NEW ENGLAND TRANSPORTATION CONSORTIUM

Re-Creating the New England Transportation Consortium

Prepared for

New England Transportation Consortium

Prepared by

CTC & Associates LLC

February 2022

ctc & associates llc

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Project Summary and Findings

Need

The New England Transportation Consortium (NETC) was initiated through a Memorandum of Understanding (MOU) dated February 17, 1988 and is currently operating under a MOU dated October 1995. Its members include the six New England States; more information may be found at the consortium's website at https://www.newenglandtransportationconsortium.org/.

Although the MOU as written still holds value, the consortium's current goals, vision, and mission may not capture what is most important to the New England region. This has been evident during an exercise to follow up on completed research topics and determine the level of implementation experienced. Is NETC on track for encouraging opportunities for interactions between member states?

It is essential that NETC strive to become a more effective resource for DOT employees including the decision-makers, designers, and field personnel.

Consulting firm CTC & Associates, which manages the pooled fund, was contracted to conduct this project with oversight and guidance from the NETC Transportation Agency Advisory Committee (TAAC).

Tasks and Outcomes

The project was scoped as a robust self-evaluation of NETC, incorporating steps to improve the effectiveness of NETC. Throughout the project, individual deliverables (sometimes formalized as "task memos") have been submitted to and approved by the TAAC. The tasks and deliverables are outlined here. Deliverables—all previously submitted to NETC—are attached as appendices to this report.

Task 1. SWOT Analysis Sessions

Over the course of two sessions in fall of 2020, two sessions, CTC facilitated Strength, Weaknesses, Opportunities, Threats (SWOT) analyses that engaged TAAC members in discussions examining the internal and external factors that are expected to impact NETC's continued effectiveness in executing its research program.

Findings are detailed in Appendix A. SWOT Analysis Sessions I and II.

Task 2. Survey of NETC Transportation Agencies

To gather information for this evaluation, online surveys were distributed to two member groups: NETC transportation agency managers and implementers, and NETC agency subject matter experts. The online surveys gathered information about staff members' experiences with NETC and their expectations and recommendations for NETC's future efforts.

Findings are detailed in Appendix B. Survey Findings: Agency Managers, Implementers and Subject Matter Experts.

Task 3. Survey of Other Research Groups

To complement and expand of the findings from Task 2, online surveys were distributed to pooled fund consortiums, university transportation centers) and cooperative research programs to gather information about administering a research program, selecting and prioritizing research, managing research projects, implementing research and communicating research results.

Findings are detailed in Appendix C. Survey Findings: Other Research Groups, with NETC's feedback tabulated in Appendix D. Summary of TAAC Responses to Survey of Other Research Groups.

Task 4. TAAC Discussion of Possible Changes

Based on the findings of the previous tasks, the NETC TAAC members and selected colleagues came together to discuss possible actions NETC could take and move toward consensus on the types of changes NETC could pursue.

The outcomes of these discussions are characterized in Appendix E. Summarizing TAAC Feedback Regarding Possible Changes for NETC. These address five thematic areas:

- Research
- Implementation
- Subject matter expert and other stakeholder engagement
- Technology transfer and outreach
- Project deliverables

Conclusions included a summary of the readily implementable actions NETC could take to begin the transformation of NETC to better meet member needs in each of these thematic areas.

TAAC-member discussions of Appendix E findings and recommendations, held throughout fall of 2021 (September 27 and 28, and October 22), led to the following outcomes and decisions.

- A consensus was not reached among member states on the future direction of NETC.
- The current phase of the pooled fund expires in 2022. At the time of the TAAC discussions, there was not a member state able to step forward to serve as lead state for the next phase of the pooled fund. The main reasons cited by members were the lack of research office staff to manage the pooled fund and the amount of work it takes to administer research project contracts.
- Pending any changes on the previous item, the pooled fund will not continue into a new phase. However, the current phase will be extended through the completion of existing research projects, including the newly selected FFY 2021 projects.

- CTC & Associates' contract will be extended to manage these projects.

Task 5: Update NETC Policy and Procedures Manual

Given the outcomes of Task 4 and the pending termination of the pooled fund, the TAAC advised that the update of the NETC policy and procedures manual as originally scoped in Task 5 was unwarranted.

Task 6: Final Report and Webinar

This document serves as the project final report. As noted, most of the project key findings appear in the appendices.

As with Task 5, given the outcomes of Task 4 and the anticipated end of the pooled fund, a project webinar as originally scoped in Task 6 was not requested.

Appendix A. SWOT Analysis Sessions I and II

NEW ENGLAND TRANSPORTATION CONSORTIUM

Re-Creating NETC

SWOT Analysis Sessions I and II

Project Background

Recognizing that transportation research needs have evolved since New England Transportation Consortium (NETC) was formed more than 30 years ago, the *Re-Creating NETC* research project was initiated to ensure that the consortium's current vision, mission and goals capture what is most important to the New England region, and NETC continues to effectively manage its research program and progress in its commitment to meet the research needs of member states.

Re-Creating NETC project tasks include:

- *Task 1: Facilitate a SWOT session*. More about this below.
- *Task 2: Conduct survey of NETC transportation agencies*. A survey of NETC transportation agency executives and subject matter experts (SMEs) will gather information about agency practices with an eye to enhancing the effectiveness of NETC research efforts.
- *Task 3: Conduct synthesis research*. An examination of the operations of other pooled fund consortiums, university transportation centers and other cooperative programs will identify best practices and opportunities to implement research results.
- *Task 4: Review of Tasks 1-3*. Discussion with NETC Transportation Agency Advisory Committee (TAAC) members to review findings from the project's first three tasks will inform execution of the project's remaining tasks.
- *Task 5: Update NETC Policies and Procedures Manual*. An update of NETC's current manual will be informed by project findings.
- *Task 6: Final report and webinar*. A final report will include revised vision and mission statements, implementation strategies and best practices, and recommendations for next steps. A webinar describing project findings will be presented in a final closeout meeting with the TAAC.

Completing Task 1

For the first two sessions, CTC facilitated a Strength, Weaknesses, Opportunities, Threats (SWOT) analysis that engaged TAAC members in discussions examining the internal and external factors that are expected to impact NETC's continued effectiveness in executing its research program.

Summary of SWOT Analysis Sessions I and II Findings

The September 22 and October 20, 2020 SWOT Analysis Sessions I and II were facilitated discussions that examined NETC's current practices to identify the internal strengths and external opportunities that can be used, and acknowledge the internal weaknesses and external threats that could limit the effectiveness of the consortium's research efforts. Four topic areas were selected to focus discussion on NETC's most critical activities:

- Administering the research program
- Managing research projects
- Implementing research results
- Disseminating research results (technology transfer)

The SWOT grids that begin on the next page reflect the feedback provided by TAAC members after Sessions I and II and CTC's assessment of the critical takeaways from the discussions. TAAC member feedback supplementing the SWOT-related entries appears below each grid.

Administering the Research Program

Internal Strengths Resources or Capabilities That Advance NETC's Goals	Internal Weaknesses Deficiencies in NETC Resources or Capabilities
Program participants • Dedication to the consortium due to its longevity. • Long-term knowledge of NETC (Dale, Colin). • Continuity as research positions turn over. • Working relationships and effective communication developed with SMEs and participants on Advisory and Technical committees. • Mentoring of newer members strengthens the consortium. **Structural issues** • NETC is a brand name, recognized by the majority of New England transportation agencies. • Maine's strong contracting process ensures financial accountability. • FHWA pooled fund structure for tracking state contributions/commitment, quarterly and annual reporting. • NETC Coordinator's administrative skills provide support needed for program success. **Financial issues** • Financial resources (SPR2) that do not require a state match. • Annual commitment of the six NETC member agencies. **Shared focus** • Common transportation-related problems and challenges can be addressed.	**Program participants** • Finding SMEs to serve on Technical committees. • Support and engagement of upper management. • Contracting with universities is challenging for lead agency. **Financial issues** • Challenges with pooled fund transfers, including closeout and transfer of funds to next lead state. • Research funding guided by the federal highway funding bill. • Four of the six member states have small research programs (less than $1.2 million). **Timelines and time commitments** • Time frame to begin research for approved projects. • Time commitments and constraints of NETC members. • SME time constraints sometimes limit active participation and commitment needed to fully engage (may limit implementation of project results). • Fatigue of the Technical Committee (TC) members (SMEs) and NETC members due to other job-related commitments. • Turnover of TC members. **Shared focus** • Different approaches of member agencies to address a research problem; resistance to compromise.
External Opportunities **Outside Factors Favorable to NETC's Goals**	**External Threats** **Outside Factors Unfavorable to NETC's Goals**
Program participants • Capitalize on executive official involvement with national committees (TRB, AASHTO). • Encourage Technical Committee member appointments that engage future leaders who are not necessarily experienced but have an interest in the research topic. • Expand focus to consider other collaborations (Tri-State Transit Conference, New England Pollinator Partnership, regional New England bridge engineering associations, AASHTO Research Advisory Committee (RAC) Region 1 and Northeast Connected and Automated Vehicles Summit). • Coordination with other researchers could minimize duplication of efforts. **Structural issues** • Investigate ways to improve solicitation, SOW. • Update NETC's Policies and Procedures Manual for easy reference/guidance. • Learn from other consortiums and pooled funds operating similarly to NETC. **Other practices** • Actively promote NETC through an "advertising" campaign.	**Program participants** • Private consultants are competing with universities on research topics. Is this a concern? • Should universities still be on the Advisory Committee? **Financial issues** • Increasing cost of research projects.

Administering the Research Program: Other Issues to Consider

Expanding NETC's mission

- Can NETC be used to bring people together to coordinate a regional response to national mandates and address larger programmatic issues?
- Should NETC be used to advocate for regional interests? Or serve as a vehicle to provide data and recommendations to well-placed staff (chief engineers and section chiefs)?

Engaging agency executives

- Is it realistic to expect TAAC members to facilitate the engagement of executive-level staff?
- Use tools such as an onboarding webinar to engage with new executive-level staff.

Reconsidering the Policy Committee

- How to move beyond a nonreliance on Policy Committee engagement?
- How to encourage Policy Committee participation in the NETC research program?

Reconsidering the Advisory Committee

- Should the committee play a more focused role in monitoring research project progress?

Reconsidering the Technical committees

- Revisit the description of roles and responsibilities of Technical Committee members to ensure it's appropriate.
- Should there be an initial meeting of the Technical Committee and researcher that addresses only the roles and responsibilities of the participants in the research process?
- How to maintain the committee's high level of interest over the life of a project?

Engaging subject matter experts

- Ensure participants understand the commitment required for Technical Committee members.
- Should NETC go beyond the technical experts sitting on Technical committees to engage policymakers in broader policy issues?
- How to engage with more SMEs and encourage collaboration?
- How to identify the research-friendly staff in member agencies and build a network around them?

Encouraging collaboration

- How to ensure member agencies learn from one another?

Participation in the research program

- How to create a balance of universities and consultants in the conduct of research?

Managing Research Projects

Internal Strengths Resources or Capabilities That Advance NETC's Goals	Internal Weaknesses Deficiencies in NETC Resources or Capabilities
Program participants • Relatively common approach/philosophy to transportation management across NETC members. • Good communication and collaboration among Advisory Committee members. • SMEs willing to review problem statements from other states and provide ratings and comments. **Structural issues** • NETC has a good reputation. • Diverse transportation planning, design, construction and maintenance practices among the six states. **Research cycle** • Problem statements tend to follow critical issues. **Shared focus** • Promote communication among Technical Committee members across member states.	**Program participants** • Securing Technical Committee members takes too long and slows the project timeline. **Structural issues** • NETC member agencies may be unaware of all critical issues that would inform direction of research; understanding the critical issues improves the quality of problem statements and relevance of research topics. • Lag time in researchers being supplied with data from member transportation agencies. • Draft and final due dates for tasks could be applied to better manage project timelines. **Shared focus** • Research needs and implementation potential vary across New England. For example, differences in the southern and northern areas/states presented challenges for the recent NETC quality control project.
External Opportunities **Outside Factors Favorable to NETC's Goals**	**External Threats** **Outside Factors Unfavorable to NETC's Goals**
Program participants • NETC works with a range of universities and consultants. • Encourage Technical Committee member appointments that engage future leaders who are not necessarily experienced but have an interest in the research topic. **Research cycle** • Consider soliciting projects year-round. • Utilize TRB Research Roadmaps for project ideas. **Structural issues** • Update NETC's Policies and Procedures Manual for easy reference/guidance. **Marketing** • Market NETC beyond transportation agencies (environmental and wildlife agencies, motor vehicle safety).	**Program participants** • Loss of institutional knowledge through retirements. • Other duties become a priority over Technical Committee members' project-related tasks. **Research cycle** • University/consultant-generated problem statements may not address member agency priorities. **Structural issues** • NETC has little reputation in other parts of state government. • Transportation issues differ among southern and northern New England states. • Changing regulatory environment (requests for proposals, contracting, finances). • COVID limitations affect project schedules and sometimes the ability to conduct research.

Managing Research Projects: Other Issues to Consider

Expanding NETC's mission

- Consider an annual forum that examines research needs. Participants may include universities, section heads and SMEs who come together to present information and discuss research priorities.

Engaging agency executives

- How to enhance upper management interest in NETC? How to encourage management to view NETC as a resource?
- How to remedy weak promotion of NETC to and by upper management?
- Include NETC information with welcoming material for new executives at member agencies.
- Use tools such as an onboarding webinar to engage with new executive-level staff.

Reconsidering the Advisory Committee

- Expand the role of the committee in recruiting participants on Technical committees.

Reconsidering the Technical committees

- Revisit the description of roles and responsibilities of Technical Committee members to ensure it's appropriate.
- Identify projects SMEs are excited about.
- Seek a variety of Technical Committee members from other state agencies and organizations (fish and wildlife, regional planning commissions, municipalities, interested individuals and groups).
- Identify a department committee member and keep the member engaged.
- Ensure members understand their project roles, duties and time commitments prior to committing to serve.
- Ensure members understand the proposed implementation of project results.
- Encourage committee members to review research results through the lens of what will be usable for member agencies.
- Communicate with committee members frequently enough to keep them engaged.

Participation in the research program

- Does NETC want a balance of universities and consultants? If so, how to create that in the conduct of research?

Project solicitation and selection

- How to identify projects that are worthy of NETC's time and money?
- Generate problem statements internally rather than accepting them from external researchers. Too many problem statements are generated by the researcher, who then finds an agency sponsor.
- Focus on practitioner needs; generate problem statements that reflect the needs of the agencies.
- Ensure that scopes of work include the requirement for draft and final task memorandums.

Implementing Research Results

Internal Strengths Resources or Capabilities That Advance NETC's Goals	Internal Weaknesses Deficiencies in NETC Resources or Capabilities
Program participants • High-quality products and services from researchers. • Access to unique resources (universities, university transportation centers, consultants). • Relationships among SMEs at the transportation agencies established through NETC or other regional committees. **Structural issues** • Ability to work together to implement across the states creates a more significant overall impact.	**Program participants** • Advisory Committee members' role in project implementation. (Committee members are focused on the next round of research topics and not implementation of completed project results.) • NETC Coordinator's currently unspecified role in project implementation. • Varying number of implementation staff, depending on the state and size of the research program. **Structural issues** • Funding, time and resistance to change are among the internal barriers to implementation. • Problem statements do not include a request to fund implementation.
External Opportunities **Outside Factors Favorable to NETC's Goals**	**External Threats** **Outside Factors Unfavorable to NETC's Goals**
Program participants • Work with SME groups to alert them to NETC project results including specifications, processes and communication with FHWA. **Structural issues** • Develop and refine a simplified implementation tracking tool for use by NETC member agencies. (TAAC members recommended a cautious approach when attempting to quantify the impacts of research.) **Financial issues** • Consider funding pilot implementation projects. **External engagement** • Capitalize on agency executive and other staff participation at national association meetings (AASHTO, TRB) to deliver NETC updates. • Track implementation opportunities from other groups and agencies for use in New England. • Pursue virtual opportunities to engage others beyond current stakeholders when describing opportunities for implementation. **Supplemental resources** • NCHRP Implementation Support Program (see https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=588, including NCHRP 20-44(28), Development of a Technology Transfer Plan for State DOT Research Programs (https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4921). **Marketing** • Promotion of NETC and expanded education and training could result in more implementation of research results.	**Program participants** • SMEs challenged to spend time to follow through with implementing project results. • Lack of collaboration among transportation agencies and the private sector regarding the use of research results. • Implementation directed by researchers may not produce the results expected by member agencies. **Structural issues** • External barriers to implementation include regulations, rules, policies and laws. • Travel restrictions (budgetary limitations, ability to attend conferences). • Resistance to change within individual states and as a region. • Although all states are closely located geographically, research needs and implementation potential vary across the region (for example, the northern versus southern areas). • Challenges in tracking research results generated by other organizations. **Financial issues** • Funding implementation takes funds away from research topics.

Implementing Research Results: Other Issues to Consider

Expanding NETC's mission

- Is NETC prepared to put funds into implementation, which includes planning, design and possibly construction?
- Is NETC ready to rewrite specifications and work on the tools needed for implementation?
- Given New England's similarities to other regions of the country, should NETC consider implementing research from other regions? How to identify the relevant research to implement?
- Consider establishing an implementation committee (IC) that convenes at the end of a research project. IC membership may differ from the Technical Committee overseeing the research project. The IC would provide a progress report to the Advisory Committee after one year.
- Should NETC establish strategic priorities and develop implementation plans derived from those priorities?

Engaging agency executives

- Gain an understanding of why implementation has not been a priority "ask" from leadership.

Reconsidering the Advisory Committee

- Expand the role of the committee in recruiting participants on Technical committees.

Reconsidering the Technical committees

- Identify how member agency SMEs can be engaged to determine what should be implemented.
- Describe and document the Technical Committee's role in implementation. Currently, members feel their work is done when the final report is provided.
- Seek a variety of Technical Committee members from other state agencies and organizations (fish and wildlife, regional planning commissions, municipalities, interested individuals and groups).
- Recognize regional committees instead of separate NETC SME calls for problem statements.
- Encourage Technical committees to identify the route to implementation and include implementation in the scope of work.
- Encourage committee members to review research results through the lens of what will be usable for member agencies.

Project solicitation and selection

- Encourage proposers to address implementation in project proposals.
- Consider allowing proposers to request implementation of an innovation when submitting a problem statement.
- Projects that have implementation imbedded within the problem statement tend to be more successful.
- Will NETC consider funding an innovation for implementation that originates from non-NETC research?
- Researchers should create implantation plans that can be adapted in all six states, whenever possible.

Disseminating Research Results (Technology Transfer)

Internal Strengths Resources or Capabilities That Advance NETC's Goals	Internal Weaknesses Deficiencies in NETC Resources or Capabilities
Program participants • High level of education of university graduates and transportation agency employees. • Smaller and localized community of states that are well-known to one another promotes technology transfer (T2) • Geographical location a plus; member agencies can come together to meet in person, if needed. **Structural issues** • Very good T2 infrastructure. • Level of T2 has increased under CTC contract. • NETC's research does not concentrate on specific transportation topics.	**Program participants** • Absence of T2 personnel in agencies. • Technical staff in agencies lack absorption capacity for scientific knowledge. • Lack of time to attend webinars and meetings. **Structural issues** • Low spillover effect from research to process. • Need to get creative when identifying ways to promote T2. **Financial issues** • No funding set aside for T2.
External Opportunities **Outside Factors Favorable to NETC's Goals**	**External Threats** **Outside Factors Unfavorable to NETC's Goals**
Program participants • High level of willingness to cooperate with universities and consultants. **Structural issues** • Available regional and national programs supporting T2. • Press/media coverage of NETC (*TR News*, *Public Roads*). **External engagement** • Participate in regional conferences (MassDOT Transportation Innovation Conference, VTrans Research and Innovation Symposium). • Disseminate information to local organizations (regional planning commissions, municipalities, interested individuals and groups). • Capitalize on agency executive and other staff participation at national association meetings (AASHTO, TRB) to deliver NETC updates. • Post new projects in Research in Progress (RiP) database; advise TRID and National Transportation Library of final reports. • Expand participation in NETC Symposium. • Pursue virtual opportunities to engage others beyond current stakeholders. **Supplemental resources** • NCHRP Implementation Support Program (see https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=588, including NCHRP 20-44(28), Development of a Technology Transfer Plan for State DOT Research Programs (https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4921). • Use a permalink service when generating URLs for final products. (Connecticut State Library has such a service.)	**Program participants** • Reduction in labor force caused by various reasons. **Structural issues** • Challenges in tracking research results generated by other organizations. • COVID-related limitations. • Travel restrictions (budgetary limitations, ability to attend conferences). **Financial issues** • Limited financial resources for T2.

Disseminating Research Results (Technology Transfer): Other Issues to Consider

Reconsidering the Policy Committee

- Consider ways to engage agency management in sharing research results to "push" the NETC message down through the agency.

Reconsidering the Advisory Committee

- Expand the committee's role to actively disseminate research results.

Reconsidering the Technical committees

- Bring in participants from other state agencies (environment, public health) to serve on Technical committees, which will facilitate technology transfer to those agencies.

Considering new communication products and practices

- Develop a coordinated approach to disseminating research results.
- Customize the message and communication product to meet the needs of various audiences. For example, brief, easy-to-use formats for agency executives; longer formats for technical audiences.
- Prepare a PowerPoint to highlight new projects or projects recently completed.
- Charge NETC Coordinator with preparing short news items about NETC research that are delivered periodically via email.
- Require new deliverables from researchers (webinar, poster, presentation, fact sheet, technical brief).
- Use social media to distribute research results.

Appendix B. Survey Findings: Agency Managers, Implementers and Subject Matter Experts

NEW ENGLAND TRANSPORTATION CONSORTIUM

Re-Creating NETC

Task Memorandum 1

Task 2 Survey Findings

Agency Managers, Implementers and Subject Matter Experts

Prepared for
New England Transportation Consortium

Prepared by
CTC & Associates LLC

March 30, 2021

ctc & associates llc

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Executive Summary

New England Transportation Consortium (NETC) uses a regional approach to solving common transportation issues in the New England states. Transportation research needs have evolved since NETC was formed more than 30 years ago, and to ensure that the consortium's current goals, vision and mission address issues that are most important to the New England region today, the consortium is conducting a self-evaluation that will inform efforts to reformulate its purpose, composition and specific role. These actions will allow NETC to continue to work effectively for member states while capturing and addressing important regional research needs.

To gather information for this evaluation, online surveys were distributed to two member groups: NETC transportation agency managers and implementers, and NETC agency subject matter experts. The online surveys gathered information about staff members' experiences with NETC and their expectations and recommendations for NETC's future efforts. Survey results are summarized below.

Survey of Agency Managers and Implementers

Twenty-four NETC member agency managers and implementers described their familiarity with and expectations for the NETC research program and the communication methods they found most useful. Respondents represented five of the six NETC member agencies, with more representation from New Hampshire and Vermont. Overall, respondents reported being moderately familiar with the NETC program. Respondents consistently expressed a need for increased collaboration among member agencies to more effectively address common issues. Encouraging and expanding participation and focusing on shared needs and sharing resources were among the recommended actions to meet this need.

The key priorities of these respondents were research that directly impacts their state followed closely by research that involves regional collaboration, specifically, addressing a regional challenge and bringing together regional subject matter experts. Research that solves a technical or engineering issue was also important to this group; respondents were least interested in research that informs policy decisions or addresses hot-topic issues. Research topics of greatest interest related to construction, maintenance and materials, and bridges and other structures; respondents reported the least interest in research devoted to aviation, rail and transit, and administration.

To meet future research, implementation and other related agency needs, respondents recommended that NETC focus on critical issues. A cluster of activities claimed the second ranking: communication, education and/or outreach of research results, conducting subject matter expert symposiums, facilitating implementation of completed research, and focusing on national transportation mandates. Communication products most useful to member agencies include periodic news items that describe recent research results, quarterly summaries of recent research results and an annual report of program results. Virtual meetings, symposiums and peer exchanges are other useful communication tools that encourage members to network with peers and discuss research findings.

Critical issues facing NETC member agencies were primarily related to workforce development, budgets and funding, and asset management. Nearly one-third of respondents mentioned staffing issues, most often associated with recruiting, retaining and developing employees but also related to retirements, performance measurement and succession planning.

Survey of Agency Subject Matter Experts

A second online survey examined subject matter experts' experience with a Technical Committee (TC) sponsored by NETC and other NETC activities. Complete or mostly complete responses were received from 43 respondents representing all six NETC member agencies, with more representation from Massachusetts, New Hampshire and Vermont. Thirty-six respondents have participated on a TC; all but two of these respondents reported serving as a TC member, five have served as a TC chair, and six have signed a problem statement as a potential TC chair. In addition, most respondents (84%) reported relatively limited experience with NETC, serving on a TC for one to two NETC research projects. Eleven respondents reported implementing NETC research, and 29 have reviewed problem statements. Other respondents noted that they have reviewed proposals and helped to select the principal investigator.

Respondents addressed a range of issues associated with TC participation. Most respondents reported receiving adequate preparation and communication for participating on a TC. Only a limited number of respondents suggested that NETC could provide more guidance and allow more time for specific activities such as proposal review. Slightly more than half of respondents reported devoting 10 to 20 hours to a single project. Interest in participating in future TCs or research implementation committees was strong. Thirty-six respondents expressed interest in TC participation and nearly two-thirds of respondents expressed interest in participating in a new type of committee that would focus on implementing research results from a NETC project or national research effort.

Overall satisfaction with NETC research results was also evaluated. In general, respondents were moderately satisfied to very satisfied that research projects addressed topics of greatest concern to member agencies. Respondents who were dissatisfied cited a lack of data, insufficient information about a research topic and results that lacked utility. Despite this satisfaction with research topics, two-thirds of respondents reported no change in their level of awareness of a specific topic after participating in a NETC research project.

Collaboration resulting from TC participation was among the rewards reported by respondents. Most cited the value of collaborating and coordinating with a range of stakeholders. Others noted the opportunity to expand knowledge and participate in research that impacted their region, and the benefits of producing and implementing research results.

Respondents assessed the effectiveness of a range of current and possible outreach methods, giving the highest average ratings to technical peer exchanges and subject matter expert symposiums. Webinars also received high ratings (third out of seven outreach methods), although a relatively small number of respondents reported viewing or participating in them. Recommendations for enhancing NETC outreach include sharing research and results on a common website, developing communities of practice, coordinating with other transportation-related conferences to disseminate information to a wider audience, holding virtual meetings and offering webinars on demand.

Nearly all of these respondents reported that the NETC research program is addressing the issues and topics of greatest concern to them and their colleagues. Recommendations for improvement focused on more effective collaboration among agencies, including measures to bring NETC members together, enhance communication and identify common needs.

The top issues facing NETC member agencies were asset management, funding and workforce development. Topics recommended for additional research were largely related to bridges and other structures, the environment and pavements.

Conclusions and Recommendations

Takeaways from both surveys are summarized below by topic. Each takeaway is followed by the actions or practices NETC could consider to address it.

- *Scope of NETC's research effort*. Keep the research focus on New England states, and prioritize research according to topics of importance to members.
- *NETC's role*. Address workforce development and other top issues, and expand communication and outreach efforts to share research results.
- *Critical issues facing NETC agencies*. Evaluate issues related to workforce development, budgets and funding, and asset management through a more intensive NETC analysis.
- *Producing research results*. Develop practices to manage data, produce useful research results and track the impacts of research on topic awareness.
- *Implementing research results*. Create a new implementation committee to further disseminate research results, and consider practices that will support the new committee's efforts.
- *Collaboration and coordination*. Encourage collaboration among NETC member agency staff, a predominant theme in survey findings.
- *Managing TCs*. Promote TC participation by providing more guidance for new TC members and highlighting the benefits of TC participation.
- *NETC outreach to agency managers and implementers*. Increase outreach to this respondent group through news items and other communication tools to enhance engagement.
- *NETC outreach to subject matter experts*. Engage SMEs through peer exchanges and symposiums, the preferred modes of outreach for this respondent group, and enhance marketing for webinars.

The findings presented in this task memorandum will be supplemented by results of a survey of selected research groups (to be presented in Task Memorandum 2). A final Task Memorandum 3 will assess findings from all surveys and any related research, reflect TAAC member feedback on these findings, and present a comprehensive set of recommendations for TAAC consideration.

1 Introduction

1.1 Project Description

New England Transportation Consortium (NETC) is a research cooperative that uses a regional approach to develop innovative solutions to common transportation issues in the New England states. Transportation research needs have evolved since NETC was formed more than 30 years ago, and the consortium's current goals, vision and mission may not capture issues that are most important to the New England region today. To become a more effective resource for state department of transportation (DOT) staff, including decision-makers, designers and field personnel, the consortium is conducting a self-evaluation that will inform efforts to reformulate its purpose, composition and specific role, and will allow NETC to continue to work effectively for member states while addressing important regional research needs.

1.2 Task Description

With input from Transportation Agency Advisory Committee (TAAC) members, investigators developed surveys for distribution to NETC transportation agency managers, implementers and subject matter experts. The online surveys gathered information about staff members' experiences with NETC and their expectations and recommendations for NETC's future efforts.

Findings from the survey of higher-level agency managers and implementers begin on page 5. Results from the survey of subject matter experts expected to have experience with NETC on a Technical Committee (TC) or in another capacity begin on page 9.

1.3 Reviewing This Task Memorandum

Survey results are summarized in Sections 2 and 3 of this task memorandum. After briefly describing the respondent group, each section presents the findings for topics specific to the group, including research topics and related activities of importance to members; roles that NETC can play to meet future research, implementation and other agency needs; and critical issues facing these agencies. When appropriate, actual responses are presented to provide more context to an issue. These responses have been lightly edited for clarity and conciseness. Section 4 presents a summary of survey findings and NETC's possible responses to them.

While the survey received responses from a range of staff, the survey is not a representative sampling across functional areas and agencies, which should be considered when reviewing the survey responses.

Interpreting Respondents' Ratings

Both surveys included ratings questions that asked respondents to apply a five-point rating scale that investigators numbered to simplify analysis:

5 = extremely (aware, effective, familiar, important, likely, satisfied)
4 = very (aware, effective, familiar, important, likely, satisfied)
3 = moderately (aware, effective, familiar, important, likely, satisfied)
2 = slightly (aware, effective, familiar, important, likely, satisfied)
1 = not at all (aware, effective, familiar, important, likely, satisfied)

Responses are summarized using averages when presenting results for rating questions. The higher the average rating using the five-point scale, the more positive the response.

2 Survey of Agency Managers and Implementers

2.1 Overview

In the first of two surveys of NETC member agency staff, managers and implementers described their familiarity with and expectations for the NETC research program and the methods of communication they found most useful. Survey questions are provided in Appendix A. The full text of survey responses and contact information for respondents, if provided, are available as a supplement to this task memorandum.

2.2 Characterizing the Respondent Group

Twenty-four staff members from NETC member agencies responded from the pool of more than 60 potential respondents identified by TAAC members. The survey received responses from five of the six NETC member agencies, with respondents from New Hampshire and Vermont more heavily represented in the respondent group. Overall, respondents reported being moderately familiar with the NETC program. (The average rating for all respondents was 3.17, which is closest to the *moderately familiar* rating of 3.)

2.3 Importance of Research-Related Activities

When asked to rate the importance of the research-related activities NETC could conduct, not surprisingly, respondents were most interested in research that directly impacts their state. Closely following that interest in local impacts were two types of regional collaboration (addressing a regional challenge and bringing together regional subject matter experts). Solving a technical or engineering issue rounded out the top four research-related activities agency managers and implementers would like NETC to conduct. Respondents were least interested in research that informs policy decisions or addresses hot-topic issues. Table 1 summarizes survey responses.

Table 1. Importance of Research Activities to Agency Managers and Implementers

Research Activity	Average Rating
Research that directly impacts our state	4.33
Research addressing a regional challenge	4.17
Initiatives bringing together regional subject matter experts	4.14
Research to solve a technical or engineering issue	4.04
Implementation projects advancing NETC research results	3.87
Research to help our state comply with national mandates	3.75
Implementation projects advancing other organizations' research results (NCHRP, Every Day Counts)	3.67
Research addressing long-term strategic issues	3.65

Research Activity	Average Rating
Research to inform policy decisions	3.63
Research addressing hot-topic issues	3.50

2.4 Importance of Research Topics

The research topic areas agency managers and implementers deem most important are construction, maintenance and materials, followed closely by bridges and other structures. Aviation, rail and transit, and administration, the lowest rated topics, failed to reach an average rating of *moderately important*. Table 2 summarizes survey responses.

Table 2. Importance of Research Topics to Agency Managers and Implementers

Research Topic	Average Rating
Construction	3.83
Maintenance	3.83
Materials	3.83
Bridges and other structures	3.75
Snow and ice control	3.57
Asset management	3.50
Environmental	3.42
Transformative technologies (CAV, UAS)	3.38
Operations and traffic management	3.29
Highway design	3.25
Mobility	3.17
Planning and forecasting	3.04
Aviation	2.83
Rail and transit	2.75
Administration	2.50

2.5 Most Important NETC Roles

Focusing on critical issues is the most important role NETC can play for this group of respondents. A cluster of activities claimed the second ranking: communication, education and/or outreach of research results, conducting subject matter expert symposiums, facilitating implementation of completed research, and focusing on national transportation mandates. In their responses to this question, respondents made clear their interest in focusing on national transportation mandates, which stands in contrast to how they rated that type of effort when asked about the importance of NETC's research activities (respondents rated complying with national mandates sixth out of 10 research activities). Table 3 provides respondents' ranking of NETC roles.

Table 3. Ranking NETC Roles

NETC Role	Rank	Mean
Focusing on critical issues	1	1.38
Communication, education and/or outreach of research results	2	2.00
Conducting subject matter expert symposiums	2	2.00
Facilitating implementation of completed research	2	2.00
Focusing on national transportation mandates and initiatives	2	2.00
Conducting technical peer exchanges	3	2.07
Focusing on emerging technologies	4	2.17
Workforce development and retention	5	2.43

A few respondents offered additional comments:

- *Implementation and applicability are key. Don't duplicate national programs.*
- *I seldom find that NETC research results have been directly implementable into specification language or the acceptance program. The best research efforts IMO [in my opinion] are those that have a clearly defined objective to resolve a specific policy decision or specification change or the like.*
- *For states within a region that are lagging in specific capability areas, NETC could leverage capability-leading states to assist in improving those less evolved.*
- *From my experience in traffic operations, I have had limited experience with NETC. Most of the research that I utilize and/or participate in is either through NCHRP or our agency research program. My comments reflect that experience. I then see NETC as a resource to make regional practitioners aware of available research through peer exchanges and other training opportunities.*
- *Research is a tough business because good research doesn't always result in rapid beneficial results that all will immediately implement, but is often building blocks advancing our understanding of the subject.*

2.6 Improving Collaboration

Respondents offered a range of responses when asked how the state transportation agencies participating in NETC can work together to more effectively address common needs. Recommendations ranged from encouraging and expanding participation to focusing on shared needs and sharing resources. Table 4 presents respondents' recommendations.

Table 4. Recommended Practices to Improve Collaboration

Practice	Description
Additional Activities	• More pooled fund activities • Peer exchanges • NETC sessions at member agency transportation conferences

Practice	Description
Common Specifications	NETC, North Eastern States' Materials Engineers Association, North East Asphalt User/Producer Group and similar groups "could be far more valuable if some New England states began to share common specification language." The respondent noted that maintaining six different construction specifications in such a small geographic area is inefficient.
Encourage and Expand Participation	• Encourage networking. • Get DOT staff operating outside of the research units invested in research results. • Encourage engagement with other state members to better understand how they deal with various challenges. Virtual meetings held during the pandemic have made it easier for members to participate with other state representatives, enhancing understanding of other states' responses to challenges. • Expand outreach by engaging with state transportation organizations such as AASHTO, National Association of State Aviation Officials and American Public Transportation Association to heighten NETC's visibility in the transportation community.
Focus on Shared Needs	• Select topic areas for which there is a joint need to improve or learn; areas that are competitive will be difficult to advance. • Submit joint or shared requests for research.
Increase Frequency	Collaborate on a more frequent basis.
Share Resources	Share resources such as research databases with other NETC members.

2.7 Critical Issues Facing NETC Member Agencies

When asked to identify the top three issues facing their agencies, respondents most often cited:

- *Workforce development*. Almost a third of respondents mentioned some type of staffing issue, most often recruiting, retaining and developing staff. Respondents also cited the impact of retirements, measuring performance and succession planning as among the most critical issues facing their agencies.
- *Budgets and funding*. Budget limitations, the lack of funding or the lack of reliable, sustainable funding was cited by almost 20% of respondents.
- *Asset management*. Implementing asset management, collecting and managing asset data, and the cost to maintain pavements and historic and other structures were cited by 13% of respondents as one of their top issues.

Other issues cited less frequently by respondents include:

- *Training*. Five respondents cited knowledge management and bridging knowledge gaps, and educating policymakers and the public.
- *Innovation*. Several respondents described issues related to innovation, including keeping up with technology, encouraging leadership and staff to embrace change for innovation efforts related to unmanned aircraft systems (UAS) and autonomous vehicles, and failure to embrace new paradigms that involve nontraditional transportation modes.

A few respondents described issues that appear to be agency-specific:

- Failure of leaders to invest in safety systems due to the difficulty in quantifying the return on investment for these systems.
- Departmentwide fragmentation, which means that various bureaus or units seek to serve individual unit needs rather than meeting department objectives.

2.8 Rating Communication Products

Respondents indicated how likely they were to use a range of communication products that provide information about NETC. Periodic news items describing recent research results received the highest rating. (The TAAC has discussed moving forward with these news items, which would be sent to the NETC mailing list.)

Also of interest to agency managers and implementers are products that report on NETC results (a quarterly summary and an annual report). The previous NETC coordinator prepared an annual report, but one is no longer being produced at the request of the NETC lead state. The current NETC coordinator prepares quarterly reports, as required by the federal Transportation Pooled Fund (TPF) program, which are posted on the NETC TPF study page. Table 5 summarizes survey responses.

Table 5. Rating Communication Products

Communication Product	Average Rating
Periodic news items describing recent research results	3.83
Quarterly summary of research results	3.42
Annual report of program results	3.13
Monthly email update	3.04
Welcome package or onboarding webinar for new agency executives	2.91
Website updates	2.75

Respondents also mentioned final research results, developing a “road show” to deliver at each member agency that provides professional development hour credits, networking with virtual meetings to discuss research results, and symposiums and peer exchanges as important communication tools.

3 Survey of Agency Subject Matter Experts

3.1 Overview

The second of two NETC surveys queried subject matter experts (SMEs) expected to have experience with a NETC TC or some other connection to NETC activities. Survey questions are provided in Appendix A. The full text of survey responses and contact information for respondents, if provided, are available as a supplement to this task memorandum.

3.2 Characterizing the Respondent Group

TAAC members identified more than 70 potential respondents for the survey. Forty-three respondents from all six NETC member agencies provided complete or mostly complete responses. Respondents from Massachusetts, New Hampshire and Vermont were more heavily represented in the respondent group. Most respondents (84%, or 36 of the 43 respondents) have participated on a TC for a NETC research project. All but two of these respondents reported serving as a TC member. Only five respondents have served as a TC chair, and six have signed a problem statement as a potential TC chair.

The same number of respondents (84%, or 36 of the 43 respondents) reported relatively limited experience with NETC, serving on a TC for one to two NETC research projects. The remaining respondents participated on three projects (four respondents) or more than three projects (two respondents).

Further clarifying their NETC participation, 11 respondents reported implementing NETC research, and 29 have reviewed problem statements. Other respondents noted that they had reviewed proposals, agreed on awards and helped to select the principal investigator.

3.3 Assessing Technical Committee Participation

A TC is created for every NETC project to guide the technical aspects of the research project's activities. Each member DOT nominates a committee representative who has the technical knowledge and expertise in the proposed area of study. TCs consist of at least one representative from a minimum of four member states. A quorum of four voting members is required to conduct the business of the TC.

Responsibilities of TC members are summarized below:

- Prepare the project's scope of work, including recommending research organizations to receive a request for proposal.
- Review the timeline and budget listed in the research problem statement and revise as needed.
- If the proposed work is not timely or prudent, report this finding to the Advisory Committee.
- Review and evaluate proposals.
- Make recommendations to the Advisory Committee about a research organization that will conduct a particular study.
- Monitor the technical aspects of each study as it progresses.
- Present recommendations to the Advisory Committee about the acceptability of interim and completed work, as well as recommendations to continue the project, including extended timeline and budget.
- Collaborate with the research organization on plans for implementation that include technology transfer and plans for incorporating the research results/products into practice.
- Recommend appropriate implementation actions to the Advisory Committee based on the research findings.

Respondents addressed a range of issues associated with TC participation:

- Adequacy of the preparation for new TC members
- Time required for TC members to fulfill their roles

- Interest in future TC participation
- Interest in participating in implementation-focused committees

Preparing New Members

Most respondents feel the communication and preparation they received to participate on a NETC TC was adequate. Six respondents described how NETC can help new TC members prepare for their participation by providing more guidance and more time:

- *More guidance*. In addition to providing background information on NETC in an easy-to-understand format (for example, a narrated presentation or short video), respondents also recommended that NETC provide new TC members with:
  - Clearly defined expectations for TC members.
  - A timeline and checklist of critical activities in the NETC research cycle.
- *More time.* One respondent noted that proposal review involved a lot of material, and too little time was allowed for TC members' review.

Time Commitment

The survey examined the issue of the time required of TC members in more detail. When asked how much time they devoted to their TC duties over the course of a single project, slightly more than half of respondents reported spending 10 to 20 hours. The remaining respondents were fairly evenly divided in reporting that they spent less time (fewer than 10 hours) or more time (21 to 30 hours or more than 30 hours). Figure 1 summarizes survey responses.

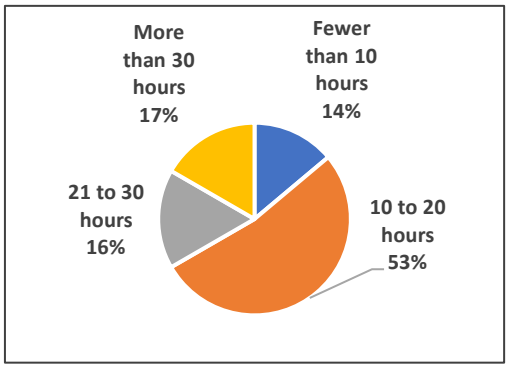

Figure 1. Time Required for Technical Committee Duties

Most—all but six of the 36 respondents—felt the time commitment to TC duties was about as expected. Three felt less time than expected was needed; another three felt that they devoted more time than expected to their TC roles.

Future Technical Committee Participation

All but seven respondents indicated that they would participate on a NETC TC in the future. Four of the seven not wishing to participate cited the lack of time, while others expressed concern about a lack of engineering knowledge or noted that other duties take priority. The final respondent noted that sufficient steps had not been taken to "ensure that all evaluators review the proposals before taking a vote to select the best."

Future Implementation Committee Participation

TAAC members have discussed possibly forming a new type of committee that would focus on implementing research results from a NETC project or national research effort. Almost two-thirds of respondents expressed interest in participating on this type of committee.

3.4 Satisfaction With NETC Research Results

Respondents were asked to consider whether the results of the NETC research projects they participated in effectively addressed the issues and topics of greatest concern to them. Overall, respondents reported being *moderately satisfied* to *very satisfied* with the results of the research projects they have participated in. (The average rating for all respondents was 3.47, which is almost midway between the 3 rating of *moderately satisfied* and the 4 rating of *very satisfied*.)

Some respondents provided their assessment of why their expectations for research results weren't met, most often mentioning the lack of data or information about a research topic and results that lacked utility. Table 6 provides more detailed survey responses.

Table 6. Factors Affecting Satisfaction With Research Results

Factor	Description
Lack of Data/Information	• A project addressed a subject the participant's state DOT "was not fully up to speed on" so the participant didn't have much to contribute. • For one of the projects, the team was not able to deliver the anticipated project due to a lack of data. • Lack of consistent and coherent data and data structure across the various Northeastern states. This should be the most important issue identified in the problem statement. • Not everyone on the evaluation panel reviewed all proposals in detail and some voted favorably based on the discussion and not based on an extensive understanding of the proposals.
Lack of Participation	Participation by other state DOTs
Lack of Preparation	Describing a project that had no results, the respondent attributed that result to the lack of an extensive literature search that would have identified there was insufficient published data to complete the research.
Lack of Time	With mounting work commitments and COVID, it was very difficult for the respondent to make time for the project.
Open-Ended Topics	For NETC projects, the topics are "somewhat vague and open-ended," which makes it "tough to come to very satisfying or concrete endings. Not much that can be done to remedy this except to try and drive towards very specific outcomes and results."
Rapidly Changing Environment	New technologies and new Federal Aviation Administration rules came to light during the two-year time frame of the project.
Relevance	Relevance to current practices in the respondent's agency
Results Not Useful	• While hoping for practical use of project results, the respondent noted that "findings indicated there wasn't enough information to provide a concrete conclusion given the very specific request. By the time this was realized, there was no more funding nor time. So basically, the results were not definitive." • Some projects become more of an academic exercise as they proceed, generating less useful results. • The project did not produce the desired results—recommendations that could be utilized in design and to modify AASHTO codes. • Study results were not directly applicable to the respondent's work but might have academic benefit.

Factor	Description
Varying Degrees of Success	Some projects exceeded expectations, while others "were a struggle to get to the finish."

NETC Research Impacts

Respondents characterized how their level of awareness of a specific research topic changed after participating in a NETC research project. Indicating an area for NETC to conduct a more in-depth inquiry, two-thirds of respondents reported no change in their level of awareness. The following describes the change in awareness for the 12 respondents reporting an impact from the NETC research effort:

- Moderately aware to extremely aware (1)
- Very aware to extremely aware (2)
- Moderately aware to very aware (6)
- Slightly aware to moderately aware (3)

3.5 Rewards of Participation

Those respondents who indicated they had enough experience with TC participation offered comments about what was most rewarding about their work on these committees. Most cited the opportunity to collaborate and coordinate efforts with a range of stakeholders. Others appreciated the opportunity to expand knowledge and participate in research with impacts to their region, while others highlighted the benefits of producing and implementing research results. Table 7 summarizes survey responses.

Table 7. Rewards of NETC Technical Committee Participation

Type of Impact	Description
Collaboration and Coordination	• Collaborating with colleagues from other DOTs throughout the region to address problems and collectively advance innovations and improvements • Collaborating with principal investigators and other TC members; working with and learning from other committee members • Coordinating with other state SMEs and technical experts • Discussing topics and use cases; identifying how practices can be adapted for use by multiple states • Engaging with multiple stakeholders • Interacting with other New England DOT staff and other professionals; making connections that carry forward into other project endeavors • Participating as part of a team of regional biologists in the New England transportation departments, which shows how other regional experts are conducting similar business • Using other states' experiences to provide a benchmark for assessing local practices • Working with and getting to know colleagues in other states in similar (and different) roles

Type of Impact	Description
Expanding Knowledge	• Advancing state of knowledge • Getting information out to the public • Learning about the subject • Sharing knowledge across jurisdictional boundaries
Impacts of Research	• Being at the forefront of new research and engineering concepts • Generating scientific literature • Identifying progress being made related to drone technology • Weighing in on research that has a direct impact on our region
Implementing Results	Implementing the knowledge gained into agency standard practice
Producing Results	• Appreciating results at the end of the project • Getting projects successfully completed in a reasonably short time from problem statement to final report

3.6 NETC Outreach

NETC's current outreach efforts include periodic SME symposiums, project webinars that are prepared and presented as each research project concludes, and other efforts designed to encourage participation and collaboration in NETC research and dissemination of results. Survey respondents described their interest and participation in these symposiums and webinars, and rated the types of outreach NETC currently conducts or is contemplating.

Symposiums and Webinars

The June 2019 NETC Symposium brought together state agency SMEs and university representatives from the six New England states for a full-day event that included roundtable discussions, poster sessions and networking. Participants represented the topic areas of materials, bridges and the environment. Planning for a similar 2021 symposium, expected to occur in late summer or fall, is underway.

While more than three-quarters of survey respondents did not attend the 2019 symposium, the same percentage of respondents expressed interest in attending a future one, which bodes well for this year's symposium. Respondents were also asked if they had attended a NETC project webinar. More than two-thirds have not attended one, highlighting an area where NETC can enhance its outreach to encourage engagement across member states with the results of NETC-funded research.

Rating NETC Outreach

NETC makes choices in how it brings together SMEs and other stakeholders to identify and address transportation challenges. Respondents offered their assessment of the effectiveness of a range of current and possible outreach methods, giving the highest average ratings to technical peer exchanges and SME symposiums. Interestingly, webinars also rated highly (third out of seven outreach methods), though a relatively small number of respondents reported viewing or participating in them. Deemed least effective are virtual poster sessions. Table 8 presents respondents' average ratings of NETC's outreach.

Table 8. Effectiveness Ratings for NETC Outreach

Outreach Method	Average Rating
Technical peer exchanges	4.15
Subject matter expert symposiums	3.90
Webinars	3.78
Periodic emails that report on research results	3.66
Posting research reports on the NETC website	3.37
Quarterly newsletter	3.27
Virtual poster sessions	2.88

Several respondents offered recommendations to expand NETC's outreach efforts:

- Share research and results on a *common website*.
- Develop *communities of practice*.
- *Coordinate with other transportation-related conferences* so that information can be shared at those conferences or work sessions can be planned while NETC SMEs attend those conferences.
- Use the *peer exchange format*, which can be more engaging and interactive than a webinar or conference.
- Hold *virtual meetings*:
    - Coffee talks on various subjects.
    - Open discussion to share information on new technology.
    - Quarterly subject matter mini-symposiums centered on a topic or theme.
- Offer *webinars on demand*. An on-demand webinar would likely differ from NETC's current webinar effort, which has researchers produce webinars on recently closed projects. These webinars are recorded and available on the NETC website.

Other recommendations addressed improvements to NETC's management of research:

- Create a *database* that can store test data from various agencies while capturing the variations in tests between agencies to provide SMEs and researchers with an evolving data set to analyze and drive future research.
- Develop *implementation guidelines* for each project.
- Develop formal *schedules/calendars* for NETC participation. The respondent noted that anything that can be put on calendars to set aside time is beneficial; schedules are hectic and trying to find time to read technical reports is challenging.

3.7 Meeting Member Agency Needs

When asked if the NETC research program is addressing the issues and topics of greatest concern to them and their colleagues, only two respondents described specific concerns. Both noted that the fault may not lie with NETC:

Not sure if it's NETC or just the lack of communication in our agency, but there has been much less activity/involvement than in the past.

But this is not the fault of NETC. I have tried to stir interest with the other NE State Safety Engineers (as we regularly meet), but there is concern about time invested and practical outcomes.

Respondents also offered recommendations for more effective collaboration among the agencies participating in NETC in addressing common needs. Respondents most often described ways to bring NETC members together, enhance communication and identify common needs. Table 9 summarizes survey responses.

Table 9. Recommendations to Address Common Needs

Activity or Issue	Description
Bring Members Together	• Bring states together in any forum. The respondent noted this type of engagement is always helpful and any electronic format seems to work well. • Conduct peer exchanges, roundtables and symposiums; use the NETC symposium to identify common needs. • Organize regional meetings to engage participants in brainstorming, work sessions and more.
Collaborate	• Encourage staff to take the initiative to find answers on issues of mutual concern. • Provide organizational charts with contact information so staff from one NETC member state can find counterparts in other states.
Conduct Outreach	• Consider NETC participation in Northeastern Transportation and Wildlife Conference or other conferences as opportunities to present NETC research results. • Continue offering webinars.
Engage Leadership	• Convene a leadership roundtable discussion on advancing innovations through NETC; include a Q&A session with the audience. • Ensure that top leadership in all state member agencies are "at the table for NETC work." • Organize meetings with high-level administrators to coordinate on projects and priorities.
Enhance Communication	• Communicate with peers and help guide researchers to important focus areas. • Present more opportunities for open communication between the states; use a facilitator with prepared questions. • Send more emails showcasing what each state is doing to highlight possible opportunities for collaboration.
Establish Priorities	• Clarify how member agencies can advance NETC research priorities. • Share with NETC the research priorities identified by state safety engineers who meet regularly.
Identify Common Needs	• Compare construction specifications. • Share/prioritize research needs prior to problem statement development to help inform the likelihood of a project being funded.
Implement Results	• Consider that implementation of a research idea may move more quickly in the private sector than through proposed NETC research; remember to examine products or methods that are already available in the private sector. • Focus more on implementing results from national research in specific jurisdictions.
Improve Staffing	Provide adequate staffing such that members can focus on their assignments.

Activity or Issue	Description
Share Data	Combine lab and field measurements from participating agencies to allow researchers and staff to correlate lab results with field performance.
Share Resources	Continue pooling funding.

3.8 Top Issues Facing NETC Member Agencies

Respondents offered varied and in some cases detailed responses when asked to cite the three top issues facing their agencies. Responses fell into two categories: issues related to the agency and how it operates, and topics requiring further research.

Issues Affecting the Agency

The most commonly cited concerns were:

- *Asset management*. Addressing the needs of an aging infrastructure when funding and other resources are insufficient is among the most critical issues facing these agencies. Respondents also cited environmental concerns, such as incorporating best management practices when projects are developed.
- *Funding*. Numerous respondents noted insufficient funding in all aspects of the transportation system—from capital and operating funds to matching funds and long-term funding.
- *Workforce development*. Staffing-related issues such as recruiting, retaining and developing staff were also top of mind among respondents.

Other issues cited were insufficient training opportunities, outdated methods and specifications for materials, and the impacts of climate change. Table 10 presents survey responses.

Table 10. Top Issues Facing NETC Member Agencies

Topic Area	Description
Administrative	• Including environmental and landscape architecture staff as a part of the design process and not an afterthought; recognize benefits and understand the impacts of federal and state mandates • Silos within the agency
Asset Management	• Asset management risks • Balancing the need for more resilient infrastructure, which typically costs more, with the insufficient funding available to provide it • Balancing the overwhelming costs—in money and people—required to maintain assets in a state of good repair with the need to modernize and expand the transportation system to grow the economy and improve quality of life • Incorporating environmental considerations as common best management practices (BMPs) in project development rather than considering environmental excellence and improvements ancillary to core mission and values • Infrastructure aging

Topic Area	Description
Climate Change	• Addressing climate change-induced changes to weather events • Improving resilience to the impacts of climate change; better understand the incremental impacts of climate change on the system as well as the obvious and major disruptive events such as flooding
Costs	• Increasing costs • Paving costs
COVID-19	COVID response and recovery
Engaging With Contractors	• Encouraging the construction industry to adopt technology advances • Unspecified issues associated with construction activities
Funding	• Capital and operating funding • Financial shortfalls (transportation projects are underfunded) • Funding for new technology • Funding for transportation projects • Inadequate capital and maintenance program funding • Lack of state funding sources to match federal funds • Long-term funding uncertainties (for example, the gas tax is not sustainable) • Stagnant or falling funding
Lab Performance	Lack of an organized process to compare lab performance test data. Lack of confidence in a lab performance test that can be shown to relate to field performance in our state and how to modify volumetrics to improve lab and field performance.
Limited Resources	Increased demands on limited resources
Materials	• Outdated methods and specifications for materials and concrete aggregates • Reduced quality of materials
Regulatory Issues	Regulatory requirements slow program development and increase capital project costs.
Resiliency	Resiliency tools are needed.
Technology	IT challenges
Work Culture	Change the work culture to incorporate more efficient work strategies and remove impediments to productivity; the respondent recommended reducing bureaucratic red tape to allow for more flexibility and encourage innovative ideas.
Workforce Development	• Attracting qualified staff when salaries are low compared to private sector • Diversity, equity and inclusion • Employee retention and development for skilled laborers • Heavy workload due to added responsibilities and inability to obtain adequate resources (staffing, equipment, IT support) • Hiring freeze • Inadequate staff resources • Loss of experienced staff who knew the history of practice • Loss of institutional knowledge as personnel retire or leave the state agency; standard operating procedures help but are only as good as those who prepare them. • More mentorship and job shadowing are needed, as are opportunities for “being on detail” to understand the big picture of the institution.

Topic Area	Description
Workforce Development	• Recruitment and retention • Staffing shortages • Staffing/experience; the respondent noted that "we have a lot of young employees and many people are retiring. The workforce is getting younger." • Teleworking • Training opportunities for skilled laborers • Understaffing • Workforce nearing retirement; knowledge transfer

Topics Requiring Further Research

Respondents also described the topic areas where additional research is needed. Most of the critical issues respondents reported fell into three categories: bridges and other structures, environmental concerns, and pavements. Identifying these priority areas can inform a more strategic effort by NETC to fund projects in the topic areas deemed most important by its member agencies. Table 11 provides survey responses.

Table 11. Research Topics Requiring Further Research

Topic Area	Description
Bridges and Other Structures	• Alternate piles types for integral abutment bridges • Building larger culverts and bridges that are more resilient and habitat-friendly as cost-efficiently as possible • Large and small culvert failures causing emergency road closures • Lack of AASHTO resistance factors for reused foundation elements • Prediction of resistance of driven piles in sands using pile driving analyzer tests • Re-use of low-level contaminate in situ structure backfill in the construction/placement of new structure backfill to reduce handling cost • Transverse deck cracking • Unreasonable scour predictions and lack of available scour prediction methods in naturally amoured streambeds
Environment	• Animal-vehicle crash reduction • Habitat connectivity; wildlife impacts from transportation infrastructure and vehicles • Navigating threatened and endangered species issues related to bats • Potential Endangered Species Act listings: monarch butterfly; upgrading of the northern long-eared bat to endangered; Blanding's turtle • Practical measures for the operation and maintenance of stormwater BMPs • Roadkill data collection • Stormwater compliance through off-site mitigation • Winter salt loading to small streams
Intelligent Transportation Systems	• Preparing and developing practices for connected and autonomous vehicles (CAVs) • Intelligent transportation system infrastructure

Topic Area	Description
Pavements	• Durable crack-free/low-crack concrete • Durable hot mix pavement • Identifying how variability in asphalt binder properties affects the performance of hot-mix asphalt (HMA) mixture • Lack of consistent laydown of asphalt pavement (variability and lack of density) • Long-term aging of laboratory HMA mixtures to predict in-place aging • Long-term concrete durability • Performance engineered mixture criteria and testing (HMA and Portland cement concrete); knowing what tests to use and criteria to follow • Quality binders used in HMA • Subsurface variability that is difficult to quantify
Roadside Maintenance	• Helping maintenance management staff understand that the environmental benefits of "no mow" and "low mow" practices will not cost more and create more work • Roadside safety hardware

4 Conclusions and Recommendations

4.1 Overview

Note: Respondents offered many and varied recommendations to enhance the effectiveness of NETC's research and related efforts. This summary of survey findings and responses to them is a representative rather than exhaustive presentation of the actions NETC might take to address respondent feedback. Some recommendations and follow-up actions are drawn directly from respondent comments, and others were developed by the investigators in response to stated needs. TAAC members may identify other recommended actions of particular interest to them or their agencies in the preceding sections of this task memorandum.

This summary of survey findings and NETC's possible responses to them highlights takeaways from both surveys in these topic areas:

- Scope of NETC's research effort
- NETC's role
- Critical issues facing NETC agencies
- Producing research results
- Implementing research results
- Collaboration and coordination
- Managing TCs
- NETC outreach to agency managers and implementers
- NETC outreach to subject matter experts

Each takeaway is followed by the actions or practices NETC could consider to address it. A recommended action may appear more than once if applicable to multiple issues.

4.2 Takeaways and Possible NETC Responses

Scope of NETC's Research Effort

Keep it local. Agency managers and implementers are most interested in research that stays close to home ("directly impacts our state") and research that addresses regional challenges or brings together regional SMEs. Bringing together SMEs was a top issue for agency managers, implementers and SMEs.

NETC could consider:

- Continuing to focus on research or other activities that have a local and/or regional impact.
- Identifying ways to strengthen and expand SME engagement and collaboration in their interactions with NETC.

Prioritize topic areas for research. Both respondent groups identified materials (pavements) and bridges and other structures as among the most important topics for research. Environmental issues were also often mentioned by members of both groups.

NETC could consider:

- Conducting a more rigorous analysis of the research priorities of NETC member agencies, and doing so in consultation with agency managers, implementers and SMEs.
- Reviewing results from the Task 3 survey of other research groups to identify effective methods of soliciting and selecting research and other activities that benefit member agencies. These might include:
    - Instituting a year-round selection process to meet research needs in a timelier manner.
    - Shifting some of the funds spent on research to technology transfer and outreach or implementation efforts that will impact all six member agencies.

NETC's Role

Conflicting responses and shared perspectives. While agency managers and implementers ranked workforce development and retention last among eight possible roles NETC could play, almost one-third of the same group of respondents identified staffing-related concerns as one of the top three issues facing their agencies (also the most frequently mentioned concern). SMEs also most often identified workforce development as one of the topic issues facing their agencies.

NETC could consider:

- Addressing workforce development and other top issues as part of a more comprehensive assessment of member agency needs and interests. NETC might consider selecting one of the top issues for development of a task force that will delve more deeply into member agency needs and identify how NETC can be part of a solution.

Shared perspectives. The respondent groups agree on the need for communication, education or outreach of research results, and the role NETC can play in bringing together SMEs at symposiums or in other group settings.

NETC could consider:

- Reviewing the recommendations for outreach to agency managers, implementers and SMEs appearing later in this section of the report.

Critical Issues Facing NETC Agencies

Shared concerns. Both respondent groups agreed on the top issues facing their agencies: workforce development, budgets and funding, and asset management. While other issues were also mentioned, these three categories were cited most often by respondents.

NETC could consider:

- Addressing the top issues as part of a more comprehensive assessment of member agency needs and interests. NETC might consider selecting one of the top issues for development of a task force that will delve more deeply into member agency needs and identify how NETC can be part of a solution.

Producing Research Results

Overall, SMEs reported being *moderately satisfied* to *very satisfied* with the results of NETC's research. Below are reasons some respondents said projects didn't produce the expected results and steps NETC might take to address those issues.

Consider data needs. Several respondents noted that disappointing research results can be traced back to a lack of data.

NETC could consider:

- Creating a database that can store test data from various agencies while capturing the variations in the test between agencies to provide SMEs and researchers with an evolving data set to analyze and drive future research.

Focus on producing useful results. Many factors can impact the usefulness of project findings, with respondents citing results becoming outdated in a rapidly changing environment, an academic rather than practitioner focus and research efforts that are too narrow.

NETC could consider:

- Ensuring TC members are adequately trained and engaged in reviewing and approving project proposals.
- Conducting thorough literature searches on all projects to identify significant gaps in knowledge or data that may preclude obtaining the desired results.
- Ensuring that problem statements are sufficiently focused without being too narrow.
- Thinking about how the duration of the research effort will impact project results for topics in rapidly changing topic areas.

Conduct research that improves topic awareness. Two-thirds of respondents indicated that their awareness of a research topic was unchanged after completing the research.

NETC could consider:

- Conducting post-project assessments that survey TC members about their experience with the project. If the project hasn't enhanced TC members' understanding, NETC could elicit feedback on why it hasn't.

Implementing Research Results

Develop a new implementation committee. Almost two-thirds of respondents reported interest in serving on an implementation-focused committee.

NETC could consider:

- Developing a formalized implementation process that includes formation of project- or program-specific implementation committee(s).
- Developing implementation guidelines for each project.
- Revisiting NETC's approach for problem statement submitters to address implementation in their submissions.
- Revisiting NETC's requirement for proposers to include an implementation plan in project proposals.
- Developing and funding implementation projects that follow up on selected NETC research results or other research findings.

Collaboration and Coordination

Collaboration is key. Collaboration cropped up repeatedly in respondents' comments about their experiences and what they would like to gain—or have gained—from their engagement with NETC.

NETC could consider:

- Providing opportunities for staff from one NETC member state to engage with other member state staff (peer exchanges, networking, participation in national transportation organizations and committees).
- Bringing states together in any forum, which could take the form of regional meetings that engage participants in brainstorming and work sessions.
- Creating a database that can store test data from various agencies while capturing the variations in the test between agencies to provide SMEs and researchers with an evolving data set to analyze and drive future research.
- Providing organizational charts with contact information so staff from one NETC member state can find counterparts in other states.

With collaboration and coordination a predominant theme in survey findings, particularly among SMEs, this task memorandum includes other respondent recommendations for encouraging effective collaboration and coordination among NETC member agency staff that TAAC members may wish to pursue.

Managing Technical Committees

Prepare new members for their TC roles. Respondents who described needing more help to prepare for their roles as TC members recommended more guidance and more time for review. Another respondent stressed the need for TC members to understand the importance of a careful review of project proposals prior to the proposal scoring meetings.

Highlight the benefits of TC participation. Many respondents appreciated the opportunity to collaborate and coordinate efforts with a range of stakeholders (principal investigators, regional experts, other New England professionals).

NETC could consider:

- Expanding guidance for TC members.
    - Offering background information on NETC in an easy-to-understand format (narrated PowerPoint, short video).
    - Developing a template welcome letter that outlines TC member responsibilities.
    - Preparing a timeline (formal schedule or calendar) and checklist of the NETC research cycle that shows critical dates for TC members; include an estimate of the time commitment (10 to 20 hours).
- Preparing a marketing piece that focuses on the rewards of TC participation to assist with TC member recruitment.
- Developing a network of experienced TC participants to solicit and provide support for new members.

NETC Outreach to Agency Managers and Implementers

Focus on news items, other methods of outreach. Agency managers and implementers were most interested in receiving periodic news items. Quarterly summaries of research results and an annual report also rated highly. The website rated lowest among these respondents.

NETC could consider:

- Developing a standard template and protocol for preparing and distributing news items; send these news items to NETC's mailing list.
- Identifying ways to increase membership on the NETC mailing list.
- Spreading the word about the revamped website to agency managers and implementers to elicit greater interest in its use.
- Developing a quarterly or annual report that highlights NETC activities.
    - Longer-format piece might be similar to at-a-glance publications produced by state DOT research programs that summarize program results (8 to 20+ pages).
    - Shorter-format piece could highlight a few significant activities or research efforts (2 to 4 pages).

NETC Outreach to Subject Matter Experts

Offer more peer exchanges and symposiums—the preferred modes of outreach. SMEs gave technical peer exchanges the highest effectiveness rating among the various forms of NETC outreach. The next

most preferred method of outreach: SME symposiums. While more than three-quarters of SMEs did not attend the 2019 NETC Symposium, the same percentage reported interest in attending a future one.

NETC could consider:

- Issuing multiple and varied communications announcing the 2021 NETC Symposium to bring in new participants.
- Thinking about convening more peer exchanges or other virtual meetings (coffee talks, periodic mini-symposiums).

Focus marketing efforts on webinars. Webinars rated highly among SMEs as an effective form of NETC outreach, but relatively few respondents reported attending one.

NETC could consider:

- Preparing a standard news item or other marketing-oriented message that can be distributed to inform NETC member agency staff of project closeout webinars—how they can attend one and where the recordings are posted on the NETC website.
- Developing webinars on other topics of interest to NETC member agencies that are not tied to a specific research project.

4.3 Closing Comments

The findings presented in this task memorandum will be supplemented by results of a survey of selected research groups (to be presented in Task Memorandum 2). A final Task Memorandum 3 will assess findings from all surveys and any related research, reflect TAAC member feedback on these findings, and present a comprehensive set of recommendations for TAAC consideration.

Appendix A
Survey Questions

The surveys below were distributed to agency managers, implementers and subject matter experts (SMEs) within NETC member agencies. The full text of survey responses is available as a supplement to this task memorandum.

Survey of Agency Managers and Implementers

1. How familiar are you with NETC's research program?
    - Extremely familiar
    - Very familiar
    - Moderately familiar
    - Slightly familiar
    - Not at all familiar
2. Please rate the importance of each of the research-related activities below that NETC could support. (The rating scale below is reflected in the online survey using horizontally aligned radio buttons.)

    Extremely important
    Very important
    Moderately important
    Slightly important
    Not at all important

    Response options:
    - Implementation projects advancing NETC research results
    - Implementation projects advancing other organizations' research results (NCHRP, FHWA's Every Day Counts)
    - Initiatives bringing together regional subject matter experts
    - Research addressing a regional challenge
    - Research addressing hot-topic issues
    - Research addressing long-term strategic issues
    - Research to help our state comply with national mandates
    - Research to inform policy decisions
    - Research to solve a technical or engineering issue
3. Please rate the importance of researching the following major topics. (The rating scale below is reflected in the online survey using horizontally aligned radio buttons.)

    Extremely important
    Very important
    Moderately important
    Slightly important
    Not at all important

    Response options:
    - Administration
    - Asset management
    - Aviation
    - Bridges and other structures
    - Construction
    - Environmental
    - Highway design
    - Maintenance

- Materials
- Mobility
- Operations and traffic management
- Planning and forecasting
- Rail and transit
- Snow and ice control
- Transformative technologies (CAV, UAS)

4. Please rank the **top three roles** NETC can play in meeting the future research, implementation and other needs of your agency in order of importance, with **1** being the **most important**. (You may rank all eight response options if you choose to.)
    - Communication, education and/or outreach of research results
    - Conducting subject matter expert symposiums
    - Conducting technical peer exchanges
    - Facilitating implementation of completed research
    - Focusing on critical issues
    - Focusing on emerging technologies
    - Focusing on national transportation mandates and initiatives
    - Workforce development and retention

4A. What other roles, not identified in Question 4, would you like NETC to play in helping to meet your agency's research-related needs?

5. How can the state transportation agencies participating in NETC work together to more effectively address common needs?
6. What are the top three issues facing your agency?
    - Issue 1:
    - Issue 2:
    - Issue 3:
7. Please indicate how likely you are to use the communication products listed below that provide information about NETC. (The rating scale below is reflected in the online survey using horizontally aligned radio buttons.)

    Extremely likely
    Very likely
    Moderately likely
    Slightly likely
    Not at all likely

    Response options:

    - Annual report of program results
    - Monthly email update
    - Periodic news items describing recent research results
    - Quarterly summary of research results
    - Website updates
    - Welcome package or onboarding webinar for new agency executives

7A. What other communication products, not identified in Question 7, would you like NETC to produce for your use?

8. Please use this space to provide any comments or additional information.

Please provide the name of your agency:

Appendix A
Survey Questions

If we may contact you about your responses, please provide the following contact information:

Name:
Division/Title:
Email Address:

Thank you for participating! The information you've provided will be very helpful to NETC. Please click **SUBMIT** to transmit your responses.

Survey of Subject Matter Experts

Note: The response to the question below determined how a respondent was directed through the survey.

(Required) Have you participated on a Technical Committee for a NETC research project?

- Yes (Skipped the respondent to the **Technical Committee Participation** questions. This group of respondents will also complete the **NETC Participation and Outreach** section.)
- No (Skipped the respondent to the **NETC Participation and Outreach** section.)

Technical Committee Participation

1. How have you participated with NETC's Technical committees? Please select all that apply.
   - Signed a problem statement as a potential Technical Committee chair
   - Served as a Technical Committee member
   - Served as a Technical Committee chair
   - Other (Please describe.)
2. How often have you served on a Technical Committee for a NETC research project?
   - 1 to 2 projects
   - 3 projects
   - More than 3 projects
   - None of the above
3. Do you feel the communication and preparation you received to participate on a NETC Technical Committee was adequate?
   - Yes
   - No (Please briefly describe how NETC can help new Technical Committee members prepare for their participation.)
4. How much time did you devote to your committee duties over the course of a single project?
   - Fewer than 10 hours
   - 10 to 20 hours
   - 21 to 30 hours
   - More than 30 hours
5. How did the time you devoted to the project compare to your expectations?
   - Less time spent than expected
   - More time than expected
   - About as expected

Appendix A
Survey Questions

6. Please indicate your level of satisfaction with the results of the NETC research projects you've participated in. When you respond, consider whether the results effectively addressed the issues and topics of greatest concern to you.
    - Extremely satisfied
    - Very satisfied
    - Moderately satisfied
    - Slightly satisfied
    - Not at all satisfied
7. What may have caused the difference, if any, between what you expected and the actual outcome of the research?
8. What was your knowledge/awareness of the topic(s) before participating in the NETC project(s)?
    - Extremely aware
    - Very aware
    - Moderately aware
    - Slightly aware
    - Not at all aware
9. What is your knowledge/awareness of the topic(s) now?
    - Extremely aware
    - Very aware
    - Moderately aware
    - Slightly aware
    - Not at all aware
10. Is there any reason you would not participate on a NETC Technical Committee in the future?
    - No
    - Yes (Please briefly explain why you would not participate.)
11. What have you found to be most rewarding about your work on a NETC Technical Committee?
12. What have you found to be most challenging about your work on a NETC Technical Committee?

NETC Participation and Outreach

1. What technical roles have you served in with NETC? Please select all that apply.
    - Implemented NETC research
    - Reviewed problem statements
    - Other (Please describe.)
2. In June 2019, NETC brought together state agency subject matter experts and university representatives from the six New England states for roundtable discussions, poster sessions and networking. This was called the 2019 NETC Symposium.
   Did you participate in the 2019 NETC Symposium?
    - Yes
    - No
3. Would you be interested in participating in a future NETC Symposium?
    - Yes
    - No
4. Have you attended a NETC project webinar?
    - Yes
    - No

5. Please rate the effectiveness of the different ways NETC can bring together subject matter experts and other stakeholders to identify transportation challenges and participate in NETC's efforts to address them. (The rating scale below is reflected in the online survey using horizontally aligned radio buttons.)

   Extremely effective
   Very effective
   Moderately effective
   Slightly effective
   Not at all effective

   Response options:

   - Periodic emails that report on research results
   - Posting research reports on the NETC website
   - Quarterly newsletter
   - Subject matter expert symposiums
   - Technical peer exchanges
   - Virtual poster sessions
   - Webinars

5A. Please describe other ways, not listed in Question 5, NETC can bring together subject matter experts to identify and address transportation challenges.

6. Would you be interested in participating on a new type of NETC committee that focuses on implementing research results from a NETC project or a national research effort?
   - Yes
   - No
7. Do you feel the NETC research program is addressing the issues and topics of greatest concern to you and your colleagues?
   - Yes
   - No (Please explain how NETC can better meet your research needs.)
8. How can the state transportation agencies participating in NETC work together to more effectively address common needs?
9. What are the top three issues facing your agency?
   - Issue 1:
   - Issue 2:
   - Issue 3:
10. Please use this space to provide any comments or additional information.

Please provide the name of your agency:

If we may contact you about your responses, please provide the following contact information:

Name:
Division/Title:
Email Address:

Thank you for participating! The information you've provided will be very helpful to NETC. Please click **SUBMIT** to transmit your responses.

Appendix C. Survey Findings: Other Research Groups

NEW ENGLAND TRANSPORTATION CONSORTIUM

Re-Creating NETC

Task Memorandum 2

Task 3 Survey Findings
Other Research Groups

Prepared for
New England Transportation Consortium

Prepared by
CTC & Associates LLC

May 3, 2021

ctc & associates llc

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Executive Summary

New England Transportation Consortium (NETC) uses a regional approach to develop innovative solutions to common transportation issues in the New England states. Transportation research needs have evolved since NETC was formed more than 30 years ago, and to ensure the consortium's current goals, vision and mission address issues that are most important to the New England region today, the consortium is conducting a self-evaluation that will inform efforts to reformulate its purpose, composition and specific role. These actions will allow NETC to continue to work effectively for member states while capturing important regional research needs.

Online surveys were distributed to 27 pooled fund consortiums, university transportation centers (UTCs) and cooperative research programs to gather information about administering a research program, selecting and prioritizing research, managing research projects, implementing research and communicating research results. Twelve research groups responded to the survey:

Pooled Fund: Regional Research

- Southeast Transportation Consortium
- Western Alliance for Quality Transportation Construction
- Western States Rural Transportation Consortium

Pooled Fund: Specific Research

- Aurora
- Clear Roads
- ENTERPRISE
- Superpave Regional Center, Southeastern Region
- Traffic Safety Culture

Regional Research Group

- Joint Transportation Research Program
- Virginia Transportation Research Council

Regional UTC

- Transportation Infrastructure Durability Center

National UTC

- National Center for Sustainable Transportation

Research Program Administration

These research groups conduct a range of research-related activities. All research groups conduct more than one type of research, and 11 groups conduct original research in specific focus areas. Priority for other research-related efforts is given to research that addresses topics of national or regional interest; supports compliance with state, regional or national mandates; and implements the group's own research findings.

Respondents' research programs may be managed by a board (five groups), one or more committees (five groups) or a leadership council (one group). Eight research groups encourage executive-level staff from member agencies to be engaged in research programs, but this level of involvement is only a priority in four of the groups.

Key Research Program Participants

Key participants in respondents' research programs are described below:

Subject matter experts (SMEs) are most likely to participate in research activities in an advisory capacity or to promote research implementation. Other common roles are as project lead and technical committee chair or member. Additional types of engagement include overseeing the research program, reviewing proposals and deliverables, identifying research and championing research.

Member agency staff involvement is typically solicited by encouraging staff members to serve on research project committees or to attend meetings; conducting formalized outreach and project solicitation; and identifying staff through recommendations and referrals.

Universities and affiliated researchers are generally involved in performing project research or disseminating research results. Other common roles include presenter, advisor, author and project coordinator.

Consultants from private firms most frequently participate in research in an advisory role but also disseminate research results and conduct initial research.

Industry and professional organization representatives play the most limited role in respondents' research programs. When representatives from these sectors do participate in research activities, they typically play an advisory role or disseminate research results.

Other partner agencies are engaged by more than half of the research groups, including federal and local partners, interested parties and nonvoting partners. Respondents noted the benefits of establishing new relationships and maintaining long-established relationships with partner agencies.

The Research Process

Identifying and Prioritizing Research

Research needs are identified most frequently through focus areas established for each research cycle or through member sponsorship of research needs. Respondents are equally likely to accept new research ideas at any time throughout the year or at one specified time each year.

Roadmaps are developed by research groups to identify research needs. Some roadmapping efforts highlight overarching themes and critical topic areas while others produce a database of research ideas or a catalog of issues organized by categories and ranked based on importance. None of the organizations is currently employing a formalized research roadmap to guide project selection, but such an effort is underway on behalf of one group through a recently approved National Cooperative Highway Research Program (NCHRP) project. Other research groups support an informal roadmapping process or support project selection based on the focus or mission of the group. To prioritize projects, groups consider balancing member agency needs, sometimes through a formalized process of ranking and scoring, but also through less formal practices such as a case-by-case analysis or a simple vote.

Managing Research

For all but three research groups, monitoring the progress of individual research projects is often the responsibility of an advisory board, council or committee. The groups not using these entities for project

oversight cited the administrative burden for providing this level of monitoring. Over the life of a project, technical committees typically meet when a project milestone is reached (such as project kickoff or task completion), when a project begins and ends, and for a review of major deliverables. Only one research group's technical committee meets monthly, and three groups' technical committees meet quarterly.

Implementing Research

Five research groups require research need or problem statements to address implementation of research findings. Although one group does not specify implementation requirements, all projects and activities have implementation in mind, and proposals must address how the results will be used and implemented. Once research projects are approved for funding, eight research groups require researchers to submit an implementation plan.

An implementation committee or other group convened by five research groups oversees and encourages the implementation of research findings; three other groups are interested in implementing this practice. Tracking the implementation of project findings is conducted through a formal practice by four groups. Implementation is funded through a separate source of funds by three research groups; another group noted that funding is provided by the sponsoring state department of transportation (DOT) and other DOTs.

The impacts of research are most frequently quantified through publications and projects. Additional practices include a project review of the qualitative and quantitative benefits, statistics and testimonials from stakeholders, and web pages highlighting the project.

Disseminating Research Results

The final tasks of the research process are communicating research project results to research groups and disseminating findings to a broader audience. To communicate project findings, all but one of the responding research groups require researchers to submit a final report detailing research project results; all but one of these groups also require a draft final report. Other frequently requested research deliverables include quarterly progress reports, PowerPoint presentations and webinars. Most of the research groups require researchers to address compliance issues when submitting final deliverables, such as accessibility issues detailed in Section 508 of the Rehabilitation Act of 1973 as amended in 1998 (seven groups), data sharing (six groups) and intellectual property (six groups).

A range of outreach tools and practices are used to disseminate research project results, most commonly websites, technical briefs, webinars, final reports to the National Transportation Library and postings of new projects in the Transportation Research Board's Research in Progress database.

Program Assessment and Future Plans

Respondents described program successes, most notably in the areas of partner engagement, collaboration and outreach; research impacts and implementation; workforce development; and the development of product guidance and online tools. Challenges in managing the research program were related to the research process, operational issues, partnerships and staffing.

Structural changes to research programs are anticipated by three research groups in the next few years, including a focus on implementation, expanded expertise and centralized operations.

Conclusions and Recommendations

Takeaways from the survey of other research groups are summarized below by topic. In this task memo's detailed findings, each takeaway is followed by the actions or practices NETC could consider to address it.

- *Research program administration*. Ensure consistency across member agencies with agency-level committees.
- *Research process*. Balance a focus on regional interests with national interests and mandates, actively identify focus areas or themes, expand the research cycle and broaden proposal review.
- *Key research program participants*. Build up executive engagement, tap SMEs for key advisory roles, involve universities and their researchers in result dissemination, and expand participation in NETC to include nonvoting interested parties.
- *Implementing research*. Keep implementation at the forefront and use committees to provide structure to the implementation effort.
- *Research project deliverables*. Require or prepare a collection of project deliverables and provide guidance on compliance-related issues.
- *Disseminating research results*. Cast a wide net when sharing research results, focus marketing efforts on webinars, and use forums, peer exchanges and symposiums to share research results.

Enacting a combination of some of the 16 possible actions or practices detailed in the Conclusions and Recommendations section of this task memo, combined with other steps suggested by the findings throughout the task memo, would constitute a significant re-creation of NETC.

Next Steps

NETC's Transportation Agency Advisory Committee (TAAC) members will provide their feedback on the findings contained in this task memorandum and Task Memorandum 1 (surveys of internal NETC staff) by May 21, 2021. By June 4, CTC & Associates will provide a summary of that feedback in advance of a TAAC meeting to be scheduled later in June to discuss survey findings and elicit specific ideas and next steps for re-creating NETC.

1 Introduction

1.1 Project Description

New England Transportation Consortium (NETC) is a research cooperative that uses a regional approach to develop innovative solutions to common transportation issues in the New England states. Transportation research needs have evolved since NETC was formed more than 30 years ago, and the consortium's current goals, vision and mission may not capture issues that are most important to the New England region today. To become a more effective resource for state department of transportation (DOT) staff, including decision-makers, designers and field personnel, the consortium is conducting a self-evaluation that will inform efforts to reformulate its purpose, composition and specific role, and will allow NETC to continue to work effectively for member states while addressing important regional research needs.

1.2 Task Description

With input from NETC's Transportation Agency Advisory Committee (TAAC) members, investigators developed a survey for distribution to a select group of pooled fund consortiums, university transportation centers and cooperative research programs. The online survey gathered information about administering a research program, selecting and prioritizing research, managing research projects, implementing research and communicating research results. Findings from the survey and supplemental research will be examined to identify best practices and opportunities for implementation by NETC.

1.3 Reviewing This Task Memorandum

Survey results are summarized in Sections 2 through 9 of this task memorandum. Section 10 provides links to relevant publications shared by respondents or sourced through a limited literature search. Section 11 presents a summary of survey findings and NETC's possible responses to them.

While the survey received responses from almost half of the possible respondents, the survey is not a representative sampling of all research groups that operate in a manner similar to NETC, which should be considered when reviewing the survey responses. If the TAAC desires, additional details of respondent practices may be gathered through follow-up contacts with selected research groups or more in-depth independent research.

2 Survey Background

2.1 Overview

With TAAC member feedback, investigators developed a distribution list that included 27 research groups organized into five respondent categories:

- Regional general research pooled funds
- Specific research area pooled funds
- Other regional consortiums
- Regional university transportation centers (UTCs)
- National UTCs

The survey received responses from 12 research groups. Table 1 identifies the respondents and categorizes them by type of research group.

Table 1. Survey Respondents

Type of Research Group	Respondent
Pooled Fund (Regional Research)	• Southeast Transportation Consortium • Western Alliance for Quality Transportation Construction • Western States Rural Transportation Consortium[1]
Pooled Fund (Specific Research)	• Aurora • Clear Roads • ENTERPRISE • Superpave Regional Center, Southeastern Region • Traffic Safety Culture
Regional Research Group	• Joint Transportation Research Program (Indiana) • Virginia Transportation Research Council
Regional UTC	• Transportation Infrastructure Durability Center
National UTC	• National Center for Sustainable Transportation

1 Three responses from representatives of Western States Rural Transportation Consortium have been combined to reflect a single response in the findings described in this task memorandum.

Survey questions are provided in Appendix A. Contact information for respondents is provided in Appendix B. The full text of survey responses is available as a supplement to this task memorandum.

2.2 Respondents' Research Focus

The research focus of each research group responding to the survey, listed alphabetically, is described briefly below. (Descriptions are excerpted from the research group's public website or provided by the respondent.)

Aurora is an international program for advancing road weather information systems (RWIS) technology.

The Aurora program is a partnership of highway agencies that collaborate on research, development and deployment of road weather information to improve the efficiency, safety and reliability of surface transportation. It is administered by the Center for Weather Impacts on Mobility and Safety, which is housed under InTrans at Iowa State University.

Clear Roads is a national research consortium focused on rigorous testing of winter maintenance materials, equipment and methods for use by highway maintenance crews.

Since getting under way in 2004, Clear Roads has grown to include 36 member agencies, each contributing $25,000 annually to fund research and technology transfer efforts. Representatives from the participating DOTs meet twice a year to discuss and prioritize projects, share effective practices and review research results.

ENTERPRISE (Evaluating New Technologies for Roads Program Initiatives in Safety and Efficiency) is an ongoing national transportation pooled fund study led by Michigan DOT. Member agencies are

committed to continuing innovation in highway operations and intelligent transportation systems through research and technology transfer.

Joint Transportation Research Program facilitates collaboration between Indiana DOT, higher education institutions and industry to implement innovations that result in continuous improvement in the planning, design, construction, operation, management and economic efficiency of the Indiana transportation infrastructure.

Research groups managed by the Joint Transportation Research Program include:

- Center for Aging Infrastructure: Steel Bridge Research, Inspection, Training and Engineering Center (S-BRITE)
- Development of an Integrated Unmanned Aerial Systems (UAS) Validation Center

National Center for Sustainable Transportation (NCST) provides national leadership in advancing environmentally sustainable transportation through cutting-edge research, direct policy engagement and education of future leaders. The Institute of Transportation Studies at the University of California, Davis leads the NCST in partnership with California State University, Long Beach; the University of California, Riverside; the University of Southern California; Georgia Institute of Technology; and the University of Vermont.

Southeast Transportation Consortium (STC) addresses high-priority transportation research topics of common interest to the southeastern and adjoining states. Initiated by AASHTO Research Advisory Committee (RAC) Region II as a collaborative research consortium through the Transportation Pooled Fund Program, STC is intended to encourage coordination among member states and provide resources and management of collaborative studies.

STC's purpose is to pool financial, professional and academic resources to coordinate research and develop improved methods of addressing common problems in the planning, design, construction, maintenance, management and operation of transportation systems in participating states.

Superpave Regional Center, Southeastern Region has been supported by state agencies through a pooled fund project that has been largely used to provide training, verify ruggedness of equipment, check equipment calibrations, provide materials research and aid in keeping agency personnel abreast of changes in asphalt technology. Several of the pooled fund's objectives deal with evaluating recently developed performance test equipment and conducting research to address materials and test issues. (The respondent describing research efforts for this pooled fund is a staff member of the National Center for Asphalt Technology.)

Traffic Safety Culture is a multiyear pooled fund program initiated by Montana DOT in partnership with the Center for Health and Safety Culture within the Western Transportation Institute at Montana State University. This program is a cooperative effort of participating state DOTs and other organizations vested in traffic safety. The program's purpose is to accelerate the development and delivery of tools and services to transform traffic safety culture. The goal of this transformation is to support the Toward Zero Deaths vision with sustainable traffic safety solutions.

Transportation Infrastructure Durability Center (TIDC) is the 2018 U.S. DOT Region 1 (New England) UTC located at the University of Maine Advanced Structures and Composites Center. TIDC's focus is on extending the life and improving the durability of transportation assets. TIDC has six member universities within the New England region.

Virginia Transportation Research Council (VTRC) specializes in basic and applied research to support Virginia DOT, its primary customer. It also provides technical consulting and training of future transportation professionals through its work with University of Virginia (UVA) and other Virginia

universities. The Smart Travel Lab, located in UVA's Center for Transportation Studies and jointly run by UVA and VTRC, supports research and education in intelligent transportation systems.

Western Alliance for Quality Transportation Construction is a partnership of western state and federal highway agencies in cooperation with industry associations. This voluntary organization was formed to assure qualified personnel for the transportation construction workforce as well as act as a unified body to meet today's challenge of improving the transportation products and services provided to the public.

Western States Rural Transportation Consortium, which includes representatives from the state DOTs of California, Oregon, Washington, Nevada and Utah, has been established to facilitate and enhance safe, seamless travel throughout the western United States. The consortium seeks to promote innovative partnerships, technologies and educational opportunities to meet these objectives. Additionally, the consortium seeks to provide a collaborative mechanism to leverage research activities in a coordinated manner to respond to rural transportation issues among western states related to technology, operations and safety. Activities of the consortium are focused on technology transfer/education and incubator projects (small-scale research projects intended to serve as a proof of concept for larger subsequent efforts) centered on the consortium pillars of technology, operations and safety.

3 Research Program Administration

3.1 Primary Research Activities

All respondents conduct more than one type of research. All but one conduct original research in their respective focus areas, and two-thirds conduct original research that addresses topics of national interest. Almost 60% of respondents conduct original research on regional issues and fund efforts that will help member agencies comply with state, regional or national mandates; the same percentage of respondents funds projects that implement their own research findings.

Respondents are least likely to implement outside research (only one does) or cast as wide a net as possible when conducting research (conduct original research on all topics). Table 2 summarizes survey responses.

Table 2. Primary Research-Related Activities

Research Group	Original Research: All Topics	Original Research: National Interest	Original Research: Regional Issues	Original Research: Focus Areas	Assist With Mandate Compliance[1]	Implement Own Research[2]	Implement Outside Research[3]
Aurora				X		X	
Clear Roads		X		X	X	X	
ENTERPRISE		X		X			
Joint Transportation Research Program	X	X	X	X	X	X	X
National Center for Sustainable Transportation		X	X	X		X	
Southeast Transportation Consortium			X		X		

Research Group	Original Research: All Topics	Original Research: National Interest	Original Research: Regional Issues	Original Research: Focus Areas	Assist With Mandate Compliance[1]	Implement Own Research[2]	Implement Outside Research[3]
Superpave Regional Center, Southeastern Region				X		X	
Traffic Safety Culture		X	X	X	X		
Transportation Infrastructure Durability Center	X	X	X	X	X	X	
Virginia Transportation Research Council	X	X	X	X	X		
Western Alliance for Quality Transportation Construction				X	X		
Western States Rural Transportation Consortium	X	X	X	X		X	
Total	**4**	**8**	**7**	**11**	**7**	**7**	**1**

1 The full text of this response option: *Funding efforts that assist member agencies in complying with state, regional or national mandates.*

2 The full text of this response option: *Funding projects that implement our own research findings.*

3 The full text of this response option: *Funding projects that implement research conducted outside our consortium.*

A few respondents elaborated on research practices:

- *AASHTO recommendations*. Western Alliance for Quality Transportation Construction reviews and consolidates recommendations for AASHTO procedures, specifications and test methods.
- *Collaboration*. Funding provided to the Transportation Infrastructure Durability Center encourages and emphasizes participation and collaboration among industry, academia and transportation agencies.
- *Implementation*. Traffic Safety Culture provides implementation resources with each project. Each funding entity can use those resources to implement results in their jurisdiction. Since multiple states fund this pooled fund, implementation activities for a particular state are not provided unless the state specifically adds funds for it.

3.2 Program Oversight

There is no consensus among respondents as to the type of oversight body tasked with general administration of the research program. Respondents' research programs may be managed by a board, one or more committees or a leadership council. Table 3 presents survey responses.

Table 3. Research Program Oversight

Oversight Body	Research Group and Description
Board	**Aurora**. A board oversees project selection; a chair, vice chair and lead state representative manage day-to-day operations along with contracted administrative managers, with input and feedback back to the board. **ENTERPRISE.** One member from each partner agency and two from the lead agency are represented on the board. Monthly meetings and two multiday (in person before COVID-19) meetings are conducted each year.

Oversight Body	Research Group and Description
Board	**Traffic Safety Culture**. A board, the pooled fund's decision-making body, consists of all entities that contribute funds. The project manager also makes some general administrative decisions and welcomes engagement by interested parties who can participate in all aspects of the pooled fund except decision-making. **Transportation Infrastructure Durability Center**. A board, made up of officials from New England state DOTs (most of the NETC member agencies), reviews and rates research proposals. **Western Alliance for Quality Transportation Construction**. An executive board, which includes at least one representative from each of the member agencies, is responsible for the mission, objectives, structure, policy decisions and direction of the pooled fund. (See also the **Committee** section.)
Committee	**Clear Roads**. Decisions related to project selection, funding, meeting locations and similar issues are made by the technical advisory committee (TAC), which is composed of representatives of all member states. An unofficial executive committee made up of the chair, vice chair, lead state technical liaison and program administrator will sometimes make decisions on behalf of Clear Roads that are not necessary to send to the entire TAC. The executive committee may also make recommendations to the TAC for a full TAC vote. **Joint Transportation Research Program**. The research program operates under the guidance of an executive committee. The Indiana DOT (INDOT) commissioner appoints the INDOT chairperson; the head of the Lyles School of Civil Engineering at Purdue University appoints a Purdue faculty member to serve as the program director. Committee members include INDOT employees who serve as voting members; Federal Highway Administration (FHWA) staff members serve as nonvoting members. **Southeast Transportation Consortium**. The TAC is composed of at least one member from each member state. **Superpave Regional Center, Southeastern Region**. An oversight committee includes representatives assigned by the participating DOTs. **Virginia Transportation Research Council**. The program's TAC is populated by representatives from each partner entity. The TAC elects a chairperson who leads meetings and works with the lead state coordinator and contractors to arrange for various logistics. **Western Alliance for Quality Transportation Construction.** A qualification advisory committee (QAC) oversees technical portions of the Transportation Technician Qualification Program (TTQP). The QAC acts in an advisory capacity to the executive board and reports directly to the board. The QAC reviews the program and suggests changes or updates and ensures that the program continues to meet the highest standards. An agency qualification committee (AQC) is the agency-level committee responsible for oversight of the TTQP within each agency to ensure regionwide consistency in the implementation of the program. The chairman of the committee is an agency employee. The type, size and makeup of the committee are at the agency's discretion. Members of the AQC are knowledgeable in the administrative procedures of the TTQP.

Oversight Body	Research Group and Description
Committee	**Western States Rural Transportation Consortium**. A steering committee includes representatives from each member state DOT, who serve as voting members, and nonvoting academic members. Committee members meet twice yearly, with meetings typically coinciding with a national or regional conference. The consortium's primary focus is information exchange through the annual Western States Forum, though other research interests and projects are discussed and considered. The steering committee executes the charter, mission, vision and goals in terms of meetings, outreach and projects, and makes an annual report to the charter steering committee detailing the current state of the consortium. The steering committee can create subcommittees at its discretion.
Leadership Council	**National Center for Sustainable Transportation**. A leadership council helps the UTC to understand the most pressing transportation research needs of a broad set of stakeholders across the country; understand the transportation policy landscape from a variety of different perspectives; and promote the UTC's work to these stakeholders.

3.3 Executive-Level Engagement

While eight of the 12 respondents noted that their research group solicits or encourages engagement by executive-level staff of member agencies, only four said it was a priority to have executive engagement in their research programs:

- Joint Transportation Research Program
- National Center for Sustainable Transportation
- Superpave Regional Center, Southeastern Region
- Traffic Safety Culture

The four respondents noting that executive engagement is welcomed but not a priority include:

- Southeast Transportation Consortium
- Transportation Infrastructure Durability Center
- Virginia Transportation Research Council
- Western States Rural Transportation Consortium

While the survey did not ask respondents to specify the role played by executives in the research effort, references to specific executive involvement appear throughout this task memorandum when respondents noted it.

4 Key Research Program Participants

Respondents described categories of key participants in their research programs:

- Subject matter experts (SMEs)
- Member agency staff
- Universities and affiliated researchers
- Consultants from private firms

- Industry and professional organization representatives
- Other partners

4.1 Subject Matter Experts

Respondents offered a high-level description of SME engagement by selecting from among a series of common roles an SME might play. For respondents, SMEs are most likely to play an advisory role and implement research results. Only two research groups employ SMEs as coordinators. Table 4 summarizes survey responses.

Table 4. Roles Played by Subject Matter Experts

Research Group	Advisor	Coordinator	Facilitator	Implementer	Mentor	Project Lead	TC Chair[1]	TC Member[2]
Aurora	X			X		X	X	
ENTERPRISE						X		
Joint Transportation Research Program	X	X	X	X	X	X	X	X
National Center for Sustainable Transportation	X			X				
Southeast Transportation Consortium	X			X		X		X
Traffic Safety Culture	X			X				
Transportation Infrastructure Durability Center	X		X	X	X			
Virginia Transportation Research Council	X						X	X
Western Alliance for Quality Transportation Construction				X			X	X
Western States Rural Transportation Consortium	X	X	X	X	X	X	X	X
Total	**8**	**2**	**3**	**8**	**3**	**5**	**5**	**5**

1 TC Chair = Technical committee chair.

2 TC Member = Technical committee member.

While three respondents noted that SMEs did not play a role in their research efforts (Clear Roads, Superpave Regional Center, Southeastern Region, and Western States Rural Transportation Consortium), others offered additional details of SME roles and participation.

Oversight Role

- *Board member*. Three pooled funds—Traffic Safety Culture, ENTERPRISE and Western Alliance for Quality Transportation Construction—place SMEs on their boards.
- *Board or committee member.* The Western Alliance for Quality Transportation Construction pooled fund is composed of practicing technicians from member states; its executive board includes materials engineers from member agencies.

Reviewing Proposals and Deliverables

- *Peer reviewer*. The Traffic Safety Culture pooled fund hires SMEs as peer reviewers to review project deliverables (proposals, task reports and final reports). The reviewers' engagement begins with the proposal to identify any serious flaws in the proposed research and resolve them before the project is contracted. The board determines which projects will be subject to peer review. In one case, the researcher asked for another peer reviewer. While the pooled fund's management plan includes the option to convene technical committees for specific projects, it hasn't formed these committees.
- *Proposal review.* The National Center for Sustainable Transportation UTC solicits SMEs to review proposals submitted in connection with calls for proposals, and to review the final reports and white papers produced from awarded projects. The UTC also encourages SME participation in project advisory boards to help shape the scope of work, provide feedback on progress and help disseminate research results.

Identifying Research

- *Focus groups.* The Joint Transportation Research Program's focus groups are organized around subject areas and meet every year to encourage staff, professors, industry representatives and others to submit research ideas.

Championing Research

- *Project champion*. ENTERPRISE board members or a nonboard member SME from a partner agency may be a project champion.
- *Technical champion*. The Transportation Infrastructure Durability Center regional UTC requires each project to have a technical champion, who is responsible for technical coaching and/or facilitating implementation of research. These people may be from industry or transportation agencies.

Limited Engagement

- *Selective engagement*. SMEs who are not members or chairs of the TAC often attend Virginia Transportation Research Council-sponsored activities through invitational travel.
- *Supporting role*. In the Aurora pooled fund, SMEs usually assist their state's representative, with the primary communication to and from the board through that state's representative. Only sometimes do SMEs attend Aurora functions.

Other Types of Engagement

- The ENTERPRISE pooled fund will interview other agency SMEs or invite them to webinars as part of individual research projects. The research team will also reach out to SMEs at nonpartner agencies to gather information in connection with a research project.
- The Traffic Safety Culture pooled fund welcomes participation by interested parties in all aspects of the group's activities except decision-making.

4.2 Member Agency Staff

Respondents reported on a range of practices to solicit participation by member agency staff in research project oversight, including recruiting staff to serve on research project committees, formalized

outreach, recommendations and referrals, and soliciting interest at meetings. Table 5 highlights respondents' practices.

Table 5. Soliciting Participation by Member Agency Staff

Practice	Research Group and Description
Committees or Teams	**Aurora**. Each member is encouraged to be on at least one project team. **Clear Roads**. Each project has a subcommittee (a subset of the full TAC) assigned to guide the research project and the research team's efforts. That subcommittee is typically made up of five to seven member state TAC representatives and the lead state technical liaison.
Outreach	**ENTERPRISE**. The research team and/or the project champion may reach out to SMEs at the partner agencies to provide information for a research project. **Southeast Transportation Consortium**. Email and word-of-mouth are used to encourage agency staff participation. **Traffic Safety Culture**. SMEs from participating agencies are on the pooled fund's board. Any additional SMEs from those agencies and other organizations are added to an interested parties list. Interested parties are identified through a number of means, including: • Sending emails to all committee chairs and committee research coordinators for Transportation Research Board (TRB) safety committees to encourage participation. • Reaching out to the AASHTO Committee on Safety. Other interested parties contact the project manager, who noted "all are welcome." The pooled fund has a broad group of organizations on its interested parties list, including local agencies, nonprofits and federal agencies.
Project Solicitation	**Virginia Transportation Research Council**. Member agencies volunteer their participation. Specific staff are usually identified through the original project solicitation, typically carrying the request for participation to an agency's research office.
Recommendations and Referrals	**Joint Transportation Research Program**. Focus group leaders and the SME invite staff from each agency to serve on study advisory committees. **Transportation Infrastructure Durability Center**. Participation is typically encouraged through advisory board recommendations or through connections or relationships established through previous research activities.
Regular Meetings	**Western Alliance for Quality Transportation Construction**. Member involvement is encouraged cooperatively through regular meetings. **Superpave Regional Center, Southeastern Region**. The pooled fund meets once a year with technical representatives and research staff from participating DOTs.

4.3 Universities and Affiliated Researchers

Universities and affiliated researchers play some type of role in the research programs of all but two of the research groups responding to the survey—the ENTERPRISE and Western Alliance for Quality Transportation Construction pooled funds. All remaining respondents employ universities as

researchers, and all but one involve universities and affiliated researchers in result dissemination. Universities are least likely to play the role of project solicitor. Table 6 presents survey responses.

Table 6. Roles Played by Universities and Affiliated Researchers

Research Group	Advisor	Author	Coordinator	Presenter	Project Creator	Project Solicitor	Researcher	Result Dissemination
Aurora	X	X	X	X		X	X	X
Clear Roads							X	X
Joint Transportation Research Program				X	X		X	X
National Center for Sustainable Transportation	X	X	X	X	X	X	X	X
Southeast Transportation Consortium	X	X		X			X	
Superpave Regional Center, Southeastern Region			X				X	X
Traffic Safety Culture	X	X	X	X	X		X	X
Transportation Infrastructure Durability Center	X	X	X	X	X	X	X	X
Virginia Transportation Research Council	X	X	X	X	X	X	X	X
Western States Rural Transportation Consortium	X	X	X	X			X	X
Total	**7**	**7**	**7**	**8**	**5**	**4**	**10**	**9**

Several respondents offered additional details:

- *Aurora* has contracted with Iowa State University to administer the pooled fund. This contractual relationship includes preparing technical summaries of completed research and working with other contractors. The respondent noted that the pooled fund also hires "a lot of other universities to conduct our research projects."
- For in-house projects conducted by the *Joint Transportation Research Program*, the in-house researcher will serve as both researcher and project administrator.
- As a national UTC, universities play many roles and have extensive responsibility for the *National Center for Sustainable Transportation's r*esearch program.
- Universities participate in the *Transportation Infrastructure Durability Center* as a networker or relationship builder with industry and agencies, and provide progress reports.
- *Western States Rural Transportation Consortium's* university participants also administer travel task orders.

4.4 Consultants From Private Firms

Respondents from three research groups—National Center for Sustainable Transportation, Superpave Regional Center, Southeastern Region, and Western States Rural Transportation Consortium—reported no engagement with consultants from private firms. The remaining respondents described engagement that ranged from advisory only (Traffic Safety Culture pooled fund) to a more expansive role that

includes advising and offering research ideas and serving as a researcher. None of the respondents permit consultants to develop projects. Table 7 presents survey responses.

Table 7. Roles Played by Consultants From Private Firms

Research Groups	Advisor	Author	Coordinator	Presenter	Project Creator	Project Solicitor	Researcher	Result Dissemination
Aurora	X			X		X	X	X
Clear Roads							X	X
ENTERPRISE			X				X	X
Joint Transportation Research Program	X							X
Southeast Transportation Consortium		X		X			X	
Traffic Safety Culture	X							
Transportation Infrastructure Durability Center	X							X
Virginia Transportation Research Council	X		X	X				
Western Alliance for Quality Transportation Construction	X		X					
Total	**6**	**1**	**3**	**3**	**0**	**1**	**4**	**5**

Several respondents offered additional details:

- *Aurora* periodically hosts Friends of Aurora meetings where representatives from the private sector can talk about things they're working on and how the work of the pooled fund relates to their current efforts.
- A consultant administers the *Clear Roads* pooled fund though coordination with the lead state.
- Two private firms are involved with *ENTERPRISE*: One handles the administration of the pooled fund, and the other conducts all of the research. If a project falls outside the expertise of the research team under contract, the lead state issues a request for proposal (RFP) for a different research team to conduct the research.
- Consultants may participate in the *Joint Transportation Research Program* only as a researcher or as a subcontractor associated with the university.
- Consultants participate in the *Traffic Safety Culture* pooled fund as interested parties.
- Consultants also participate in the *Transportation Infrastructure Durability Center* as a research partner, SME or funder.

4.5 Industry and Professional Organization Representatives

All but three responding research groups—Superpave Regional Center, Southeastern Region, Western Alliance for Quality Transportation Construction and Western States Rural Transportation Consortium—reported some type of engagement by representatives from industry and professional organizations in their research programs. Of all the key players examined in the survey, industry and professional organization representatives play the most limited role in respondents' research programs. When they

do participate, they're most likely to participate as an advisor or to disseminate research results. Table 8 presents survey responses.

Table 8. Roles Played by Industry and Professional Organization Representatives

Research Group	Advisor	Author	Coordinator	Presenter	Project Creator	Project Solicitor	Researcher	Result Dissemination
Aurora	X			X		X	X	X
Clear Roads	X							
ENTERPRISE				X				
Joint Transportation Research Program	X							X
National Center for Sustainable Transportation	X					X		X
Southeast Transportation Consortium					X			X
Traffic Safety Culture	X							
Transportation Infrastructure Durability Center	X							X
Virginia Transportation Research Council			X	X				
Total	**6**	**0**	**1**	**3**	**1**	**2**	**1**	**5**

Several respondents offered additional details:

- *ENTERPRISE* occasionally invites people from other agencies or research groups (FHWA, other pooled funds) to present at meetings on selected topics. Representatives from industry and professional organizations are often interviewed or surveyed for individual research projects.
- Industry and professional organizations serve also as a co-coordinator with *Joint Transportation Research Program* staff for implementation of research results in the field.
- These representatives participate in the *Traffic Safety Culture* pooled fund as interested parties.
- Representatives from industry and professional organizations also participate in the *Transportation Infrastructure Durability Center* as a research partner, SME or funder.
- Project and activity support for *Virginia Transportation Research Council* is sometimes informally provided by industry and professional organization members.

4.6 Other Partners

More than half of respondents reported success in engaging partner agencies in their research programs. Highlighted below are notable responses.

- **Establishing new relationships**. *Transportation Infrastructure Durability Center* has been ramping up efforts in this area since its inception two years ago. This regional UTC has engaged trade organizations in open houses and research presentations, and has reached out to identify the challenges industry faces to incorporate them into UTC research projects and facilitate partner participation.
- **Federal partner.** *Virginia Transportation Research Council* has "traditionally partnered well with the Federal Highway Administration."

- **Interested parties.** Partner organizations participate in the *Traffic Safety Culture* pooled fund as interested parties. Outreach to these partners is a continual process.
- **Local partners.** The *Aurora* pooled fund often tries to include a local partner in on-site meetings, and sometimes asks those who participate to give a short presentation. Local partners are usually recommended by a pooled fund member.
- **Maintaining long-established relationships**. *National Center for Sustainable Transportation* has long-standing relationships with various state DOTs, California Air Resources Board, California Energy Commission, air quality management districts and other state, regional and local agencies, largely through research contracts but also through personal and professional connections. These partners provide a substantial amount of the UTC's research funding, and the respondent noted that "we work very closely with them to execute the research program."
- **Nonvoting partners.** *Clear Roads* currently has nonvoting participants, or partner representatives, from FHWA, American Public Works Association, Snow and Ice Pooled Fund Cooperative Program and Norwegian Public Roads Administration.

Three research groups—ENTERPRISE, Southeast Transportation Consortium and Superpave Regional Center, Southeastern Region—haven't tried to engage partner agencies but are interested in doing so. Perhaps not surprisingly, given their narrowly defined mission and membership, representatives from the Western Alliance for Quality Transportation Construction and Western States Rural Transportation Consortium pooled funds reported no interest in engaging with partner agencies.

5 The Research Process

5.1 Identifying Research Needs

When asked how their research groups identify the research needs that direct the research efforts of their organizations, respondents most often indicated that they establish research focus areas for each research cycle and require member sponsorship of research needs. Respondents were evenly split between accepting research needs only once each year and accepting research needs anytime. Table 9 presents survey responses.

Table 9. Identification of Research Needs

Research Group	Research Focus Areas for Each Research Cycle	Require Member Sponsorship of Research Needs	Accept Research Needs From Universities and Private Consultants: No Member Sponsorship	Accept Research Ideas From Universities and Private Consultants: Require Member Sponsorship	Accept Any Research Need Submitted	Accept Research Needs Once/Year	Accept Research Needs Multiple Times/Year	Accept Research Needs Anytime
Aurora		X	X					X
Clear Roads		X				X		
ENTERPRISE		X				X		
Joint Transportation Research Program	X							X

Research Group	Research Focus Areas for Each Research Cycle	Require Member Sponsorship of Research Needs	Accept Research Needs From Universities and Private Consultants: No Member Sponsorship	Accept Research Ideas From Universities and Private Consultants: Require Member Sponsorship	Accept Any Research Need Submitted	Accept Research Needs Once/Year	Accept Research Needs Multiple Times/Year	Accept Research Needs Anytime
National Center for Sustainable Transportation	X				X	X		
Southeast Transportation Consortium						X		
Superpave Regional Center, Southeastern Region	X							
Traffic Safety Culture [1]					X			X
Transportation Infrastructure Durability Center		X				X		
Virginia Transportation Research Council	X			X				X
Western States Rural Transportation Consortium[2]	X	X		X				X
Total	**5**	**5**	**1**	**2**	**2**	**5**	**0**	**5**

1 The pooled fund accepts research ideas from anyone, but formally requests them from its associated principal research entity, board members and interested parties. Under consideration is a revised practice to offer a formalized, wide-reaching request for research topics. The pooled fund does not specify a recurring time period for submission of research ideas. When sufficient funds are available to fund new projects, research ideas are solicited.

2 While research problem statements can be submitted any time, formal review and selection has generally been done during the pooled fund's annual meeting. Projects are championed by a member agency and conducted by member research institutions.

5.2 Using Research Roadmaps

Research roadmaps are used by research groups to identify research needs and guide the selection of projects. Some roadmaps identify overarching themes that are used to categorize research problem statements, while others provide a graphical representation of critical topic areas or an Excel-based database of research ideas organized by topic area. Still other roadmaps are catalogs of issues that are expected to impact the research group clustered into categories and ranked based on importance. (See page 39 for information about and examples of research roadmaps produced by national research organizations.)

When asked if their research groups had developed a research roadmap to guide selection of research projects, respondents reported varying experiences, described below. None is currently employing a formalized research roadmap, but one indicated that a formal roadmapping effort is in progress in the form of a recently approved National Cooperative Highway Research Program (NCHRP) project.

Roadmap in Progress

- A research roadmapping effort for the *Traffic Safety Culture* pooled fund was recently approved as NCHRP Project 17-96, Traffic Safety Culture Research Roadmap. Proposals have been received in response to an RFP; the project panel will meet to select a contractor to perform the work.

Informal Roadmapping Process

- While *Clear Roads* does not have an official research roadmap, the pooled fund has categorized its research by topic. This manner of organizing research is part of an effort to not only make it easier to find research, but also to serve as a research agenda moving forward.
- *Joint Transportation Research Program's* focus groups determine the roadmap prior to their annual meetings. Focus group leaders are mostly executive staff and senior directors.
- *Transportation Infrastructure Durability Center* applies a strategy outlined in its RFPs to gather information from trade associations and industry firms about the challenges they are facing and to place highest weighting on those projects that focus on those challenges and engage those partners.
- *Virginia Transportation Research Council* uses an informal process: a spreadsheet of priorities and list of "to-do's."

Focus on Themes or Mission

- *National Center for Sustainable Transportation*'s research projects are solicited and selected based on the themes of the UTC, which were established in the group's proposal:
  - Environmentally responsible infrastructure and operations
  - Multimodal travel and sustainable land use
  - Zero-emission vehicle and fuel technologies
  - Institutional change

  As one of the center's major funders, California DOT (Caltrans) provides research needs statements to be included in each annual RFP; however, those statements still need to align with the UTC's overarching thematic areas.
- *Western States Rural Transportation Consortium* uses its mission, vision and goals to guide the type and style of research projects, focusing on partnership, technology, research and education.

5.3 Prioritizing Research

Research groups can prioritize research using a range of factors. For research groups like NETC, balancing member agency needs is likely among the factors considered. When asked how their research groups consider the possibly competing needs of their member agencies when prioritizing research, a few respondents described a formalized process for balancing research needs, while others reported that a simple vote was used to identify research to move forward.

Respondents with formalized practices to prioritize research use ranking and some type of scoring; Table 10 describes these practices. Descriptions of more informal practices follow the table.

Table 10. Formalized Practices to Prioritize Research

Practice	Research Group and Description
Ranking	**Traffic Safety Culture**. Board members rank competing projects based on their agencies' needs. The project manager compiles the rankings, and projects are selected for funding based on available funds. With each ranking effort, board members are asked to identify any projects they think should not be funded. These projects are further discussed by the board and interested parties. Projects ranked below the funding point are considered with new project ideas when additional funds are available.
Scoring	**Clear Roads**. Five research development groups composed of a random selection of seven member states per group meet three times each year—in January, February and March—to identify and scope research ideas prior to the Clear Roads spring meeting, during which these research ideas are discussed and selected for funding. At the spring meeting, each member state representative completes a Research Rating Form that contains the titles of all the projects considered for funding and a score of 1 to 5 (1 = no need to 5 = absolute need). The top-scoring projects are selected for funding based on project budgets and funds available for research. Each Clear Roads member state receives one vote when projects are selected. **ENTERPRISE**. Board members suggest potential research projects and present them at the March board meeting. Each board member scores each project (0-100) based on several scoring categories. Scores are added together for each project and the projects' total scores are listed from highest to lowest. The board selects the number of top-scoring projects that can be conducted with available funds. When the ENTERPRISE board discusses and scores projects, members take into account the impact of the projects at their respective agencies. Board members will support projects that may not apply to their agency directly but elicit enough interest from other board members to be useful to the group as a whole.
Weighted Scoring	**National Center for Sustainable Transportation.** NCST has established a weighted scoring system that takes into consideration such factors as: • Research quality • Policy relevance • Researcher's prior performance • Collaboration/partnerships An equity score will be introduced this year. Weighting includes an external (SME) review of proposals, program staff review of eligibility, director's reviews and internal policy staff reviews. The weighting helps the center make unbiased selections. The respondent noted that the center weighs Caltrans' needs more heavily toward the selection of projects awarded under the UTC's Caltrans/NCST call for proposals. **Transportation Infrastructure Durability Center**. The group's DOT advisory board evaluates each proposal based on provided weighted criteria and overall score. Leadership then reviews the evaluations and funding requests and makes final selections or solicits additional information or modifications to make final selections.

Other respondents described a less formal approach to prioritizing and selecting research:

Case-by-Case Analysis

- After each participating DOT in the *Superpave Regional Center, Southeastern Region* pooled fund selects the research needs statements they wish to fund, the proposing research team for a specific research needs statement meets with the participating DOTs. If the participating DOTs agree to contribute sufficient funds as requested, the research team proceeds with the research needs statement.

Voting

- The *Aurora* board will discuss and vote on prioritizing research.
- *Southeast Transportation Consortium* prioritizes projects based on a majority vote.
- *Virginia Transportation Research Council* arrives at a group consensus. The respondent doesn't recall pursuing anything that the entire group didn't support.
- *Western States Rural Transportation Consortium* discusses projects as a committee and votes on the topics to advance.

6 Managing Research

6.1 Monitoring Progress

Two-thirds of respondents use an advisory board, council or committee to monitor the progress of individual research projects. These research groups include:

- Aurora
- Clear Roads
- ENTERPRISE
- Joint Transportation Research Program
- Superpave Regional Center, Southeastern Region
- Traffic Safety Culture
- Virginia Transportation Research Council
- Western States Rural Transportation Consortium

Respondents from three of the four research groups not using this type of entity to track research progress described their research oversight practices:

- *National Center for Sustainable Transportation.* This national UTC does not ask its leadership council be involved with this level of detail, with the respondent noting that "many are very busy, high-level executives. Our [e]xecutive [c]ommittee, which consists of our [d]irector, [a]ssociate [d]irectors from each of the [five] partner campuses and program staff do work together to monitor the progress of individual projects, as needed."
- *Southeast Transportation Consortium*. Sometimes this pooled fund does engage its oversight body in project-level review, but the respondent noted that this body is usually made up of SMEs from participating agencies and not the pooled fund's TAC members.
- *Transportation Infrastructure Durability Center*. At most, this regional UTC's oversight body meets once a year to review progress or in connection with additional phases of existing projects. The respondent noted that this is "because the administrative burden with so many projects underway is just too large for the advisors."

6.2 Technical Committee Engagement

Research groups typically task technical committees with overseeing the ongoing work associated with individual research projects. Respondents were asked to indicate the frequency with which these committees meet over the life of a project. The responding research groups are most likely to hold technical committee meetings to address a project milestone (when the project kicks off or when a task is completed). Meetings are also typically convened when a project begins and ends, and to allow for review of major deliverables. Table 11, which presents survey responses, is followed by additional context provided by some respondents.

Table 11. Technical Committee Meeting Frequency

Research Group	Monthly	Quarterly	Milestones (Project Kickoff, Task Completion)	Beginning and End of Project	Midproject and Project Conclusion	Reviews of Major Deliverables
Aurora			X	X		X
Clear Roads			X	X		X
Joint Transportation Research Program			X			
National Center for Sustainable Transportation	X	X	X	X	X	X
Southeast Transportation Consortium			X	X		
Superpave Regional Center, Southeastern Region			X			X
Traffic Safety Culture		X	X	X	X	X
Transportation Infrastructure Durability Center			X			
Virginia Transportation Research Council		X				
Total	**1**	**3**	**8**	**5**	**2**	**5**

Respondents provided additional details of technical committee engagement, described below. Several mentioned the production of quarterly progress reports, which are required for participants in the Transportation Pooled Fund Program. Other respondents take advantage of national meetings to bring together technical committee members.

- The *ENTERPRISE* pooled fund board meets monthly and serves as the technical committee for every project. The research team provides in-depth project updates at every meeting; not every project is addressed at every meeting.
- Technical committees for *Joint Transportation Research Program* research projects meet at least every six months.
- *National Center for Sustainable Transportation* currently has more than 80 active projects, all with varying timelines, lengths and level of involvement of the technical committee.
- *Traffic Safety Culture* meets quarterly as a pooled fund. At each meeting, progress for individual projects is discussed; a pooled fund progress report is prepared the month before each meeting. Task reports are reviewed as they are prepared.

- *Transportation Infrastructure Durability Center* submits quarterly reports. Follow-up meetings are scheduled to review potential concerns, as needed.
- The *Virginia Transportation Research Council* respondent noted that the frequency of council meetings has increased during the pandemic, but generally, the council only meets formally, in person, twice annually, with one meeting in conjunction with a related national meeting.
- For *Western States Rural Transportation Consortium* research projects, the sponsoring agency and research team meet as needed to manage the project. Project updates are provided at consortium meetings (at minimum, the consortium meets biannually). The consortium may also meet at national events, such as Intelligent Transportation Society of America and Institute of Transportation Engineers meetings, and will discuss the progress of research efforts at those meetings.

7 Implementing Research

7.1 Addressing Research Implementation

Nearly half of respondents require research need or problem statements to address implementation:

- Joint Transportation Research Program
- National Center for Sustainable Transportation
- Superpave Regional Center, Southeastern Region
- Traffic Safety Culture
- Transportation Infrastructure Durability Center

Joint Transportation Research Program informs submitters that each research proposal should include benefits to the department, clear deliverables and implementation plans. National Center for Sustainable Transportation proposals must include a policy and practice impact plan that identifies relevant policies and agency activity, and that develops an engagement strategy.

While Western States Rural Transportation Consortium does not specify implementation requirements, all projects and activities have implementation in mind. Proposals must address the impactful results of projects—how the results will be used and implemented. The extent to which implementation is addressed in incubator and spinoff projects may differ.

One-third of respondents require researchers to submit an implementation plan once research projects are approved for funding. Implementation activities are included in the Superpave Regional Center, Southeastern Region's research need statement. Other research group practices follow:

- *Joint Transportation Research Program*. An implementation plan is required in the proposal. When the research is finished, the researcher and business owner must sign the implementation plans.
- *Transportation Infrastructure Durability Center*. The lead principal investigator is responsible for describing the potential implementation of proposed research in the RFP. The lead investigator works with the assigned technical champion to ensure that the research results are implementable.

- *Western States Rural Transportation Consortium.* While not required, an implementation plan might be part of the objectives, work plan, deliverables or other component (scope of work, budget, Gantt chart that indicates project milestones).

7.2 Overseeing Implementation of Research

Nearly half of respondents support an implementation committee or other group that oversees and encourages the implementation of research findings:

- *Clear Roads*' seven-member committee comprises five states, one lead state and the consultant administrator. The respondent noted that the pooled fund could do more to engage this committee.
- In the *Joint Transportation Research Program*, most implementation results are reported to the department executive staff and technical committees.
- *Superpave Regional Center, Southeastern Region*'s implementation committee is the same as the research committee that approves the research need statement and oversees the research.
- At the *Transportation Infrastructure Durability Center*, implementation is part of the research process led by the principal investigator and technical champion. However, leadership and advisory board members consider encouraging and facilitating implementation a group effort.

Three research groups—Aurora, Southeast Transportation Consortium and Virginia Transportation Research Council—haven't supported an implementation committee or other group for research implementation oversight but are interested in doing so. ENTERPRISE, National Center for Sustainable Transportation, Traffic Safety Culture and Western States Rural Transportation Consortium reported no interest in establishing an implementation committee.

7.3 Tracking Implementation

Four research groups have a formal practice for tracking implementation of research findings:

Clear Roads administers research use surveys one year after project completion. The project champion (the chair of the project subcommittee) completes the surveys, and the response is then reviewed and revised as needed by subcommittee members. In addition, Clear Roads administers a Research Implementation Summary approximately every three or four years to determine the extent to which states have implemented all completed Clear Roads research.

Joint Transportation Research Program tracks each finished project for five years. Each year, a benefit–cost ratio is developed.

National Center for Sustainable Transportation collects follow-up information from completed projects every six months for about two years. Among the information collected is evidence that research has led to the deployment of new technologies, analytical methods and/or informed policy at the local, state and/or national level. Results of these follow-up efforts and other ad hoc submissions are logged in a tracking database.

Transportation Infrastructure Durability Center documents implementation in its semiannual report to the federal government.

7.4 Funding Implementation Projects

Three research groups maintain a separate source of funds or sponsor a solicitation effort specifically for implementation projects:

Clear Roads sets aside $5,000 for each current and approved project to be used for dissemination and implementation activities. Members voted to adopt this practice in 2020 on a trial basis; results are still pending.

Joint Transportation Research Program has a separate fund dedicated to implementation. If indicated in the implementation form, the business owner and researcher write a short proposal for implementation funding after the research project is completed.

For *Superpave Regional Center, Southeastern Region*, implementation is part of the original research need statement.

Although the Western States Rural Transportation Consortium indicated that it does not maintain separate funding, a respondent noted that the sponsoring state DOT will provide funding for research efforts within the consortium; other DOTs may also contribute to the research.

7.5 Quantifying the Impacts of Research

One-half of the research groups attempt to quantify the impacts of research through a range of practices, primarily publications. National Center for Sustainable Transportation notes the difficulty in quantifying research impacts given the policy-oriented nature of its research where impacts may not be apparent for many years. Table 12 describes these practices.

Table 12. Quantifying the Impacts of Research

Practice	Research Group and Description
Project Review	**Joint Transportation Research Program**. Qualitative and quantitative implementation benefits are reviewed for all finished projects. Benefit–cost ratios are calculated if research results can be quantified.
Publications and Projects	**Clear Roads**. The Research Implementation Summary identifies the number and percentage of Clear Roads members implementing research results and the extent to which results are implemented. Monetary impacts, however, have not been determined. **National Center for Sustainable Transportation**. Biannual Technology Transfer Plans are required by the U.S. DOT UTC grant. These plans must include goals; performance measures; and annual targets for outputs, outcomes and impacts. Quantifying research impacts has been difficult since the research is largely policy-oriented; impacts may not be apparent for many years. **Southeast Transportation Consortium**. Two studies have been completed on how best to quantify impacts. **Western States Rural Transportation Consortium**. Research impact brief papers are created and posted on the group's website.

Practice	Research Group and Description
Publications and Projects	**Transportation Infrastructure Durability Center**. Semiannual reports document the research impacts, which are quantified primarily by describing effective implementation by state transportation agencies or industry.
Statistics and Other Evidence	**Western States Rural Transportation Consortium**. Statistics and testimonials from users, students and participants have been gathered. Web pages have also been developed that describe the impact of some projects. *Note*: These efforts are somewhat project-specific.

8 Research Project Deliverables

8.1 Communicating Research Deliverables

All but one of the research groups require researchers to submit a final report detailing research project results; all but one of these groups also require a draft final report. Other frequently requested deliverables are quarterly progress reports, PowerPoint presentations and webinars. None of the groups require researchers to submit monthly progress reports or social media posts. (The Western Alliance for Quality Transportation Construction respondent noted that these types of project deliverables are not relevant to the pooled fund's mission, which includes "work[ing] together to improve AASHTO specifications and procedures.")

Table 13, which presents survey responses, is followed by additional context provided by some respondents.

Table 13. Required Research Deliverables

Research Group	Draft Final Report	Final Report	Interim Task Reports	One-Page Fact Sheet	Poster	PowerPoint	Quarterly Progress Reports	Technical Brief	Webinar
Aurora	X	X					X	X	X
Clear Roads	X	X	X			X	X		X
ENTERPRISE	X	X				X	X		
Joint Transportation Research Program	X	X						X	
National Center for Sustainable Transportation	X	X					X	X	X
Southeast Transportation Consortium	X	X				X			
Superpave Regional Center, Southeastern Region	X	X	X			X	X		X
Traffic Safety Culture	X	X	X		X	X	X	X	X
Transportation Infrastructure Durability Center		X			X	X	X		X
Virginia Transportation Research Council	X	X				X	X		X
Western States Rural Transportation Consortium	X	X	X	X		X	X		
Total	**10**	**11**	**4**	**1**	**2**	**8**	**9**	**4**	**7**

Additional details about the deliverables that researchers are required to submit are described below:

- *Aurora* requires the submission of software, prototypes or other project-specific deliverables for some projects.
- *ENTERPRISE* pooled fund requires updates with presentations, but not monthly. The respondent noted that projects are updated on a rotating basis during monthly board meetings.
- *Joint Transportation Research Program* requires semiannual progress reports.
- *National Center for Sustainable Transportation* requires a two-page policy brief for all projects, which includes research findings and policy implications. If the project is not policy-oriented research, a research brief (similar to a technical brief) may be submitted. Also, a quarterly progress report is required for some projects and biannual progress reports for others, depending on the source of funding.
- *Southeast Transportation Consortium* requires biannual reports and technical summaries.
- *Traffic Safety Culture* requires researchers to submit additional products tailored to each project, such as videos and talking points.
- *Transportation Infrastructure Durability Center* notes that webinars are coming in 2021, and presentations are required at the annual conference.
- *Western States Rural Transportation Consortium* requires websites and project-specific deliverables, depending on the member agency.

8.2 Addressing Compliance Requirements

Responding research groups were almost evenly split among the compliance issues that they require researchers to address when submitting final deliverables. Approximately two-thirds require researchers to address accessibility issues detailed in Section 508 of the Rehabilitation Act of 1973 as amended in 1998, as well as data sharing and intellectual property issues. Table 14, which presents survey responses, is followed by additional context provided by some respondents.

Table 14. Compliance Requirements of Final Deliverables

Research Group	Accessibility[1]	Data Sharing	Intellectual Property
Aurora		X	X
Clear Roads	X	X	X
Joint Transportation Research Program	X	X	X
National Center for Sustainable Transportation	X	X	
Southeast Transportation Consortium	X		
Superpave Regional Center, Southeastern Region	X	X	
Traffic Safety Culture	X		X
Transportation Infrastructure Durability Center		X	X
Western States Rural Transportation Consortium	X		X
Total	**7**	**6**	**6**

1 The full text of this response option: *Accessibility (Section 508 of the Rehabilitation Act).*

Below are additional details about the deliverables that researchers are required to submit:

- *National Center for Sustainable Transportation* staff members do not strongly require researchers to comply with Section 508 requirements since staff largely addresses these requirements before publishing. However, the respondent noted that it is helpful when researchers provide alternative text for figures.
- *Traffic Safety Culture* identifies any intellectual property issues in the proposal. The pooled fund is working on data management and plans to implement these requirements in 2021.
- *Transportation Infrastructure Durability Center* requires researchers to input project information into TRB's Research in Progress (RIP) database, which contains information on more than 12,000 current or recently completed transportation research projects.
- At *Virginia Transportation Research Council*, compliance depends on the underlying funding source and expected deliverable.
- *Western States Rural Transportation Consortium* requires the sponsoring agency to address any potential intellectual property issues and other compliance requirements. The consortium is currently working on accessibility related to its website.

8.3 Disseminating Research Results

Research groups share research results through numerous outreach tools and practices. The most common outreach methods are websites, technical briefs, webinars and postings of new projects in the RiP database. None of the responding groups disseminate research results through Lunch and Learn events. Tables 15 and 16, which present survey responses, are followed by additional context provided by some respondents.

Table 15. Outreach to Disseminate Research Results

Research Group	Annual Report	Blog Post	News Item[1]	Newsletter	Technical Brief[2]	Posting in RiP[3]
Aurora	X	X			X	
Clear Roads			X		X	X
ENTERPRISE					X	
Joint Transportation Research Program	X	X	X	X	X	X
National Center for Sustainable Transportation		X	X	X	X	X
Southeast Transportation Consortium					X	
Superpave Regional Center, Southeastern Region	X			X		X
Traffic Safety Culture			X		X	X
Transportation Infrastructure Durability Center	X				X	X
Virginia Transportation Research Council					X	X
Western States Rural Transportation Consortium		X	X			X
Total	**4**	**4**	**5**	**3**	**9**	**8**

1 The full text of this response option: *Email news item describing research results.*

2 The full text of this response option: *One- or two-page technical brief.*

3 The full text of this response option: *Posting new projects in Research in Progress database.*

Table 16. Outreach to Disseminate Research Results, Continued

Research Group	Social Media Post	TRID Database[1]	Final Report to NTL[2]	Webinar[3]	Website
Aurora					X
Clear Roads		X	X	X	X
ENTERPRISE				X	X
Joint Transportation Research Program	X	X	X	X	X
National Center for Sustainable Transportation	X	X	X	X	X
Southeast Transportation Consortium		X	X		X
Superpave Regional Center, Southeastern Region	X	X	X	X	X
Traffic Safety Culture		X	X	X	X
Transportation Infrastructure Durability Center	X			X	X
Virginia Transportation Research Council				X	
Western States Rural Transportation Consortium		X	X		X
Total	**4**	**7**	**7**	**8**	**10**

1 The full text of this response option: *Providing publications for TRB's TRID database.*

2 The full text of this response option: *Submitting final reports to National Transportation Library (NTL).*

3 The full text of this response option: *Webinar describing completed research*.

Below are additional details about the outreach tools and practices used by research groups to disseminate research results:

- *Aurora* used to publish an email newsletter.
- *ENTERPRISE* posts a project's final report on its website. (Every project is required to produce a final report.) Webinars are also required for some projects.
- *Joint Transportation Research Program* publishes information in journals and other resources such as the AASHTO High Value Research repository.
- *National Center for Sustainable Transportation* posts its biannual progress reports to U.S. DOT online, though they are not widely distributed.
- *Traffic Safety Culture* disseminates research findings through posters, presentations, meetings and conferences, and through members and interested parties.
- *Western States Rural Transportation Consortium* shares research information with practitioners during its annual Technology Implementers Forum. Other tools and practices used by the research group include meetings and conferences, fact sheets, implementation sheets, conference and technical meeting presentations and related publications, and internal networking and connections.

9 Program Assessment and Future Plans

9.1 Successes

Respondents described the following successes that their research groups have achieved:

Collaboration and Coordination

- *Relationship building with partners and industry* (Joint Transportation Research Program, National Center for Sustainable Transportation). The National Center for Sustainable Transportation respondent noted that its close relationship with Caltrans has allowed the UTC to establish and manage 56 projects under its current five-year contract with Caltrans. (*Note*: Caltrans designates funding for California-led UTCs; each center facilitates Caltrans-funded RFPs for research projects that fit into the themes of the respective centers.)
- *Helping states perform or participate in research* that they wouldn't have been able to conduct alone (Aurora).
- *Funding research projects with shared interests* (Superpave Regional Center, Southeastern Region).
- *Focus on the unique needs of each participating DOT* (Superpave Regional Center, Southeastern Region). Each DOT can contribute funds to the research projects of interest.
- *Information exchange between member state DOTs* (Western States Rural Transportation Consortium).
- *Coordination and input into the AASHTO Committee on Materials and Pavements* (Western Alliance for Quality Transportation Construction).

Guidance Development

- *Transition of the Qualified Products List (QPL)* from the Pacific Northwest Snowfighters to Clear Roads, which included a substantial overhaul of the specifications and processes surrounding the QPL (Clear Roads).

Partner Engagement

- *Fostering a community* for road weather discussion (Aurora) and innovation (Traffic Safety Culture).
- *Growth and sustainability* (Clear Roads). The group has been conducting winter maintenance research since 2004 and has grown to 36 members.

Executive-Level Engagement

- *Sharing ideas and information* with board members (ENTERPRISE) and upper management (Traffic Safety Culture).
- *Funding to conduct many projects of interest to board members* (Traffic Safety Culture).

Implementation

- *Including implementation activities and products in the original research need statement* so they are planned along with research activities (Superpave Regional Center, Southeastern Region; Traffic Safety Culture).
- *Technology Implementers Forum* (Western States Rural Transportation Consortium). Held annually since 2006, this forum provides a high-quality exchange of technical information to promote enhanced intelligent transportation system (ITS) deployment in rural areas. ITS technology practitioners and implementers share best practices and field deployment

experiences with fellow professionals from across the western United States. The project is partially funded by the consortium.

- *Staff involvement and dedication to implement the research results* (Joint Transportation Research Program).

Outreach

- *Meetings serve as mini-peer exchanges for all states* (Southeast Transportation Consortium).
- *Participation in national, subject-relevant conferences and meetings* (Virginia Transportation Research Council).
- *Developing and fostering a professional network* (Virginia Transportation Research Council).

Research Impacts

- *Advancing emerging technologies* (Virginia Transportation Research Council).
- *Helping states test emerging equipment and methods* to guide their upcoming RWIS/weather services procurement (Aurora).
- *Completing multiple research projects across a wide range of topics within the ITS world* (ENTERPRISE) *and with tangible products* (Western States Rural Transportation Consortium).
- *Quantifying impacts from policy research* (National Center for Sustainable Transportation).
- *Implementing research project results* (Transportation Infrastructure Durability Center, Western States Rural Transportation Consortium). Michigan DOT has adopted one of the first research projects conducted by the Transportation Infrastructure Durability Center to remove existing bridge load restrictions on previously posted bridges. Western States Rural Transportation Consortium has seen the implementation of the Automated Safety Warning Controller, a roadside system that monitors road and weather conditions and updates driver warning systems

Section 508 Compliance

- *Promoting accessibility (Section 508) compliance in publications, on websites and in media content* (National Center for Sustainable Transportation). The research group has become a resource for other research programs as more and more funders require Section 508 compliance.

Website Enhancements

- *Developing One-Stop-Shop*, a web application that provides a central source for rural traveler information (Western States Rural Transportation Consortium).
- *Developing the Research by Topic online search tool*, which allows users to easily locate and learn about completed and in-progress research (Clear Roads). The tool includes six topics and 16 subject pages highlighting Clear Roads research products. A final deliverable included a sortable table to filter all Clear Roads projects by project number, title, completion date and status.

Workforce Development

- *Careers in transportation* (Transportation Infrastructure Durability Center). Twenty students have transitioned into the transportation industry employment and 130 students were supported in transportation research projects in two years.
- *Materials development* (Western Alliance for Quality Transportation Construction). Training materials for certifying agencies and a program outline for materials technician certification have been developed.

9.2 Challenges

Managing research programs also involves challenges. The most common among research groups are summarized below:

Research Process

- *Gathering ideas*:
    - Soliciting new, fresh ideas (ENTERPRISE, Western States Rural Transportation Consortium).
    - Encouraging submission of research problem statements (Western States Rural Transportation Consortium).
    - Scoping research ideas before project selection (Clear Roads).
- *Long-term planning* (Superpave Regional Center, Southeastern Region). It's more difficult to plan for long-term research efforts that address long-term challenges.
- *Variability of research projects* (Joint Transportation Research Program). Some research projects can be very successful because the outcomes can be predicted early on while others are difficult to predict.
- *Tracking research* (Virginia Transportation Research Council). Following the progress of multi-entity projects (mainly a challenge for the lead-state coordinator).
- *Project timelines:*
    - Difficult to manage project budget and expenditures that are linked to the researchers' performance (Joint Transportation Research Program).
    - Need improved processes for ensuring that research projects adhere to timelines or get through contracting or review in a timely fashion (Aurora).
    - Difficult to define timeline for research that involves long-term testing or trial and error (Joint Transportation Research Program). Time extensions are very common for this type of research project.
    - Ensuring project findings are easily accessible to nonagency practitioners (Aurora). Copies of final deliverables are sent to board members but sometimes the results aren't widely distributed, especially to non-Aurora practitioners.
    - Researchers who repeatedly fail to complete deliverables on time (National Center for Sustainable Transportation). Repeat offenders are denied future funding, which is sometimes a successful incentive.
- *Disseminating and implementing results:*
    - Unable to support implementation specific to each participating agency (Traffic Safety Culture).
    - *Communicating and implementing results in the field* (Clear Roads). The group holds two business meetings each year; attendance at each meeting is limited to one member per state, who is then responsible for communicating results to all districts and regions.
- *Measuring the impact of policy research* (National Center for Sustainable Transportation).

Operational Issues

- *Recognizing and accommodating competing priorities* (Virginia Transportation Research Council).

- *Funding*, such as coordinating and monitoring Transportation Pooled Fund Program contributions for additional research opportunities (Western States Rural Transportation Consortium).
- *Time commitment:*
    - Time to manage the pooled fund, which is somewhat alleviated by a management support contract (Traffic Safety Culture).
    - Creating a multistate project in addition to conducting internal DOT work (Western States Rural Transportation Consortium).
- *Keeping up with changes in testing specifications* (Western Alliance for Quality Transportation Construction).

Partnerships

- *Managing existing partnerships:*
    - Challenging the status quo of university culture to partner and collaborate with outside entities (Transportation Infrastructure Durability Center).
    - Maintaining engagement from partner technical representatives (Virginia Transportation Research Council).
    - Facilitating research processes and contract limitations (National Center for Sustainable Transportation).
- *Soliciting new research partners:*
    - Challenging academic institutions to engage with industry (Transportation Infrastructure Durability Center).
    - Obtaining responses to RFPs from researchers who have not led a project (Clear Roads).

Staffing-Related Issues

- *Time commitment* (Traffic Safety Culture). Available time for board members to fully participate.
- *Continuity of project oversight* (Aurora). Keeping the intended direction of multiyear projects when the original project team and board members are no longer part of the research program.
- *Recruiting new members* (ENTERPRISE).
- *Workforce development*:
    - Keeping up with the changing environment and migration to online learning (Western Alliance for Quality Transportation Construction).
    - Resources within agencies for both training and certification (Western Alliance for Quality Transportation Construction).

COVID-19

- *Shutdowns and restrictions* (Transportation Infrastructure Durability Center), including face-to-face meetings (Southeast Transportation Consortium).

9.3 Future Plans

Three research groups planning to make structural changes to their research programs in the next few years described these plans:

- *ENTERPRISE* pooled fund ends in 2021, and at the time of the survey, board members were discussing whether to continue the study. Changes could occur in a new phase of the pooled fund.
- *National Center for Sustainable Transportation* will recompete for a UTC grant once the next transportation bill is passed, and is considering restructuring to centralize more activities instead of maintaining the current structure where each consortium partner "largely facilitates its own research portfolio and other center activities."
- *Virginia Transportation Research Council* has set two goals: implementation and expanded expertise.

While significant structural modifications are not anticipated within Clear Roads or Joint Transportation Research Program, change is ongoing for both groups. Clear Roads is always considering ways to improve operations. In the recent past, changes have included restructuring its website to make research results more accessible; creating online forms to allow access to agency training; creating forms for vendors that submit deicing agent testing results for inclusion on the QPL; and developing an online equipment database that provides member states with access to the equipment used by other states. Joint Transportation Research Program anticipates making adjustments in response to particular situations.

10 Related Resources

Below are resources provided by the research groups that describe policies, procedures, program administration, advisory or technical committee guidance, and /or staff and researcher training. Additional resources sourced through a limited literature search describe research roadmaps.

10.1 Respondent Publications

Aurora
https://aurora-program.org/
Access to the program's completed and in-process research, publications, databases and other resources is available from this web page.

Related Resource:

Aurora Program, Transportation Pooled Fund Program, National Cooperative Highway Research Program, undated.
https://www.pooledfund.org/details/study/189
Included on this web page are a description of the Aurora program pooled fund, the pooled fund's lead agency and member states, financial commitments, program status reports and quarterly progress reports.

Clear Roads
https://clearroads.org/
Information about research projects, the QPL and other resources is available from this web page. Operating procedures and a December 2020 research and implementation update are also available (https://clearroads.org/intro-to-clear-roads/, both located under Program Documents).

ENTERPRISE
https://enterprise.prog.org/
Progress reports, annual work plans and the ENTERPRISE management plan are available at this website along with completed, in-progress and future research projects.

Related Resource:

> **Management Plan**, ENTERPRISE Transportation Pooled Fund, August 2015.
> https://enterprise.prog.org/wp-content/uploads/ENT_mgmt_plan_082515.pdf
> *From the introduction*: ENTERPRISE was established in 1991 through an agreement of four U.S. states with common ITS interests. Since that time, ENTERPRISE has preceded through a Phase I program planning effort. ENTERPRISE now continues to enhance Phase II of the initiative, involving technology research and development. This [m]anagement [p]lan has been prepared to bring together the results of Phase I, and to serve as a guiding document in support of ENTERPRISE's ongoing Phase II efforts in the ITS arena.

Joint Transportation Research Program
https://engineering.purdue.edu/JTRP
The Principal Investigator Resources section (available from the Resources tab) provides access to various policy and procedures documents, including the program's procedures manual and current project administration information (login required to view).

Related Resource:

> **User's Manual for Research and Innovation**, Joint Transportation Research Program, December 2019.
> https://engineering.purdue.edu/JTRP/files/UsersManual_20191201.pdf
> General information is provided about conducting and implementing research, including program administration, identification of research needs, proposals and work plans, research reporting requirements and research implementation.

National Center for Sustainable Transportation
https://ncst.ucdavis.edu/
Resources for current researchers and those interested in the center's funding opportunities are provided (https://ncst.ucdavis.edu/resources-current-grantees), including data management requirements and guidance (https://ncst.ucdavis.edu/data-management-plan-info-guidance) and information about calls for proposals (https://ncst.ucdavis.edu/funding-opportunities).

Related Resources:

> **Requirements for Principal Investigators Agreement for UC Davis Federal Research Grants**, National Center for Sustainable Transportation, April 2020.
> See Attachment A.

Requirements and expectations of principal investigators are included in this document, including engagement and outreach, data management and reporting requirements.

Data Management Plan for the National Center for Sustainable Transportation, Version 2.0, University of California, Davis, May 2017.
https://ucdavis.app.box.com/v/NCSTDMP20170530
Guidance briefly describes the types of data collected in research projects, policies for accessing and sharing, and plans for archiving and preservation.

Southeast Transportation Consortium
https://www.ltrc.lsu.edu/stc/
Information is available about the consortium's member states, its charter, current projects and published reports.

Related Resource:

Charter, Southeast Transportation Consortium, undated.
https://www.ltrc.lsu.edu/stc/pdf/charter.pdf
Guidance includes a brief discussion of the project solicitation and selection process.

Superpave Regional Center, Southeastern Region
https://www.pooledfund.org/Details/Study/456
This web page provides a description of the pooled fund, its lead agency and member states, financial commitments and quarterly progress reports.

Traffic Safety Culture
https://www.mdt.mt.gov/research/projects/trafficsafety.shtml
Access to the pooled fund's management plan, annual work plans and annual reports is provided on this web page along with research project solicitation and other guidance for researchers.

Related Resources:

FFY 2021 Annual Work Plan, Traffic Safety Culture Transportation Pooled Fund, April 2021.
https://www.mdt.mt.gov/other/webdata/external/research/docs/research_proj/tsc/FFY_2021_WORK_PLAN.pdf
Current and completed research projects are summarized in this work plan.

Management Plan: Phase II (FFY 2020-2024), Traffic Safety Culture Transportation Pooled Fund, June 2020.
https://www.mdt.mt.gov/other/webdata/external/research/docs/research_proj/tsc/TSC_TPF-5-444_MGMT_PLAN-FINAL-6-23-20.pdf
From the executive summary: The key purposes of the TSC-TPF [Traffic Safety Culture Transportation Pooled Fund] [m]anagement [p]lan are as follows:

- [T]o provide an overview of why the TSC-TPF was formed, which can be used to explain the program to organizations unfamiliar with the initiative;
- [T]o define the management of the TSC-TPF including roles and responsibilities, and processes;
- [T]o define the TSC-TPF charter and operating rules.

Transportation Infrastructure Durability Center
https://www.tidc-utc.org/
Reporting requirement due dates are provided in the Grant Deliverable Documents and Resources section of the web page (https://www.tidc-utc.org/pi-toolbox/).

Virginia Transportation Research Council
http://vtrc.virginiadot.org/
Access to information about research needs statements and other contractor information is available from this web page.

Related Resources:

Program Administration Manual, Virginia Transportation Research Council, February 2017.
See Attachment B.
This manual describes the procedures for selecting and implementing research, development and technology transfer activities

VTRC Research Needs Statements, Virginia Transportation Research Council, undated.
https://sites.google.com/view/vtrc-contractor-info/home
Current research needs are posted on this web page.

Participation Requirements and Policies, Contract Research Needs Program, Virginia Transportation Research Council, April 2019.
https://drive.google.com/open?id=1fv-xsPiTRzwxOWvDBIHzRsk2nA5tqiyw
This guidance provides details on eligibility requirements and how to participate in the program.

Western Alliance for Quality Transportation Construction
http://www.waqtc.org/
The Library section of this website provides access to organizational documents, such as the research group's bylaws (http://www.waqtc.org/library/documents/bylaws.pdf); 2020 strategic plan (http://www.waqtc.org/library/documents/2020_waqtc_strategic_plan.pdf); field operating procedures (http://www.waqtc.org/library/library.cfm); and guidance related to the Transportation Technician Qualification Program (TTQP), which provides training and certification in field materials testing procedures.

Related Resources:

Transportation Technician Qualification Program (TTQP), Western Alliance for Quality Transportation Construction, 2021.
http://www.waqtc.org/ttqp.cfm
From the web page: The TTQP consists of instruction and certification in field materials testing procedures with qualification modules for [a]ggregate, [a]sphalt, [c]oncrete, [e]mbankment and [b]ase, and [i]n-[p]lace [d]ensity. The program ensures that participating individuals have demonstrated abilities to engage in quality control and quality assurance activities in transportation construction work.

Administration Manual, Transportation Technician Qualification Program, Western Alliance for Quality Transportation Construction, April 2021.
http://www.waqtc.org/library/documents/2021_administration_manual.pdf
From the manual: The purpose of this Qualification program is to provide improved quality in the transportation products that we provide. One means of accomplishing this is by ensuring that individuals have demonstrated abilities to engage in quality assurance activities (quality control, acceptance and independent assurance) in transportation construction work under the jurisdiction of the WAQTC [Western Alliance for Quality Transportation Construction] contracting [a]gencies and those laboratories that perform [a]gency work meet an acceptable level of performance.

Western States Rural Transportation Consortium
http://westernstates.org/
The consortium's charter briefly summarizes the research group's guiding principles (http://westernstates.org/Documents/WSRTC/WSRTC_Charter_2011_final.pdf). Additional information about the mission, vision and goals statement is also available (http://westernstates.org/Documents/WSRTC/WSRTC%20MVG%20and%20Cover%20Page_final.pdf).

10.2 Research Roadmaps

The publications cited below describe roadmapping efforts conducted by national research groups and offer examples of the guidance documents these efforts produce.

ACRP Web-Only Document 49: Research Roadmap on Airport Administration and Human Resource Issues, Kathryn Solook, Allison Alexander, Brian Cronin, Juan Carlos Batarse, Amy Bisker, Jacqueline Marhefka, Jay Souder and Diana Long, May 2020.
Publication available at https://www.nap.edu/download/25857
The roadmap development process is presented on page 3 of the report (page 8 of the PDF). Below is a brief summary of the tasks involved in the roadmapping effort:

- *Literature review* identified examples of how research needs could be organized and presented.
- *Interviews and focus groups* were used to better understand research needs and gaps in knowledge or practice.
- *Surveys of airport management and the ACRP project panel* gathered and prioritized additional research ideas.

See below for information about the resulting roadmapping products.

Related Resources:

Visual Research Roadmap
For access: Go to http://www.trb.org/Main/Blurbs/180928.aspx and click on the Visual Research Roadmap link.
This graphical representation of the roadmap applies an iterative scale to icons (larger icons were rated as being more important to airports).

Research Idea Database
http://onlinepubs.trb.org/onlinepubs/acrp/acrp_wod_049Database.xlsx
An Excel spreadsheet organizes data using these categories: theme, research idea, objective, background information, related research, importance (out of 5), time frame (0-2 years, 2-5 years, 5+ years), ACRP IdeaHub tags and subtopics.

AASHTO CV/AV Research Roadmap: NCHRP 20-24(98), undated.
http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-24(98)_AASHTOAVCVResearchRoadmapLONGFORM.pptx
This presentation summarizes a research roadmapping project's key steps:

- Develop a catalog of open issues and research needs
- Prioritize issues in catalog and consolidate into research projects
- Develop a roadmap of research activities
- Develop a structure for maintenance of the roadmap

Slide 38 provides a step-by-step process for an annual review and readjustment of the roadmap.

History of the CP Road Map, National Concrete Pavement Technology Center, undated.
https://cptechcenter.org/cp-road-map/
This website describes development of the CP Road Map (or Long-Term Plan for Concrete Pavement Research and Technology), described as "an innovative program developed and jointly implemented by the concrete pavement stakeholder community." Among the activities described on the site:

- *Ranking* of concrete pavement research needs enabling state DOTs to optimize resource use by working together with other states sharing the same research concerns.
- Identification of 12 *primary research tracks* and several subtracks by the CP Road Map Executive Committee. The committee prioritized the 12 tracks, obtained executive-level buy-in and "cultivated collaborative sponsorship of research across the nation."
- Development of a *curated and searchable onlin*e Concrete Infrastructure Research Database of in-progress and recent research. (The database is available at https://cptechcenter.org/concrete-infrastructure-research-database/.)

NCHRP Project 20-122: Rural Transportation Issues: Research Roadmap, start date: October 2018; expected completion date: March 2021.
Project description at https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4579

Note: The project website describes project status: *A final meeting of the panel was held in October 2019. A draft final report was delivered in April 2020. Revised final deliverables are anticipated in March 2021.*

From the objective: The objectives of this research are to (1) identify critical rural transportation issues that can be addressed by research through NCHRP and other research programs; (2) produce a research roadmap; and (3) submit, by November 1, 2018, at least five problem statements drawn from the research roadmap that are appropriate for consideration for NCHRP funding in the FY 2020 program.

Related Resource:

"NCHRP 20-122: Rural Transportation Issues Research Roadmap," Jaime Sullivan and John Shaw, *5th Stakeholder Meeting*, March 2019.
https://westerntransportationinstitute.org/wp-content/uploads/2019/03/NCHRP-20-122_March_Webinar.pdf
This presentation describes progress to date on the NCHRP project cited above, noting that a "curated collection of research needs" will help establish short- and long-term research agendas, and help define priorities and sequencing of research work. This roadmapping effort started with definitions of several rural community types and a categorization of rural critical needs. Fact sheets developed for critical themes served as "conversation starters" while stakeholder workshops were used to develop research needs statements.

11 Conclusions and Recommendations

11.1 Overview

Note: This summary of survey findings and responses to them is a representative rather than exhaustive presentation of the actions NETC might take based on respondent feedback. Some recommendations and follow-up actions are drawn directly from respondent comments, and others were developed by the investigators in response to stated needs. Additionally, some of the recommendations are pulled from the task memorandum summarizing Task 2 survey findings. TAAC members may identify other recommended actions of particular interest to them or their agencies in the preceding sections of this task memorandum.

This summary of survey findings and NETC's possible responses to them highlights takeaways from the survey of other research groups in these topic areas:

- Research program administration
- Research process
- Key research program participants
- Implementing research
- Research project deliverables
- Disseminating research results

Each takeaway is followed by the actions or practices NETC could consider to address it. A recommended action may appear more than once if applicable to multiple issues.

11.2 Takeaways and Possible NETC Responses

Research Program Administration

Ensure consistency across member agencies with agency-level committees. Some research groups convene agency-level committees to try to ensure consistency across member agencies. For example, Western Alliance for Quality Transportation Construction's agency-level committees oversee one of the pooled fund's programs to ensure consistent implementation by all members.

NETC could consider:

- Establishing new committees within each member agency that are tasked with engaging member agency staff, encouraging collaboration, as recommended by agency managers, implementers and SMEs, and working in concert with the TAAC to align NETC's research and related activities with specific agency needs.

Research Process

Balance a focus on regional interests with national interests and mandates. The respondent pool included research groups with a national focus and groups very focused on regional needs. Both types of research groups expanded their scope of research beyond that initial charge.

NETC could consider:

- Identifying short- and long-term needs from a regional perspective.
- Ensuring that topics of national interest or national mandates are tracked and considered for funding during every research cycle.
    - Consider implementation of initiatives proposed through Every Day Counts, State Transportation Innovation Councils, AASHTO Innovation Initiative and other national efforts.
- Bringing together SMEs from NETC member agencies to discuss commonly held concerns. SME gatherings can be used to:
    - Spur the development of research ideas and identify strategies for collaboration in implementing regional or national mandates.
    - Inform and expedite the implementation of solutions proposed by national initiatives.

Actively identify focus areas or themes. Almost all of the research groups surveyed conduct original research in focus areas and are less likely to conduct research more broadly in all topic areas. Several groups use an informal roadmapping process to provide structure to the research cycle. This approach allows the research group to set the parameters of the research problem statements they're soliciting and makes it more likely that proposers will present potential solutions to current member agency needs.

NETC could consider:

- Conducting a more rigorous analysis of the research priorities of NETC member agencies and doing so in consultation with member agency managers, implementers and SMEs.
- Developing a limited or more sophisticated form of a research roadmap that identifies short- and long-term needs in the focus areas or themes the TAAC identifies for each research cycle.
    - Use NETC's mission, vision and goals to guide the TAAC in developing themes, focus areas and prioritization.
    - Convene SME groups to gather feedback on commonly held issues and concerns as part of an annual development of research focus areas and prioritization.
- Providing clear direction to potential proposers about NETC's research focus areas, themes and priorities so the resulting research problem statements better address NETC's actual needs.

Expand the research cycle. While respondents were evenly split between accepting research needs only once a year and accepting research needs anytime, NETC might consider expanding the research cycle in terms of timing and the type of activity it funds.

NETC could consider:

- Soliciting and selecting research and other activities that benefit member agencies using new practices such as:
    - Instituting a year-round process to accept and evaluate research need statements to allow NETC to be more nimble and respond to needs as they occur.
    - Shifting some of the funds spent on research to technology transfer and outreach or implementation efforts that will impact all six member agencies.

Broaden proposal review. Some research groups involve a wide range of reviewers when evaluating research proposals. SMEs, program staff, directors and other stakeholders may assist the research group's oversight body in a formalized, sometimes weighted, scoring process.

NETC could consider:

- Widening the circle of proposal reviewers to include SMEs, agency managers and implementers to increase the likelihood that project proposals will meet an identified need and produce implementable results.
- Revisiting NETC's current proposal review process to determine if application of a more extensive, weighted scoring process is needed.

Key Research Program Participants

Build up executive engagement. While only four respondents noted that executive engagement was a priority, a few offered examples of how to encourage active participation of member agency leaders. Joint Transportation Research Program's focus groups are led by members of the executive staff or senior directors. These groups are organized around subject areas and meet every year to encourage staff, professors, industry representatives and others to submit research ideas.

NETC could consider:

- Establishing new groups organized around subject areas that jump-start the gathering and prioritizing of research ideas. Each group could be led by representatives from member agency leadership.

Tap SMEs for key advisory roles. More than three-quarters of the research groups responding to the survey employ SMEs in an advisory role or as an implementer.

NETC could consider:

- Developing a roster of SMEs in each member agency that is updated continually with staff members who are well-positioned to advise on potential research and participate in implementing research results in their agencies.
- Formally tasking selected SMEs with a first level of review of potential research topics and/or proposals before the TAAC considers them. (This mirrors current practices by the Traffic Safety Culture pooled fund and National Center for Sustainable Transportation UTC.)

Involve universities and their researchers in result dissemination. All research groups except one involve their university researchers in disseminating research results. This provides another network than can be tapped to ensure research results are widely shared.

NETC could consider:

- Establishing a standard practice to engage with the university and affiliated researcher upon completion of a research project to ensure that research results are shared within the university's communication network and with its partners.

Expand participation in NETC to include nonvoting interested parties. The program administrator for the Traffic Safety Culture pooled fund actively solicits participation in the pooled fund's activities by interested parties from relevant national committees, local agencies, nonprofits and federal agencies. These individuals do not participate in decision-making but can provide valuable perspective that informs the pooled fund's efforts.

NETC could consider:

- Seeking the participation of interested parties throughout New England, including representatives from professional associations and industry and other New England transportation practitioners. These participants could play an important role in advocating for implementation of NETC's research results.

Implementing Research

Keep implementation at the forefront. Nearly half of respondents require research need statements to address implementation. Other groups keep implementation in mind when specifying project deliverables or follow up after projects conclude to assess implementation progress.

NETC could consider:

- Focusing on implementation prior to soliciting research needs statements.
  - Facilitate one or more SME groups to help identify critical research needs with solutions that can be readily implemented.
  - Identify those needs in the call for research so proposers are providing research ideas with an associated implementation plan that solves real problems.
- Revisiting NETC's approach for problem statement submitters to address implementation in their submissions. Emphasize the need for practical and implementable research.
- Revisiting NETC's requirement for proposers to include an implementation plan in project proposals.
  - Develop implementation guidelines that must be applied for most projects. (Some projects may meet other needs and will not result in implementable results.)
- Setting aside specific funding for implementation projects.
- Developing and funding implementation projects that follow up on selected NETC research results or other research findings.
- Developing a standard practice to highlight implementation efforts in NETC publications and resources (technical briefs, annual or other periodic reports, news items and postings on the NETC website).

Use committees to provide structure to the implementation effort. Nearly half of respondents support an implementation committee or other group that oversees and encourages implementation of research findings.

NETC could consider:

- Establishing program- or project-level implementation committees. (Almost two-thirds of respondents to the internal surveys of agency managers and implementers and SMEs reported interest in serving on such a committee.)
  - These committees can focus on advancing implementation-related activities (testing, pilot projects, specifications) in member states.
- Developing an implementation tracking tool to encourage preparation for implementation while a project is underway and track implementation after a project concludes.
  - Report on implementation activities at set time frames after a project concludes (six months, one year, two years or five years).

Research Project Deliverables

Require or prepare a collection of project deliverables. All but one of the research groups surveyed require researchers to submit a final report. Most also require quarterly progress reports, PowerPoint presentations and webinars.

NETC could consider:

- Continuing to require a final report, fact sheet, poster and webinar for each research project.
- Developing new types of deliverables such as videos, two-page technical or policy briefs, or a social media communication plan for all or selected projects. (These products can be required of researchers or prepared by consultants.)
- Finding new ways to use project deliverables to share research results with member agency staff and beyond.

Provide guidance on compliance-related issues. Approximately two-thirds of respondents require researchers to address accessibility issues identified in Section 508 of the Rehabilitation Act of 1973 as amended in 1998. A similar percentage requires researchers to address data sharing and intellectual property issues in final deliverables.

NETC could consider:

- Providing additional support to researchers for preparing final project deliverables that meet Section 508 requirements.
    - Develop a Section 508-compliant research report template and accompanying guidance for researchers' use.
- Investigating other research groups' practices for addressing data sharing, intellectual property and other compliance-related issues to identify possible changes to NETC guidance for researchers.

Disseminating Research Results

Cast a wide net when sharing research results. Research groups share research results using an array of outreach methods, most typically through their websites, technical briefs, webinars and posting new projects in TRB's RiP database. Respondents also publish periodic news items and share research findings during annual forums.

NETC could consider:

- Developing new ways of disseminating research information, such as technical briefs, email blasts, newsletters, social media communication plans, and presentations at meetings or conferences. Different outreach methods can target different audiences—transportation agency practitioners, NETC member agency decision-makers and staff, and the public.
    - Develop a standard template and protocol for preparing and distributing news items; send these news items to NETC's mailing list. Identify ways to increase membership on the NETC mailing list.
    - Spread the word about the revamped website to member agency managers, implementers and SMEs to elicit greater interest in its use.
        - Consider further website enhancements such as the search tool developed for Clear Roads (Research by Topic) that allows users to easily locate and learn about completed and in-progress research.

- Develop a quarterly or annual report that highlights NETC activities.
  - Longer-format piece might be similar to at-a-glance publications produced by state DOT research programs that summarize program results (8 to 20+ pages).
  - Shorter-format piece could highlight a few significant activities or research efforts (2 to 4 pages).

Focus marketing efforts on webinars. Webinars were frequently cited by the research groups surveyed as one of their key practices to disseminate research results. Webinars also rated highly among NETC SMEs as an effective form of outreach, but relatively few SME respondents reported attending one.

NETC could consider:

- Preparing a standard news item or other marketing-oriented message that can be distributed to inform NETC member agency staff and others of project closeout webinars—how they can attend one and where the recordings are posted on the NETC website.
- Developing webinars on other topics of interest to NETC member agencies that are not tied to a specific research project.

Use forums, peer exchanges and symposiums to share research results. Cited by the Western States Rural Transportation Consortium respondent as one of its program successes, the annual Technology Implementers Forum serves as a vehicle for the exchange of high-quality technical information and helps promote implementation of the group's research. Similarly, NETC SMEs gave technical peer exchanges the highest effectiveness rating among the various forms of NETC outreach. The next most preferred method of outreach was SME symposiums.

NETC could consider:

- Issuing multiple and varied communications announcing the 2021 NETC Symposium to bring in new participants.
- Convening more peer exchanges or other virtual meetings (coffee talks, periodic mini-symposiums).
- Bringing member states together using a collaborative meeting format. This could take the form of regional meetings that engage participants in brainstorming, work sessions and discussion of recent research findings.

Appendix A
Survey Questions

The survey below was distributed to 27 research groups from five respondent categories:

- Other consortiums (Eastern Transportation Coalition)
- Regional general research pooled funds
- Specific research area pooled funds
- Regional university transportation centers (UTCs)
- National UTCs

Administering the Research Program

1. Does your research group maintain an advisory board, council or committee that oversees the general administration of your research program?
    - No
    - Yes (Please briefly describe this board, council or committee and its activities.)
2. Please describe your research group's primary research-related activities by selecting all that apply.
    - Funding and overseeing original research in all topic areas
    - Funding and overseeing original research that addresses topics of national interest
    - Funding and overseeing original research that addresses regional issues
    - Funding and overseeing original research that addresses the research group's focus areas
    - Funding efforts that assist member agencies in complying with state, regional or national mandates
    - Funding projects that implement our own research findings
    - Funding projects that implement research conducted outside our consortium
    - Other (Please describe.)
3. Does your research group solicit or encourage **engagement by executive-level staff** of member agencies?
    - No
    - Yes (Please respond to **Question 3A**.)

3A. Is it a priority to have executive engagement in your research program?

- No
- Yes

4. Does your research group have a formalized process to solicit or encourage participation by **subject matter experts (SMEs)**?
    - No
    - Yes (Please describe this process.)
5. What role(s) do SMEs play? Please select all that apply.
    - Advisor
    - Coordinator
    - Facilitator
    - Implementer
    - Mentor
    - Project lead
    - Technical committee chair
    - Technical committee member
    - Other (Please describe.)
6. How does your research group solicit participation by **member agency staff** in research project oversight?
7. What role(s) do **universities and affiliated researchers** play in your research program? Please select all that apply.

- Advisor
- Author
- Coordinator
- Presenter
- Project creator
- Project solicitor
- Researcher
- Result dissemination
- Not applicable
- Other (Please describe.)

8. What role(s) do **consultants from private firms** play in your research program? Please select all that apply.
    - Advisor
    - Author
    - Coordinator
    - Presenter
    - Project creator
    - Project solicitor
    - Researcher
    - Result dissemination
    - Not applicable
    - Other (Please describe.)
9. What role(s) do **representatives from industry and professional organizations** play in your research program? Please select all that apply.
    - Advisor
    - Author
    - Coordinator
    - Presenter
    - Project creator
    - Project solicitor
    - Researcher
    - Result dissemination
    - Not applicable
    - Other (Please describe.)
10. Has your research group been successful in engaging partners (for example, an environmental or public health agency, regulatory agency or professional organization) to participate in your research program?
    - We haven't tried to engage these groups and have no interest in doing so.
    - We haven't tried to engage these groups, but we're interested in doing so.
    - We tried to engage partners but were unsuccessful.
    - We've been successful in engaging with partner agencies.
11. If applicable, please describe your efforts to engage partners in your research program and the outcome of these efforts.

Selecting and Prioritizing Research

1. Has your research group developed a research roadmap that guides the selection of research projects?
    - No
    - Yes (Please briefly describe the roadmap. Please also provide a link to the roadmap or send any files not available online to chris.kline@ctcandassociates.com.)
2. Please describe how your research group identifies research needs by selecting all that apply.
    - We establish research focus areas for each research cycle and post them for researchers and staff to review.
    - We require a member agency representative to sponsor every research need or problem statement submitted.
    - We accept research ideas from university and private consultant researchers without member agency sponsorship.
    - We accept research ideas from university and private consultant researchers only if they include a member agency sponsor.
    - We accept any research need or problem statement submitted.
    - We accept research need or problem statements at only one specified time each year.

- We accept research need or problem statements at multiple specified times each year.
- We accept research need or problem statements at any time throughout the year.
- Other. (Please describe.)

3. When prioritizing research, how does your research group balance member agency needs?
4. Does your research group use a formalized prioritization process when selecting research projects to fund?
    - No
    - Yes (Please briefly describe this process.)

Managing Research Projects

1. Does your research group use its advisory board, council or committee to monitor the progress of individual research projects?
    - Yes
    - No (Please describe why not.)
2. How frequently do the technical committees overseeing research projects meet over the life of the project? Please select all that apply.
    - Monthly
    - Quarterly
    - Milestones (project kickoff, task completion)
    - Beginning and end of project
    - Midproject and project conclusion
    - Reviews of major deliverables
    - Other (Please describe.)

Implementing Research

1. Does your research group require research need or problem statements to address implementation?
    - No
    - Yes (Please describe how submitters are advised to address implementation.)
2. Are the researchers approved for funding required to submit an implementation plan?
    - No
    - Yes (Please indicate who is responsible for submitting the implementation plan and when it is submitted.)
3. Does your research group support an implementation committee or other group responsible for overseeing and encouraging implementation of research findings?
    - No, and we have no interest in establishing one.
    - No, but we have interest in establishing one.
    - Yes. (Please describe the implementation committee or group.)
4. Has your research group formalized a practice to track the implementation of findings from the research projects you fund?
    - No
    - Yes (Please describe this practice.)
5. Does your research group maintain a separate source of funds or sponsor a solicitation effort specifically for implementation projects?
    - No
    - Yes (Please describe this funding or solicitation effort.)

6. Has your research group attempted to quantify research impacts?
    - No
    - Yes (Please briefly describe how you quantify research impacts.)

Research Project Communication

1. Please identify the deliverables researchers are required to submit by selecting all that apply.
    - Draft final report
    - Final report
    - Interim task reports
    - Monthly progress reports
    - One-page fact sheet
    - Poster
    - PowerPoint presentation
    - Quarterly progress reports
    - Social media posts
    - Technical brief
    - Webinar
    - Other (Please describe.)
2. Please identify the compliance issues your researchers are required to address when submitting final deliverables by selecting all that apply.
    - Accessibility (Section 508 of the Rehabilitation Act)
    - Data sharing
    - Intellectual property
    - Other (Please describe.)
3. Please identify the outreach your research group conducts to disseminate research results by selecting all that apply.
    - Annual report
    - Blog post
    - Email news item describing research results
    - Lunch and learn
    - Newsletter
    - One- or two-page technical brief
    - Posting new projects in Research in Progress database
    - Posting to social media
    - Providing publications for TRB's TRID database
    - Submitting final reports to National Transportation Library
    - Webinar describing completed research
    - Website
    - Other (Please describe.)

Appendix A
Survey Questions

Assessment and Future Plans

1. Please describe your research group's three greatest successes.
    - Success 1:
    - Success 2:
    - Success 3:
2. Please describe the three greatest challenges your research group has encountered in managing your research program.
    - Challenge 1:
    - Challenge 2:
    - Challenge 3:
3. Does your research group plan to make structural changes to the research program in the next few years?
    - No
    - Yes (Please briefly describe these plans.)

Wrap-Up

1. Please provide links to documents associated with your research group's policies, procedures, program administration, advisory or technical committee guidance, and staff and researcher training (other than those you have already provided). Please send any files not available online to chris.kline@ctcandassociates.com.

Please provide your contact information.

Name:
Research Group:
Your Organization:
Division/Title:
Email Address:

Thank you for participating! The information you've provided will be very helpful to NETC. Please click **SUBMIT** to transmit your responses.

Appendix B
Contacts

Pooled Funds: Regional Research

Southeast Transportation Consortium
Tyson Rupnow
Research Administrator
Louisiana Department of Transportation and Development/Louisiana Transportation Research Center
tyson.rupnow@la.gov

Western Alliance for Quality Transportation Construction
Scott Nussbaum
State Engineer, Quality and Materials
Utah Department of Transportation
snussbaum@utah.gov

Western States Rural Transportation Consortium
Sean Campbell
Division of Research, Innovation and System Information
California Department of Transportation
sean.campbell@dot.ca.gov

Leann Koon
Research Associate, Systems Engineering, Development and Integration
Western Transportation Institute/Montana State University
leann.koon@montana.edu

Jeremiah Pearce
Chief, Office of ITS Engineering and Support, District 2
California Department of Transportation
jeremiah.pearce@dot.ca.gov

Pooled Funds: Specific Research

Aurora
Tina Greenfield
Iowa Department of Transportation
tina.greenfield@iowadot.us

Clear Roads
Tom Peters
Engineer, Office of Maintenance, Research & Training
Minnesota Department of Transportation
tom.peters@state.mn.us

ENTERPRISE
Kirsten Seeber
CTC & Associates
kirsten.seeber@ctcandassociates.com

Superpave Regional Center, Southeastern Region
Nam Tran
Assistant Director
National Center for Asphalt Technology
nht0002@auburn.edu

Traffic Safety Culture
Sue Sillick
Research Manager
Montana Department of Transportation
ssillick@mt.gov

Appendix B
Contacts

Regional Research Groups

Joint Transportation Research Program
Tommy Nantung
Research and Development
Indiana Department of Transportation
tnantung@indot.in.gov

Virginia Transportation Research Council
Kevin McGhee
Associate Director, Research
Virginia Department of Transportation
kevin.mcghee@vdot.virginia.gov

Regional University Transportation Center

Transportation Infrastructure and Durability Center
James Bryce
Senior Program Manager
University of Maine
james.bryce@maine.edu

National University Transportation Center

National Center for Sustainable Transportation
Lauren Iacobucci
Institute of Transportation Studies/National Center for Sustainable Transportation
University of California, Davis
liacobucci@ucdavis.edu

Appendix D. Summary of TAAC Responses to Survey of Other Research Groups

Re-Creating NETC

Summary of TAAC Responses to Survey of Other Research Groups

Topic Area	Actions for NETC to Consider	Change (Y/N/NA)
General	Focus on big changes for NETC, not incremental changes to existing policies and procedures.	
Engaging Partners	Engage partner agencies (e.g., other state agencies, industry or professional organizations). Create a list based on expertise.	
	Engage the private sector to learn about what they are working on and how the work of NETC relates to their work.	
	Welcome participation of others outside member agencies in all aspects of NETC, except decision-making. Create a "friends of" NETC role.	
	Develop and foster a professional network.	
Focus Areas/Research Roadmap	Establish focus areas for the research cycle. Consider focus areas developed by executive staff/senior directors.	
	Use a Research Roadmap to identify research needs. Review recent NCHRP Roadmap project.	
Focus Groups	Organize focus groups (staff, professors, industry representatives and others) to meet yearly to submit research Ideas.	
	Find out if more narrowly focused pooled fund studies that generate research ideas/needs through focus groups (state reps or SMEs) lead to better implementation and impact.	
Implementation	Strengthen Research Problem Statement form to include how the technical champion would envision practical implementation of the project.	
	Consider creating an impact plan to show how a project can have impact, even if it is not implemented.	
	Develop an implementation policy (i.e., set up committee, survey TC Chair for X years, provide funding, other staff involvement).	
	If implementation plans are done by the research teams, they should get TC's input to ensure the plans are implementable at the agencies.	
	Consider an implementation committee that focuses solely on implementing NETC research results.	

Topic Area	Actions for NETC to Consider	Change (Y/N/NA)
Implementation	Separately solicit/fund implementation efforts. Establish a separate source of funds for implementation.	
	Track implementation longer (two to five years). Determine the cost-benefit ratio for implementation.	
	Consider implementation successful if it happens at some states, if not all.	
	Find out if pooled fund studies that help states meet national mandates have a better record of implementing research results and meeting state DOT needs.	
Outreach	Identify rising stars within the agency to attend new committee to enhance the agencies'/NETC's research programs.	
	Establishing agency-level committees would be difficult given how busy agency staff are. Utilize agencies' existing research advisory groups to encourage participation in NETC activities.	
	Promote NETC at national meetings/events.	
Project Deliverables	Discontinue final reports. Go with easier-to-read phased reports or a brief final summary. Depending on the topic, encourage the TC to determine what deliverable would make it into their agency for immediate impact and use.	
Research Needs	State specific research topics in the Research Problem Statement solicitation to generate statements that address identified needs. Still allow for statements on any topic.	
	Engage chief engineers to determine hot topics/potential areas of research.	
Research Process	Institute a year-round research process.	
Research Projects	Consider small-scale research projects to serve as proof of concept.	
Subject Matter Experts	Establish/facilitate SME groups to discuss common concerns and identify critical research needs that are readily implemented.	
	Have SMEs on an Advisory Committee subcommittee.	
	Develop a roster of SMEs but find an easy way to keep it updated.	
	Increase pool of SME research problem statement reviewers at individual agencies.	
Technical Committees	Survey TC members 6 to 9 months into a project about how it's going, the value of the project to their state, their contribution to the project, implementation opportunities at their state, etc.	
Technology Transfer	Publicize research impacts.	
	Develop a two-page brief for tech transfer.	
	Target groups that would benefit most from NETC research when disseminating research results.	
	Target universities with tech transfer activities.	
	Consider putting additional efforts into project webinars, including format and promotion.	

Topic Area	Actions for NETC to Consider	Change (Y/N/NA)
Workforce Development	Support industry associations to assure qualified personnel for transportation workforce.	
	Promote educational opportunities.	
	Document impact on students that have transitioned from NETC projects into transportation industry employment.	
Challenges	Staffing time/turnover of staff during multiyear project; sustaining engagement of TC members; and keeping the intended direction of multiyear projects when the original project team and board members are no longer part of the research program.	
Follow-Up	Follow up with three consortiums that anticipate structural changes in the next few years.	

Appendix E. Summarizing TAAC Feedback Regarding Possible Changes for NETC

NEW ENGLAND TRANSPORTATION CONSORTIUM

Re-Creating NETC

Task Memorandum 3

Summarizing TAAC Feedback Regarding Possible Changes for NETC

Prepared for
New England Transportation Consortium

Prepared by
CTC & Associates LLC

August 17, 2021

ctc & associates llc

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Executive Summary

New England Transportation Consortium (NETC) uses a regional approach to develop innovative solutions to common transportation issues in the New England states. Transportation research needs have evolved since NETC was formed more than 30 years ago, and to ensure the consortium's current goals, vision and mission address issues that are most important to the New England region today, the consortium is conducting a self-evaluation that will inform efforts to reformulate its purpose, composition and specific role. The actions identified through the Re-Creating NETC research effort will allow NETC to continue to work effectively for member states while capturing important regional research needs.

In previous Re-Creating NETC tasks, online surveys sought information from NETC agency stakeholders and other research groups. These surveys queried respondents on staff members' experiences with NETC and their expectations and recommendations for NETC's future efforts, and examined other research groups' experiences with administering a research program, selecting and prioritizing research, managing research projects, implementing research and communicating research results.

Equipped with these survey findings, NETC's Transportation Agency Advisory Committee (TAAC) members and selected colleagues came together on June 30, 2021, to discuss possible actions NETC could take and move toward consensus on the types of changes NETC will pursue.

Characterizing the Changes Needed for NETC

When asked if NETC should focus on big changes rather than smaller incremental changes, three-quarters of participants want to see big changes for NETC. TAAC participants want to expand outreach, explore opportunities to promote NETC to a wider audience, and sharpen NETC's focus on a range of issues, including implementation and issues specific to the Northeast.

Ranking and Assessing Thematic Areas

Participants ranked the importance of the following thematic areas that could guide NETC's future:

- Research
- Implementation
- Subject matter expert (SME) and other stakeholder engagement
- Tech transfer, outreach and project deliverables
- Workforce development

The rankings indicated a clear interest in implementation and research, with implementation ranking first, just slightly ahead of research. SME and other stakeholder engagement was a more distant third, followed closely by tech transfer, outreach and project deliverables. Workforce development ranked a lagging fifth.

Possible actions to change course or expand on NETC's current focus on research were presented in each of the six thematic areas identified above. TAAC participants assessed each possible action using a rating scale of 1 (strongly disagree) to 5 (strongly agree), with 3 being the neutral position. The general principles below allow for a quick assessment of average ratings:

- An average rating **between 1 and 3** means respondents had a **more negative view** of the possible action.

- An average rating of **3** means respondents had a **neutral view** of the possible action.
- An average rating of **more than 3** means respondents had a **more positive view** of the possible action.

NETC's Current Research Focus

To gain a better understanding of how strongly the TAAC prefers a continued focus on research, TAAC participants responded to the following statements before considering specific possible actions:

- *NETC should move away from conducting research and focus on totally new activities.* **(average rating of 2.3)**
- *NETC should continue conducting research, but research should receive less funding to allow NETC to focus on other things.* **(average rating of 3)**

These ratings indicate that the TAAC isn't ready to move completely away from research, which is consistent with its ranking of research as the second-most important thematic area. The TAAC also expressed a neutral view toward setting aside funding for other activities.

Summarizing Each Thematic Area

Below is a brief summary of TAAC participants' assessment of the thematic areas discussed during the June 30 meeting. (The meeting concluded before participants could wrap up discussion with regard to project deliverables. Participants also did not address the possible actions NETC could take in the area of workforce development, the lowest ranked thematic area.)

Research. Participants rated most highly the relatively easy-to-implement action of more frequent engagement with Technical Committee (TC) members. TAAC participants also discussed conducting a year-round project solicitation (mixed views), developing research roadmaps (not a significant level of support), requiring unanimous approval before funding a new project (greater interest) and working with an on-call contractor to provide services in connection with quick turnaround projects (greater interest).

Implementation. Of all the thematic areas under consideration by the TAAC, implementation ranked highest, just slightly ahead of research, but participants gave the possible actions associated with this theme mixed reviews. There is little interest in establishing a formal implementation committee, but participants do want to focus on implementation in other ways, such as developing an implementation policy and requiring an implementation/impact plan. Participants had differing views on the benefits of establishing a separate funding source for implementation.

Subject Matter Expert and Other Stakeholder Engagement. All the possible actions in this area received positive-leaning average ratings. Highest rated was the establishment of SME groups to discuss common concerns and research needs. Participants viewed other formal gatherings of SMEs and other stakeholders positively, along with greater engagement of SMEs in identifying research needs and participating in the development of research need statements. Participants also indicated interest in expanding engagement with friends of NETC and partner agencies.

Tech Transfer and Outreach. High average ratings in this area indicate the TAAC's interest in ramping up current communication and outreach efforts. Publicizing research impacts within NETC agencies and beyond was among the highest rated activities across all thematic areas. Discussion in this area tended to overlap with the next thematic area—project deliverables. Participants recommended expanding researchers' deliverables to include a brief recorded presentation that provides project highlights,

developing a method to track and highlight tech transfer successes, and telling a story about research that resonates with the public.

Project Deliverables. After rating six possible actions, expiration of the June 30 meeting time cut short participants' follow-up discussion. Participants gave both the highest and lowest ratings across all thematic areas to possible actions associated with project deliverables. TAAC participants are clearly not interested in focusing more attention—or funding—on project webinars. At the other end of the spectrum, participants are united in their interest in elevating the quality of deliverables, expanding the current suite of researchers' deliverables to include ready-to-implement products, and implementing changes that make final reports more useful.

Highest and Lowest Ratings

Summarized below are the highest- and lowest-rated possible actions the TAAC considered during the June 30 meeting.

The **highest-rated** possible actions (one-third of the 25 actions TAAC participants rated):

- 5 Requiring researchers to develop ready-to-implement deliverables. (*Project Deliverables*)
- 5 Reimagining final reports to make them more useful and easier to read. (*Project Deliverables*)
- 5 Assessing current deliverables to elevate quality and expand offerings. (*Project Deliverables*)
- 4.4 Focusing on publicizing research impacts within NETC agencies and beyond. (*Tech Transfer and Outreach*)
- 4.4 Engaging TC members more often to assess research in progress. (*Research*)
- 4.1 Establishing SME groups to discuss common concerns and research needs. (*SME and Other Stakeholder Engagement*)
- 4 Providing funding for research teams to present at conferences. (*Project Deliverables*)
- 4 Identifying agency rising stars to participate in NETC committees. (*SME and Other Stakeholder Engagement*)

The **lowest-rated** possible actions:

- 1 Providing more funding for project webinars to enhance the format and expand promotion. (*Project Deliverables*)
- 2.3 Developing an implementation committee focused on NETC research results. (*Implementation*)
- 3 Calculating implementation benefit–cost ratios. (*Implementation*)
- 3 Developing two-page briefs for projects. (*Project Deliverables*)

Conclusions and Next Steps

Readily implemented next steps were identified for each thematic area discussed to some degree during the June 30 meeting. These next steps are based on participants' discussion and recommendations for NETC. (Time constraints did now allow for any discussion of workforce development, ranked last among the thematic areas under discussion. Next steps are not identified for that thematic area.)

A comprehensive list of readily implementable next steps across all thematic areas begins on page 18. These next steps are organized into the following topic areas:

- Research cycle
- Project deliverables
- Implementation
- Outreach

While the readily implemented next steps arising from the TAAC's June 30 discussion are reflective of the types of big changes participants said they wanted for NETC (being more flexible and nimble, expanding outreach, sharpening NETC's focus on implementation), it is unlikely that these changes—considered individually or taken collectively—would be considered "big" changes. While these smaller, more incremental changes are unlikely to significantly alter NETC's current mission or direction, if successful, they could advance NETC's goal of enhancing its effectiveness and better serving its member agencies.

Next Steps

The TAAC and its colleagues are slated to discuss the findings presented in this task memo during an August 19 meeting. The desired result of that meeting is consensus on a list of actions the TAAC will undertake to move forward as it re-creates NETC. The TAAC is expected to implement these actions and monitor them over a limited period of time to assess their impact. If the TAAC determines that the new policies, procedures and practices are producing valuable results, NETC's consultant will formally document the changes in NETC's Policies and Procedures manual.

Funding to pursue the changes the TAAC identifies may be provided, in part, by the limited funds remaining on the Re-Creating NETC contract. Additional funds may be obtained through a new implementation funding source set aside by NETC or a follow-on project proposed and approved by the TAAC.

1 Introduction

New England Transportation Consortium (NETC) uses a regional approach to develop innovative solutions to common transportation issues in the New England states. Transportation research needs have evolved since NETC was formed more than 30 years ago, and to ensure the consortium's current goals, vision and mission address issues that are most important to the New England region today, the consortium is conducting a self-evaluation that will inform efforts to reformulate its purpose, composition and specific role. The actions identified through the Re-Creating NETC research effort will allow NETC to continue to work effectively for member states while capturing important regional research needs.

After reviewing the results of surveys of NETC agency stakeholders and other research groups, TAAC members and their colleagues came together on June 30, 2021, to move toward consensus on the types of changes the pooled fund will pursue.

This report presents highlights of the June 30 meeting. After considering two overarching questions that examined their expectations for NETC's continued focus on research, participants examined six thematic areas informed by the surveys and TAAC meeting discussions. Possible actions NETC could take to shift its focus or enhance current efforts were grouped within each theme. Extensive use of Mentimeter with anonymous polling encouraged input from all participants.

In the sections below, findings in each thematic area are followed by several readily implemented next steps that reflect TAAC feedback. The report's Conclusions and Next Steps section, beginning on page 17, presents a comprehensive list of the actions NETC can take to enhance its effectiveness and better serve its member agencies.

2 Characterizing the Changes Needed for NETC

When asked if NETC should focus on big changes rather than smaller incremental changes, three-quarters of meeting participants want to see big changes for NETC (see Figure 1).

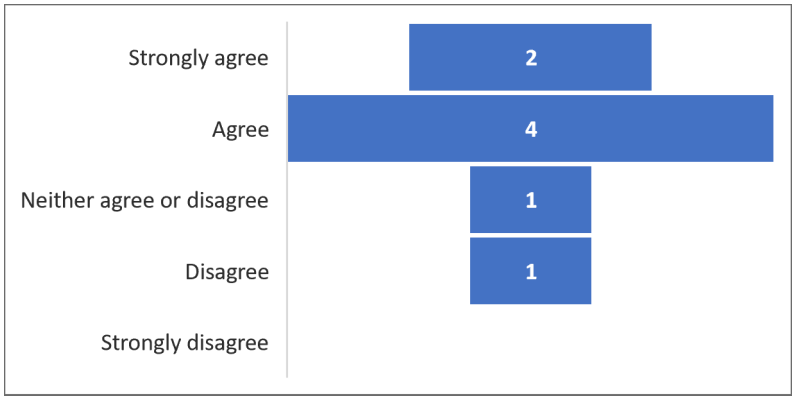

Figure 1. *Query*: Should NETC focus on big changes rather than smaller incremental changes to policies and procedures?

The TAAC briefly described the big changes they'd like to see:

- Be more flexible and nimble

- Expand outreach; explore opportunities to promote NETC to a wider audience
- Sharpen NETC's focus on:
    - Implementation with a limited role for research.
    - Issues specific to the Northeast.
    - Critical issues identified by agency leadership or subject matter experts (SMEs) that will inform development of research need statements.

3 Ranking Thematic Areas

TAAC participants ranked the following thematic areas that could guide NETC's future:

- Research
- Implementation
- SME and other stakeholder engagement
- Tech transfer, outreach and project deliverables
- Workforce development

Figure 2 provides a graphical representation of responses, which indicate a clear interest in implementation and research, with implementation ranking first, just slightly ahead of research. SME and other stakeholder engagement was a more distant third, followed closely by tech transfer, outreach and project deliverables. Workforce development ranked a lagging fifth.

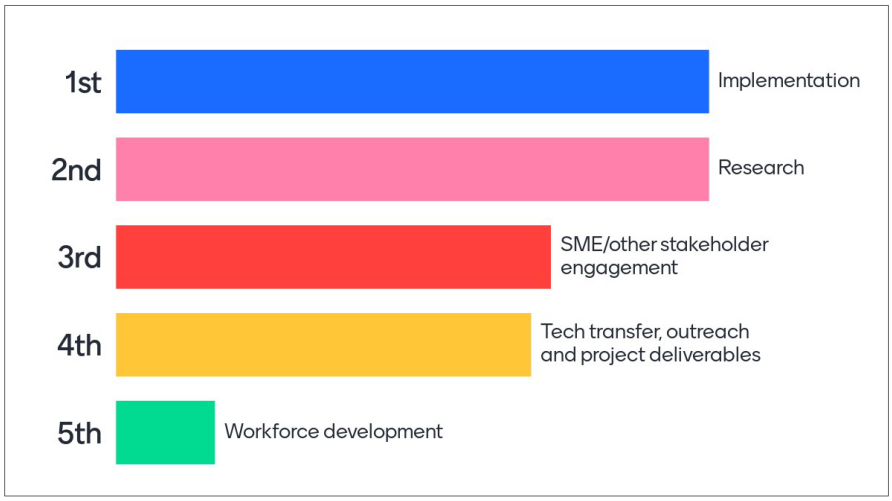

Figure 2. *Query*: Please rank the thematic areas that could guide NETC's future.

4 Assessing Each Thematic Area

A more extensive examination of each thematic area followed the general ranking. For each of six thematic areas identified above, TAAC participants were presented with possible actions they might consider to change course or expand on NETC's current focus, and asked to rate each possible action using a rating scale of 1 (strongly disagree) to 5 (strongly agree), with 3 being the neutral position. The sections that follow present each of the six thematic areas with the possible actions considered by TAAC participants and the average ratings generated by their responses.

The general principles below allow for a quick assessment of average ratings:

- An average rating **between 1 and 3** means respondents had a **more negative view** of the possible action.
- An average rating of **3** means respondents had a **neutral view** of the possible action.
- An average rating of **more than 3** means respondents had a **more positive view** of the possible action.

5 Theme: Research

5.1 NETC's Current Research Focus

NETC has focused on research since its inception more than 30 years ago. To gain a better understanding of TAAC preferences with regard to the current research focus, participants were asked to respond to the following statements before considering specific possible actions:

- *NETC should move away from conducting research and focus on totally new activities.* **(average rating of 2.3)**
- *NETC should continue conducting research, but research should receive less funding to allow NETC to focus on other things.* **(average rating of 3)**

These ratings indicate that the TAAC isn't ready to move completely away from research, which is consistent with its ranking of research as the second-most-important thematic area. The TAAC also expressed a neutral view toward setting aside funding for other activities.

5.2 Possible Actions for the TAAC to Consider

TAAC participants rated all four possible actions identified in Figure 3 positively, with a relatively easy-to-implement action ranking highest (more frequent engagement with Technical Committee (TC) members received an average rating of 4.4).

When asked about other significant changes the TAAC might make in the area of research, each TAAC participant posted comments individually and then participated in a group discussion. The following summarizes the posts and follow-up discussion.

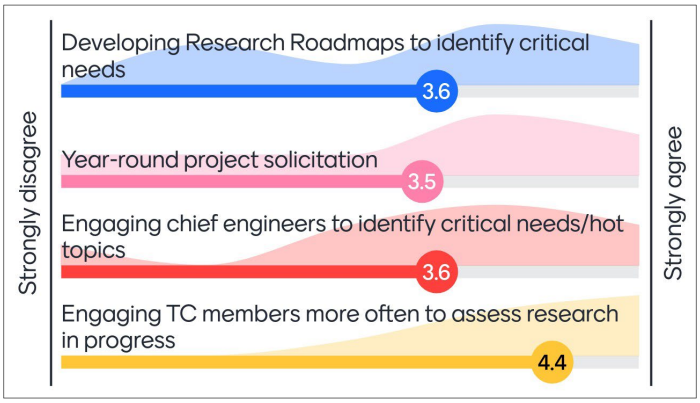

Figure 3. Average Ratings for Research-Related Activities the TAAC Might Consider

Program Administration

- Simplify program administration.
- Ensure that NETC is adding value.
- *Implementation*. Shift focus to implementation; add a focus on mass transit.
    - Make sure implementation is part of the planning process; require a plan to use the research results.
- *On-Call Contractor.* Consider working with an on-call contractor to provide services for quick turnaround projects. Such a contract would allow NETC to issue project-specific task orders with a limited dollar amount per order.

Project Solicitation and Selection

- *Year-Round Solicitation.* While participants viewed year-round solicitation fairly positively (3.5 average rating), they also recommended retaining the current solicitation cycle but changing its timing so SMEs are not tasked with reviewing problem statements for NETC research when also reviewing potential project submissions for other research programs.
    - An annual solicitation simplifies administration and allows NETC to monitor funds dispersal throughout the year.
- *Developing Research Need Statements*
    - Require development of research need statements by the participating agencies, not researchers.
    - Encourage joint submission of problem statements by multiple states, especially from technical sponsors.
    - Solicit for short-term, focused, smaller research efforts that solve problems and address hot topics.
- *Engaging Chief Engineers (CEs).* While participants rated engaging with CEs to identify hot topics positively (3.6 average rating), SMEs may be better suited to providing this level of feedback or guidance. Participants posed this question: Are the best ideas generated from the top down or bottom up?
- *Research Roadmaps.* While development of a research roadmap received a positive average rating of 3.6, TAAC discussion reflected differing perspectives:
    - Participants noted that roadmaps may not be followed, and research areas are often too dynamic to make the roadmapping effort worthwhile.
    - NETC might benefit from the specific topic-area roadmaps developed by National Cooperative Highway Research Program (NCHRP), Federal Highway Administration and other research groups.
    - A research roadmap could be developed in tandem with CE engagement, with the CE identifying general topics of interest and an SME providing details.
- *Unanimous Approval.* Require that all projects selected for funding receive the votes of all members of the TAAC, not just a majority.

Project Management

- *Engaging SMEs on the TCs*
    - Coordinate and collaborate with SMEs to implement research results and respond to national mandates. SMEs are critical to getting things implemented.
    - Survey TC members regularly as a project unfolds (similar to the highest-ranking activity among the possible actions described above) and commit to addressing feedback, as needed.
    - Track state-by-state participation to ensure all participating states provide data. Consider adjusting the scope and budget if SMEs are not able to fully participate in a data-driven project.
    - Make sure there are enough junior TC members for each participating state who can step in as more senior staff retire or move to other positions.
- *Final Deliverables.* Focus on an actionable final deliverable, not final reports that "collect dust."

5.3 Readily Implemented Next Steps

The following next steps are informed by the TAAC's recommendations and can be readily implemented:

- **Program Administration**. Investigate the possibility of implementing an on-call contract to conduct quick turnaround projects.
- **SME Engagement**
  - Develop a procedure that has the TAAC engaging with TC members more often to assess research in progress.
  - Develop a procedure that describes how CEs and SMEs can participate in the development of research ideas and research needs statements. Include step-by-step instructions and a sample research need statement.
- **Solicitation Cycle**
  - Modify the timing of the current solicitation cycle to not coincide with problem statement reviews for other research programs.
  - Provide the opportunity for submission of off-cycle research need statements the TAAC consider. (This approach allows for an extension of the current solicitation cycle without adopting a formalized year-round solicitation.)
  - Revise NETC policy to require unanimous approval to fund research projects and other NETC activities.

6 Theme: Implementation

6.1 Possible Actions for the TAAC to Consider

Of all the thematic areas under consideration by the TAAC, implementation ranked highest, just slightly ahead of research. While that initial ranking indicated a significant interest in implementation, TAAC participants did not view all of the six possible actions related to implementation positively.

Development of an implementation committee focused on NETC research results received the lowest rating in this area—a negative-leaning 2.3 average rating—and the second lowest in all thematic areas. Calculating benefit–cost ratios received the next lowest rating, coming in with the neutral average rating of 3. The remaining possible actions received relatively high average ratings, with maintaining a separate source of implementation funds rating highest among the other possible actions (3.9 average rating). Figure 4 presents all TAAC average ratings.

Figure 4. Average Ratings for Implementation-Related Activities the TAAC Might Consider

Each TAAC participant posted comments individually and then participated in a group discussion about other significant changes the TAAC might make with regard to implementation. The following summarizes the posts and follow-up discussion.

Program Administration

- *Implementation Policy*
  - Demonstrate NETC's recognition of the importance of implementation by developing a formal policy.
  - Ensure that all research need statements formally address implementation.
- *Implementation Plan.* Include such a plan in each project proposal. Participants embraced development of an implementation plan as a more effective approach than establishing a separate implementation committee.
  - Combine an implementation plan with an impact plan so the project will show value even if all states haven't implemented it.
  - Educate TC members on the value of an implementation plan and provide examples.
- *Facilitating Progress.* NETC's role should focus on facilitating progress by implementation and innovation backed by limited research.
- *Benefit–Cost Analyses.* Consider conducting analyses to demonstrate the benefits of research and identify the savings generated by implementing research results. (See NETC 17-2 Quick Response: Quantification of Research Benefits for one approach to conducting this type of analysis.)

Formalizing Implementation

- Establish a clear path between research and implementation, articulating it in research need statements and scopes of work: who, how, when.
- Engage more effectively with technical champions and SMEs to encourage implementation; leave implementation in the hands of SMEs and section heads.
- Define implementation and identify the steps needed to get something implemented.
- Include implementation-related questions on regular survey check-ins of TC members.
- Ensure that SMEs on the TCs see the need to implement research results and have the right environment and conditions to implement them.
- Identify during development of the scope of work deliverables that will lead to implementation (for example, specification language, contract standard drawing or a special provision).

Funding Implementation

- *Separate Source of Implementation Funds.* Maintaining a separate source of funds for implementation received a relatively high average rating (3.9), but participants offered differing opinions during group discussion. Proponents noted that a separate source of funds for implementation will:
  - Allow states to take research results to the next level, particularly when it's not clear from the outset how each state will use project results.
  - Put the focus on implementation and allow for a separate implementation project for activities that might have gotten lost in the course of the initial research project.
  - Encourage stakeholders to translate project results into specifications or other concrete deliverables with impacts to agency operations.

- Allow for funding of special implementation projects, separate from the initial research effort. While ideally implementation happens as a result of the research project, a separate source of funds could inspire an implementation effort for those projects that don't result in a readily implemented deliverable.

A participant voicing opposition to establishing a separate source of funds still expressed support for implementation and recommends considering implementation from the beginning of each project.

Expanding Implementation Focus

- Establish a separate solicitation for implementation funding and not necessarily for NETC projects.
- Consider reviewing unsuccessful implementation requests submitted to other research groups (Domestic Scan or NCHRP Implementation Support Program (NCHRP 20-44)) for funding through NETC.

Tech Transfer

- Present implementation and impact stories in NETC outreach efforts and on its web pages.

6.2 Readily Implemented Next Steps

The following next steps are informed by the TAAC's recommendations and can be readily implemented:

- **Implementation Policy**. Develop an implementation policy for inclusion in NETC's Policies and Procedures manual and make it available to potential research partners.
    - Adopt an associated new procedure that describes how to consider implementation throughout the life of a project—from the research idea to the research proposal to project closeout.
- **Program Administration**. Shift a portion of funds now directed to research to a separate funding source solely for implementation projects.
    - Adopt an associated new procedure that describes the types of implementation projects NETC is seeking (NETC-funded research only or expanded to include outside research efforts) and the solicitation cycle for this new funding source.
- **Implementation/Impact Plan**. Develop a template or model for an implementation/impact plan researchers will prepare as part of a project proposal. This practice will expand on NETC's current requirement for proposers to include an implementation plan in project proposals.
    - Adopt an associated new procedure that requires researchers to review and modify the plan over the life of the project.

7 Theme: Subject Matter Expert and Other Stakeholder Engagement

7.1 Possible Actions for the TAAC to Consider

All possible actions in this thematic area received positive-leaning average ratings (higher than 3). The highest rated possible action was the establishment of SME groups to discuss common concerns and research needs, with an average rating of 4.1.

This possible action, and identifying agency rising stars to participate in NETC committees (average rating of 4), were among the possible actions across all thematic areas rated highest by TAAC participants. Figure 5 presents all TAAC average ratings in this thematic area.

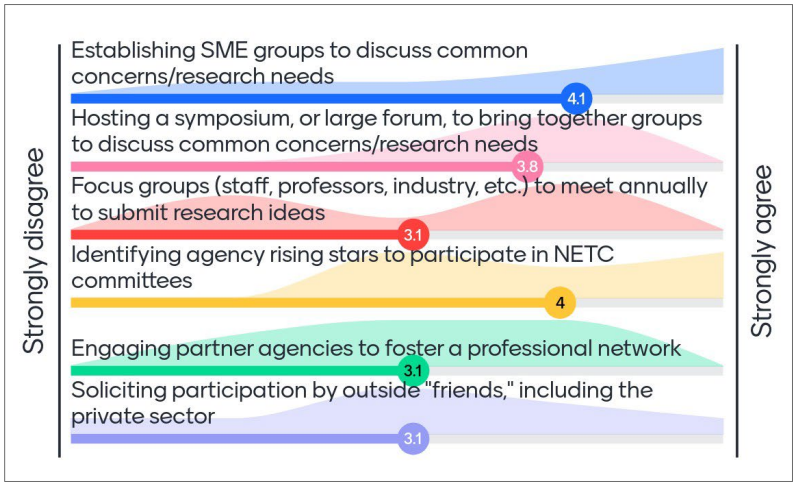

Figure 5. Average Ratings for SME and Other Stakeholder Engagement-Related Activities the TAAC Might Consider

Each TAAC participant posted comments individually and then participated in a group discussion about other significant changes the TAAC might make in the area of SME and other stakeholder engagement. The following summarizes the posts and follow-up discussion.

Acknowledge SME Participation

- Work with upper management and the Policy Committee to encourage and commend SME involvement in NETC activities.
- Develop practices to identify rising stars, which participants acknowledged can be difficult to do.

Engage With SMEs Using Meetings

- *In-Person Meetings*. Coordinate and provide funding for in-person working meetings of SMEs.
- *Meetings of Regional Transportation-Related Groups*
    - Develop a list of New England-based transportation groups and organizations that meet regularly. (TAAC members may already have such a list.)
    - Encourage SMEs to attend relevant meetings in New England and ask for agenda time to present NETC updates.

Engage With SMEs Using Focus Groups. Consider a formally planned event during which SMEs present research results, followed by coordinated breakout sessions with SMEs and university researchers.

Engage With SMEs Using Small-Scale Symposiums. Consider using small groups rather than a large forum to encourage the exchange of ideas. (TAAC participants noted that webinars are not an effective way to advance the exchange of ideas.)

Developing Research Need Statements

- Encourage SMEs to develop succinct research need statements during in-person working meetings. Recognize that elevating the importance of research among SMEs and generating research needs requires effort and attention.
- Develop a methodology for SMEs to follow in preparing a research need statement, scope of work and proposal.
- Ask SMEs to provide research ideas using the "sticky note approach"—the SME provides the general idea and another person or group takes the lead in preparing the research need statement.

NETC Friends and Partner Agencies

- Consider engaging with environmental groups, local agencies, power suppliers and others.
- Develop a list of friends of NETC to share information, conduct annual surveys, distribute stories of implementation and impacts, and provide lists of ongoing projects and activities.

Outreach

- Share significant project milestones to update SMEs and other stakeholders; consider developing a quarterly one-page newsletter distributed by email.
- Consider other ways to promote NETC with SMEs using a brochure or other marketing-type email.

7.2 Readily Implemented Next Steps

The following next steps are informed by the TAAC's recommendations and can be readily implemented:

- **SME Engagement**
    - Prepare a list of experienced TC participants (SMEs and others) to identify rising stars to inform development of a network of SMEs that can be used to solicit and provide support for new TC members.
    - Allocate funding for in-person meetings of SMEs from all member states.
    - Prepare a list of New England-based transportation groups and organizations that meet regularly. Share this list with the SME network and encourage their participation to discuss NETC research results.
    - Expand current guidance for SME members of TCs to provide background information on NETC in an easy-to-understand format; develop a welcome letter that outlines TC member responsibilities; and prepare a timeline and checklist of the NETC research cycle that shows critical dates. (Feedback provided by respondents to the survey of NETC agency stakeholders informed this next step.)
- **Other Outreach**. Develop a list of friends of NETC to share information, conduct annual surveys, distribute stories of implementation and impacts, and provide lists of ongoing projects and activities.
- **Research Ideas**. Develop a procedure that describes how CEs and SMEs can participate in the development of research ideas and research need statements. Include step-by-step instructions and a sample research need statement.

8 Theme: Tech Transfer and Outreach

8.1 Possible Actions for the TAAC to Consider

All three of the possible actions in this thematic area received fairly high average ratings (3.7 to 4.4). The highest-rated activity—publicizing research impacts within NETC agencies and beyond—was among the highest rated actions across all themes, along with three activities related to project deliverables (the thematic area addressed next). These high ratings reflect TAAC participants' interest in ramping up current communication and outreach efforts. Figure 6 presents all TAAC average ratings in this thematic area.

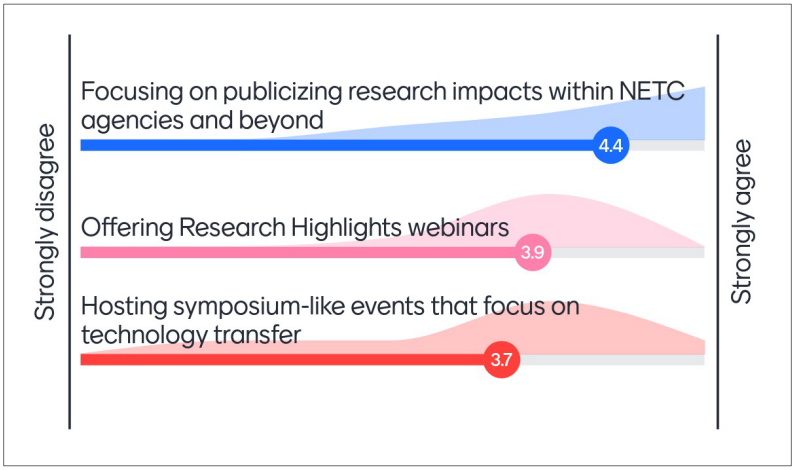

Figure 6. Average Ratings for Tech Transfer and Outreach-Related Activities the TAAC Might Consider

Each TAAC participant posted comments individually and then participated in a group discussion about other significant changes the TAAC might make in the area of tech transfer and outreach. The following summarizes the posts and follow-up discussion.

New Project Deliverable. Require researchers to record a brief presentation (less than 10 minutes) that describes the project need and who benefits, and presents a summary of project results and next steps. Presentations can be prepared using PowerPoint and recorded using virtual meeting software.

Tracking Tech Transfer

- Recognize that tech transfer is only the beginning to transfer technology and use it.
- Develop a method to track and highlight tech transfer successes; see below.
- Tell the story: Use examples of research efforts that have produced results that will be readily familiar to the public (for example, rumble strips). Tie the success of the research back to how it was proposed and conducted, and how the results impact daily life.

Opportunities for Outreach

- Offer an opt-in for interested parties to receive NETC listserv emails, website updates and solicitations.
- Reach out to a wider variety of related organizations and transportation professionals.
- Have a stronger presence at other organizations' events, particularly professional organizations.

- Coordinate the addition of NETC projects to TRB and AASHTO committee meeting agendas.
- Be ready to prepare project abstracts for submission to conferences at which the researcher can present findings.
- Provide funding in the research contract for researchers to make conference presentations. (This possible action appears in the next thematic area, Project Deliverables, and received a 4 average rating.)

8.2 Readily Implemented Next Steps

The following next steps are informed by the TAAC's recommendations and can be readily implemented:

- **Reconsider Suite of Project Deliverables**. Require researchers to record a brief presentation (less than 10 minutes) that describes the project need and who benefits, and presents a summary of project results and next steps.
- **Expand Outreach**
    - Develop a list of possible partners or friends of NETC to receive periodic NETC updates.
    - Track opportunities for NETC to present at other organizations' events.
    - Identify and document two or three success stories each year to illustrate the impact of NETC research. Develop one or more communication pieces describing these success stories to post on the NETC website, highlight in periodic news items or present in another manner that reaches a wide audience.
- **Track Outreach**. Develop a tracking mechanism that monitors tech transfer successes.

9 Theme: Project Deliverables

9.1 Possible Actions for the TAAC to Consider

This thematic area generated the greatest range in ratings for the possible actions NETC could take in reimagining its role, with both the highest and the lowest ratings recorded across all thematic areas. (The only 5 ratings were recorded in this area and the only 1 rating.)

TAAC participants are clearly not interested in focusing more attention—or funding—on project webinars, giving this action the lowest possible rating. At the other end of the spectrum, participants are united in their interest in elevating the quality of deliverables, expanding the current suite of deliverables to include ready-to-implement products, and implementing changes that make final reports more useful. Providing funding for research teams to present at conferences, addressed in the previous section, also rated highly. Figure 7 presents all TAAC average ratings in this thematic area.

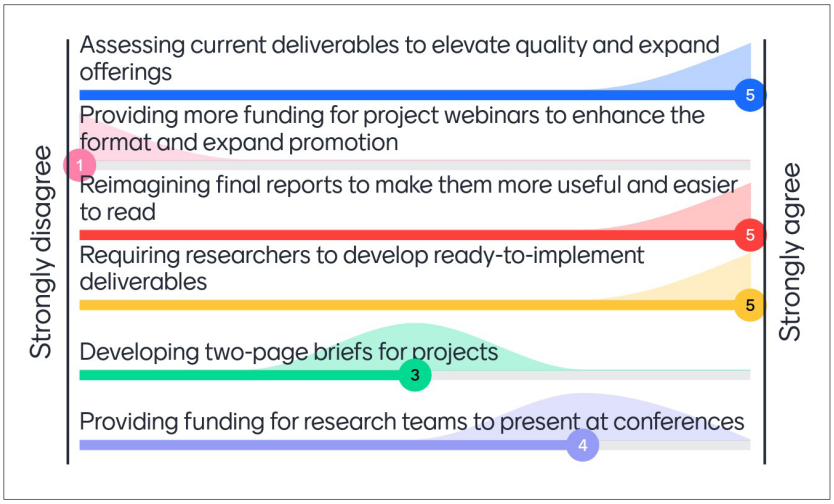

Figure 7. Average Ratings for Project Deliverable-Related Activities the TAAC Might Consider

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Note: The June 30 meeting concluded before the TAAC could wrap up discussion with regard to project deliverables. Participants also did not address the possible actions NETC could take in the area of workforce development, the lowest ranked thematic area.

9.2 Readily Implemented Next Steps

The following next steps are informed by the TAAC's recommendations and can be readily implemented:

- **Reconsider Suite of Project Deliverables**. Review current directives to researchers to identify opportunities to elevate the quality of project deliverables and ensure their relevance and readability. For those projects that will support it, ensure that the suite of deliverables identified in the research contract includes a product that can be readily implemented.
    - Develop guidelines and templates for researchers to increase the likelihood of compliance with new deliverable requirements.
- **Expand Outreach**. Review current guidelines and make the necessary revisions to provide funding for research teams to present project findings at conferences and other appropriate venues.

10 Conclusions and Next Steps

10.1 Conclusions

Below is a summary of the readily implementable actions NETC can take to begin the transformation of NETC to better meet member needs. These actions are based on the TAAC's thematic area assessments described in this task memo. Next steps are organized into the following categories:

- Research cycle
- Project deliverables

- Implementation
- Outreach

Research Cycle

- **Program Administration**
    - Investigate the possibility of implementing an on-call contract to conduct quick turnaround projects.
    - Shift a portion of funds now directed to research to a separate funding source solely for implementation projects.
        - Adopt an associated new procedure that describes the types of implementation projects NETC is seeking (NETC-funded research only or expanded to include outside research efforts) and the solicitation cycle for this new funding source.
- **Research Ideas**. Develop a procedure that describes how CEs and SMEs can participate in the development of research ideas and research need statements. Include step-by-step instructions and a sample research need statement.
- **Solicitation Cycle**
    - Modify the timing of the current solicitation cycle to not coincide with problem statement reviews for other research programs.
    - Provide the opportunity for submission of off-cycle research need statements the TAAC consider. (This approach allows for an extension of the current solicitation cycle without adopting a formalized year-round solicitation.)
    - Revise NETC policy to require unanimous approval to fund research projects and other NETC activities.

Project Deliverables

- **Reconsider Suite of Project Deliverables**
    - Require researchers to record a brief presentation (less than 10 minutes) that describes the project need and who benefits, and presents a summary of project results and next steps.
    - **Reconsider Suite of Project Deliverables**. Review current directives to researchers to identify opportunities to elevate the quality of project deliverables and ensure their relevance and readability. For those projects that will support it, ensure that the suite of deliverables identified in the research contract includes a product that can be readily implemented.
        - Develop guidelines and templates for researchers to increase the likelihood of compliance with new deliverable requirements.

Implementation

- **Implementation Policy**. Develop an implementation policy for inclusion in NETC's Policies and Procedures manual and make it available to potential research partners.
    - Adopt an associated new procedure that describes how to consider implementation

throughout the life of a project—from the research idea to the research proposal to project closeout.

- **Implementation/Impact Plan**. Develop a template or model for an implementation/impact plan researchers will prepare as part of a project proposal. This practice will expand on NETC's current requirement for proposers to include an implementation in project proposals.
    - Adopt an associated new procedure that requires researchers to review and modify the plan over the life of the project.

Outreach

- **SME Engagement**
    - Develop a procedure that has the TAAC engaging with TC members more often to assess research in progress.
    - Develop a procedure that describes how CEs and SMEs can participate in the development of research ideas and research needs statements. Include step-by-step instructions and a sample research need statement.
    - Prepare a list of experienced TC participants (SMEs and others) to identify rising stars to inform development of a network of SMEs that can be used to solicit and provide support for new TC members.
    - Allocate funding for in-person meetings of SMEs from all member states.
    - Prepare a list of New England-based transportation groups and organizations that meet regularly. Share this list with the SME network and encourage their participation to discuss NETC research results.
    - Expand current guidance for SME members of TCs to provide background information on NETC in an easy-to-understand format; develop a welcome letter that outlines TC member responsibilities; and prepare a timeline and checklist of the NETC research cycle that shows critical dates. (Feedback provided by respondents to the survey of NETC agency stakeholders informed this next step.)
- **Expand Outreach**
    - Develop a list of possible partners or friends of NETC to receive periodic NETC updates.
    - Track opportunities for NETC to present at other organizations' events.
    - Identify and document two or three success stories each year to illustrate the impact of NETC research. Develop one or more communication pieces describing these success stories to post on the NETC website, highlight in periodic news items or present in another manner that reaches a wide audience.
    - Review current guidelines and make the necessary revisions to provide funding for research teams to present project findings at conferences and other appropriate venues.
- **Track Outreach**. Develop a tracking mechanism that monitors tech transfer successes.
- **Other Outreach**. Develop a list of friends of NETC to share information, conduct annual surveys, distribute stories of implementation and impacts, and provide lists of ongoing projects and activities.

While the readily implemented next steps arising from the TAAC's June 30 discussion are reflective of the types of big changes participants said they wanted for NETC (being more flexible and nimble, expanding outreach, sharpening NETC's focus on implementation), it is unlikely that these changes—considered individually or taken collectively—would be considered "big" changes. While these smaller, more incremental changes are unlikely to significantly alter NETC's current mission or direction, if successful, they could advance NETC's goal of enhancing its effectiveness and better serving its member agencies.

10.2 Next Steps

The TAAC and its colleagues are slated to discuss the findings presented in this task memo during an August 19 meeting. The desired result of that meeting is consensus on a list of actions the TAAC will undertake to move forward as it re-creates NETC. The TAAC is expected to implement these actions and monitor them over a limited period of time to assess their impact. If the TAAC determines that the new policies, procedures and practices are producing valuable results, NETC's consultant will formally document the changes in NETC's Policies and Procedures manual.

Funding to pursue the changes the TAAC identifies may be provided, in part, by the limited funds remaining on the Re-Creating NETC contract. Additional funds may be obtained through a new implementation funding source set aside by NETC or a follow-on project proposed and approved by the TAAC.