage of its fatalities that did not wear a seatbelt. Does the population in Texas have similar values than in Vermont? I believe that there is some Vermont data that already exists.&quot;</td>
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<td></td>
<td>Much info is available on encouraging seat belt use. Written as a TX study not a national effort. Survey on attitudes about seat belt usage may be nice to know but could (though chances are low) lead to different efforts to encourage seat belt use.</td>
</tr>
<tr>
<td></td>
<td>I would like this to be more than just Texas.</td>
</tr>
</tbody>
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