

NYS DOT Research Peer Exchange

Creating an Effective
SPR Research Program

September 23-24, 2015
Albany, New York

FINAL REPORT

September 2016



NEW YORK
STATE OF
OPPORTUNITY.

Department of
Transportation

Disclaimer

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New York State Department of Transportation Research Peer Exchange September 23-24, 2015

Introduction

This following report summarizes the results of the New York State Department of Transportation (NYSDOT) State Planning and Research (SPR) research peer exchange held in Albany, New York, on September 23-24, 2015. Managers and staff from NYSDOT's Transportation Research and Development Bureau (TRDB) of the Engineering Division and the Research and Policy Studies Section (RPSS) in the Statewide Planning Bureau of the Policy and Planning Division hosted this peer exchange, which focused on ideas and approaches for creating and delivering an effective SPR research program.

Peer exchanges are a practical and effective tool to foster improvement and provide an opportunity for participants to share ideas, best practices and management innovations. This peer exchange was focused on the challenges, ideas and best practices in creating and managing the quality and effectiveness of State DOT RD&T (research) programs. For this exchange, NYSDOT invited an outside panel of State DOT representatives and other relevant transportation research stakeholders to meet with the Department to discuss and review RD&T management processes. Representatives from three State DOTs (the Massachusetts Department of Transportation, New Jersey Department of Transportation, and Pennsylvania Department of Transportation), the Office of the Assistant Secretary for Research and Technology, United States Department of Transportation (OST-R/USDOT), and the New York State Energy Research and Development Authority (NYSERDA) joined representatives from NYSDOT and FHWA-New York Division to exchange ideas, share experiences, best practices and lessons learned in RD&T program management. The specific topic was "Creating and Managing an Effective SPR Research Program." The exchange provided an opportunity to rethink how best to deliver critical services, including research in a time of fiscal, and sometimes workforce constraints.

Information on NYSDOT's SPR research program, RD&T management process and related policies and procedures was shared with panel members in advance of the meeting. The exchange consisted of presentations and active discussions as the group shared key information about their involvement in creating and managing an effective SPR research program.

This report highlights the key observations and findings resulting from the peer exchange discussions, including best practices and opportunities identified to potentially improve NYSDOT's SPR research program, RD&T management process, and associated RD&T policies and procedures.

Objective

The objective of the peer exchange was to improve the quality and effectiveness of NYSDOT's research program and RD&T management process and to benefit all participants through an open exchange of ideas, knowledge and best practices by documenting shared experiences, best practices and lessons-learned in managing an SPR research program.

The following topics were discussed:

- Key functions necessary to manage an effective research program;
- How State DOTs deliver these key functions (e.g., within one program office, delivered with support from across the agency, outsourced);
- What skills are required to deliver an effective research program;
- What training is needed to ensure staff has the skills to deliver an effective program;
- Experiences/best practices/lessons learned to share with others.

As the host of this research peer exchange, NYSDOT set the context of the discussions by presenting an overview of the NYSDOT SPR research program with an emphasis on its RD&T management process, and how it handles current challenges. The primary focus of the discussions was the research functions, research management processes, associated regulations and rules, staff resources and the skill sets and training required to deliver and manage an effective SPR research program.

The peer exchange took place over two days. On the first day, panel members presented overviews of their respective agency's efforts to create an effective SPR research program. On the second day, the session proceeded with a review of the first day's discussions, continued exchanges of ideas and concluded with recommendations based on the best practices identified.

The goal for the NYSDOT research team was to leave the exchange with ideas for potential improvement in its RD&T management process and its SPR research program. The team found that each of the participating organizations face similar challenges with demographics and an aging or changing workforce, as well as with fiscal constraints. In the context of these challenges, participants were able to identify key functions of a research program, critical skill sets and knowledge and helpful training ideas to assist NYSDOT moving forward.

Participants

Peer Exchange Panel Members

- Gary Frederick, Director, Transportation Research and Development Bur., NYSDOT
- Deborah L. Mooney, SPR Program Administrator and Head, Research and Policy Studies, Statewide Planning Bureau, Policy and Planning Division, NYSDOT

- Curtis T. Bradley, Transportation Program Planner, Research Section, Massachusetts Department of Transportation (MassDOT)
- Camille Crichton-Sumners, Manager, Surface Design, Bureau of Research, New Jersey Department of Transportation (NJDOT)
- Timothy A. Klein, Senior Policy Advisor, Office of the Assistant Secretary for Research and Technology, U.S. Department of Transportation (OST-R, USDOT)
- Valeriya Remezova, Planning and Environmental Team Leader, FHWA-New York Division
- Joseph D. Tario, Senior Project Manager, New York State Energy Research and Development Authority (NYSERDA)
- Lisa A. Tarson, Section Manager, Research Program Management, Pennsylvania Department of Transportation (PennDOT)

Other Peer Exchange Participants

- Nadia Aslam, Asst. Director, Technology Transfer and Outreach, University Transportation Research Center (UTRC)
- Beth Brown, Research and Policy Studies, Statewide Planning Bureau, NYSDOT
- Matthew Hannon, Research and Policy Studies, Statewide Planning Bur., NYSDOT
- Camille Kamga, Director, University Transportation Research Center (UTRC)
- Jane Minotti, Sr. Librarian, Transp. Research and Development Bureau, NYSDOT
- Marty Neveu, Acting Director, Statewide Planning Bureau, NYSDOT
- Robert Sack, Director, Office of Technical Services, NYSDOT



From L to R: Robert Sack, NYSDOT; Timothy Klein, USDOT; Camille Crichton-Sumner, NJDOT; Marty Neveu, NYSDOT; Jane Minotti, NYSDOT; Valeriya Remezova, FHWA-NY; Lisa Tarson, PennDOT; Joseph Tario, NYSERDA; Deborah Mooney, NYSDOT; Curtis Bradley, MassDOT; Matthew Hannon, NYSDOT; Gary Frederick, NYSDOT; and Camille Kamga, UTRC

Overview of Participating Agencies' Research Programs

The peer exchange panel members were asked to frame their presentations to address the following key functions necessary to carry out an effective SPR research program:

- Program management;
- Project management;
- Contract management;
- Financial management; and
- Staff management.

Additionally, the participants were asked to explore how these key functions are delivered:

- Are the functions performed by in-house staff or by Consultant contracts?
- What procedure manuals or documented processes are used?
- What skills are required to deliver an effective research program?
- What training is needed to ensure staff have the required skills?
- What experience and expertise is needed and/or desirable?

New York State Department of Transportation's (NYSDOT) SPR Research Program

NYSDOT has developed an effective SPR research program. The SPR Program is funded with approximately \$32 million annually from Federal funds, of which 25% or \$8 million is set aside for RD&T projects and activities. Overall responsibility for the management and administration of the SPR Program resides with the Statewide Planning Bureau (SPB) in the Policy and Planning Division in close consultation with the Transportation Research and Development Bureau (TRDB) in the Engineering Division. TRDB provides the engineering expertise required to assess, manage and evaluate technical research projects.

SPB's key functions include:

- Acting as the primary contact with FHWA regarding the SPR Program;
- Establishing management policies and procedures for the SPR Program;
- Submitting the annual SPR Work Plan to FHWA for review/approval;
- Processing SPR amendments to the Program;
- Submitting an annual SPR expenditure report to FHWA;
- Executing and administering project Task Assignments (contracts) and contract payments;
- Monitoring SPR project progress, taking action as needed;
- Collecting federally required SPR quarterly status reports;
- Executing and managing research consortia and consultant contracts;
- Training and coaching SPR Project Managers (e.g., requests for proposals; consultant selection process; scope of work and Implementation Plan development; managing contracts and research Principal Investigators/Consultants; project closeout activities).

TRDB's key functions include:

- Providing funding recommendations on technical / engineering research proposals;
- Managing in-house technical research projects;
- Maintaining the Department Library;
- Supporting the Department's representative on the American Association of State Highway and Transportation Officials (AASHTO) Standing Committee on Research (SCOR);
- Representing and providing liaison to the Department in national transportation research programs and with other State DOTs;
- Supporting the activities of the AASHTO Research Advisory Committee (RAC);
- Acting as the primary contact for the Transportation Research Board (TRB), coordinating the Department's recommendations regarding national research proposals, Panel Members for national research projects, and potential national research synthesis topics; and
- Administering the Transportation Pooled Fund (TPF) Program for research and the Local Technical Assistance Program (LTAP).

A total of six staff from the Transportation Research and Development Bureau in the Engineering Division and four staff from the Research and Policy Studies Section (RPSS) in the Statewide Planning Bureau in the Policy and Planning Division jointly manage the SPR research program components. This represents a reduction from approximately twenty-five staff members involved in SPR Program management during the last decade. The SPR research program is organized and managed in four research components: in-house research; contract research; pooled fund research; and national research.

TRDB manages the Department's In-House Research Program which includes the maintenance of the Department's library, the administration of the LTAP and the TPF program, which has an approximate \$1.7M annual research budget, and the performance of special projects requiring technical and engineering expertise. The TRDB research staff is divided into two technical groups: structures and pavements. In-house TRDB staff provides technical and engineering support to Main Office and Regional program areas as follows:

- The TRDB Structures Group assists the Office of Structures with the instrumentation of bridges to analyze structural problems and performs analysis of unique structural problems to improve the safety of the State's bridges. They have developed specialized repairs for certain bridges allowing them to remain open to traffic rather than post load restrictions or close them for significant rehabilitation.
- The TRDB Pavement Group provides high-level pavement analysis to support the implementation of the AASHTO Mechanistic Design Procedure and to assess the effect of various unique loading conditions on NYSDOT's infrastructure.

TRDB also manages NYSDOT's National Research Program activities which include administering contracts for the Transportation Research Board (TRB) programs, the

National Cooperative Highway Research Program (NCHRP), participating on the Research Advisory Committee (RAC) and on the Standing Committee on Research (SCOR), and administering the Strategic Highway Research Program (SHRP2) contract of approximately \$1.3 million a year. Other national research programs such as the Transit Cooperative Research Program (TCRP), Airport Cooperative Research Program (ACRP), National Cooperative Freight Research Program (NCFRP), and the Hazardous Materials Cooperative Research Program (HMCRP) are typically managed directly within the individual program area.

In addition, TRDB staff coordinates and administers the contracts for the AASHTO programs, including the National Transportation Product Evaluation Program (NTPEP), and the American Concrete Institute (ACI).

RPSS manages the SPR Contract Research Program, which includes executing and managing contracts with research consortia and consultants. NYSDOT has a multi-year, multi-million dollar contract agreement with the University Transportation Research Center (UTRC), a federally funded University Transportation Center representing the Federal Region 2. UTRC is a consortium of nineteen major academic institutions in New York, New Jersey, and Puerto Rico. NYSDOT commissions research projects by issuing Requests for Proposals (RFPs). Proposals from member universities and colleges are evaluated by the requesting Project Manager and Technical Working Group. Projects may include outside experts and private firms as subcontractors. NYSDOT also has a multi-year, multi-million dollar partnership agreement with the New York State Energy Research and Development Authority (NYSERDA) to solicit and administer research projects on its behalf. Research projects are solicited annually through a Program Opportunity Notice (PON) inviting proposals from private firms, community-based groups, universities, industry, MPOs, and others.

NYSDOT has a well established contract research process. NYSDOT's SPR RD&T Management Process includes the procedure "Call for Contract Research." Projects can be added to the SPR Program on an "as needed" basis using available funding. Often, these ongoing and anticipated needs are sufficient to use the available SPR funding. However, periodically, a broader "call for research proposals" is made, soliciting ideas from Department staff. The timing of the call is based upon funding availability and staff work load. The NYSDOT Program Areas seeking SPR funding must prioritize their research needs. SPR funding applications are prepared by the interested program areas and proposals are evaluated based on established criteria. Projects which are eligible for federal SPR funding are evaluated based on criteria established by the Policy and Planning Division. Criteria are aligned with NYSDOT's priority goals and objectives and critical needs. This Division works closely with TRDB and other Divisions in the Department to understand changing conditions and needs. As a result of changing conditions and needs, the criteria used may change over time.

Applications for research proposals can be submitted by NYSDOT Program Areas anytime; but, it is the policy of the SPR Program to require a Program Area Sponsor, at the Bureau level or higher, to sponsor the project and to designate a NYSDOT Project Manager to be responsible for managing the project. The research proposals are jointly screened by RPSS and TRDB staff and include performing a literature search through

Transportation Research Information Services (TRIS) and other National Libraries to avoid potential duplication of research. The staff also reviews the proposals for technical input, as needed, and before the SPR funding application is progressed for review and approval by the SPR Program Administrator and applicable PPD Directors. If a research project proposal is approved for SPR funding, the project is added to the currently approved FFY SPR Program through an SPR Amendment process with FHWA. The individual Project Managers oversee each project, ensuring quality research, and provide the required SPR quarterly reports, which are collected and reviewed by RPSS staff and provided to FHWA per the SPR federal requirements.

Massachusetts Department of Transportation's (MassDOT) SPR Research and Technology Transfer Program

For the past two years, the MassDOT Research and Technology Transfer program has been mainly influenced by the geography and the weather conditions prevailing in Massachusetts. To address transportation in difficult weather conditions, the MassDOT research program has participated in relevant research on highways and transit, pavement profiles, multimodal transportation (including bicycle, pedestrian, and transit), and safety for all modes of transportation.

The research initiatives undertaken are aligned with MassDOT's goals of safety, capacity to build and preserve infrastructure and assets, restoring stewardship, improving customer service, and efficiency. As a result of a research peer exchange previously conducted by MassDOT, another focus is on providing metrics and facilitating implementation strategies for research projects. MassDOT also focuses on facilitating information and technology transfer. The research program is currently being administered and managed within the Strategic Planning Department by four staff members reporting directly to the Director of Strategic Planning. The Research Manager recently retired and there is an ongoing process to find a replacement.

MassDOT delivers research through traditional research project solicitations, which are submitted, based on needs, and require a project champion and a working group. The problem statements are reviewed and revised if necessary and using in person meetings is encouraged, as it is more effective. Once the problem statements are completed, they are distributed to directors and administrators for consent and approval to ensure that the research projects align with the short and long term strategies of their divisions. The directors and administrators are asked to recommend their top three to five projects per division and the selection of projects is made based on these recommendations. Many of the research projects are outsourced to the state academic institutions.

MassDOT is establishing a central unit called the One Center to optimize the resources available to the department as they are reduced. The One Center will consolidate the Massachusetts Cooperative Research Program (MCRP), the Local Technical Assistance Program (LTAP) and the Massachusetts Technical Assistance Program (MTAP). The MCRP primarily provides literature searches, synthesis surveys, project administration, and assistance in the NCHRP problem statement solicitation process. The MTAP is

used to train employees, manage the MassDOT Information and Technology Transfer and provide workshops, trainings, and webinars to disseminate information. The LTAP concentrates mainly on disseminating information to and technology transfer with municipalities and towns.

MassDOT organizes two major conferences annually. The Moving Together Conference (Bicycle, Pedestrian & Transit) aims to directly engage the transportation advocates. The MassDOT Innovation Conference (MIC) encourages all MassDOT employees to participate and share ideas related to highway safety and transit. The MIC has been extended to include other government agencies, municipalities, towns, and consultants.

Multimodal and policy research projects are typically recommended by either the Secretary of Transportation or the Executive Director. They are typically one to two day research projects. The multimodal research projects include exploring national issues and trends for transit, bicycle, and pedestrian transportation. The policy research focuses mainly on transportation financing and policies.

MassDOT also participates in other research activities such as the State DOT Applied Research Projects, New England Transportation Consortium (NETC), National Transportation Pooled Fund Projects, AASHTO, TRB, NCHRP, and USDOT's research activities (FHWA-SHRP2 and OST-R).

New Jersey Department of Transportation's (NJDOT) SPR Research Program

In 2013, NJDOT received approximately \$4.7 million for SPR research. The program receives \$500,000 annually from the New Jersey State transportation trust fund to support research activities including quick turn-around projects delivered through an on call contract procured through the state procurement process at the New Jersey Department of Treasury. Most of the research projects relate to capital program management (pavement, bridge, etc.) to meet the infrastructure preservation goals of NJDOT. The Bureau of Research serves NJ Transit and the Motor Vehicle Commission in addition to NJDOT. Occasionally, the Bureau of Research may receive requests for research from other state agencies such as the Governor's office and the State Police.

The mission of NJDOT and thus the Bureau of Research is "*Improving Lives... Improving Transportation*" and the Bureau seeks to deliver customer-focused quality research and technology transfer solutions that reduce congestion, protect the environment, increase public safety, enhance transportation security, enhance infrastructure durability, and introduce innovation. Currently, the Bureau of Research is aligned to meet NJDOT's capital investment strategies.

The Bureau of Research, on average, maintains sixty (60) active research projects each year. All research studies are conducted by institutions of higher education or consultants, while oversight is conducted by in-house research staff. There is a research treasury consultant contract, meeting the federal reporting and certification requirements, designed to be a quick turn-around solution, and currently funded with State funds. The bureau coordinates national surveys, manages FHWA Pooled Fund

projects, develops and manages the Technology Transfer Program, including an annual research showcase event, assists in research implementation tasks, oversees the Local Technical Assistance Program, and is responsible for the coordination of SHRP2, NCHRP, TRB, database updates, AASHTO's Research Advisory Committee (RAC), and Long Term Pavement Performance activities.

The Bureau of Research has established a procedure to procure research projects. The Bureau of Research has entered into a basic agreement with the two University Transportation Centers and the institutions of higher education in NJ. The basic agreement is not a guarantee that research projects will be awarded. The basic agreement contains general provisions required for task orders in accordance with all relevant laws, rules and regulations, statutes or executive orders of the federal government and the state of New Jersey. Research projects are awarded based on a competitive process and task order agreements are issued for the performance of each awarded research project. The Bureau of Research solicits research needs at the request of NJDOT staff, NJ Transit, and the Motor Vehicle Commission (MVC). Research needs are reviewed continually to maintain flexibility and meet the research needs of the department. After a limited literature review to avoid overlap of research, potential projects are ranked by a research oversight committee to assess their value to the State of New Jersey. The prioritization rankings guide the decision on whether or not a research project is funded. For projects selected for funding, RFPs are developed and posted on the NJDOT website and institutions of higher education are notified by email. Proposals in response to RFPs are reviewed and winning proposals are selected. The Bureau of Research is updating its proposal evaluation criteria. The research studies are monitored as required by the Federal Program requirements. Results from the research are disseminated, and training and products resulting from findings of the research are implemented according to the implementation action plan.

The Bureau of Research maintains a webpage on the NJDOT website. Problem statement forms are available online and submissions of project ideas can be made either online or by printing and completing the forms. The problem statements are sent to the research user's committee and research oversight committee for review, scoring, and ranking. The Bureau of Research is developing an electronic format system to manage and administer all RFPs, contracts, and projects. The system will be the online project management system with capability for principal investigators to submit proposals and quarterly progress reports. The system can be accessed from outside NJDOT with proper administration privileges. The system will be able to automatically generate task orders and the research program report and will make the management of the research process less labor intensive and more streamlined. There will be a form for evaluating the project after the project is complete.

The Bureau of Research is also developing a risk assessment protocol for monitoring the procured entities. A pre-qualification form and a pre-award risk assessment must be completed to screen vendors who are seeking to enter into contractual agreements with the state of New Jersey. The monitoring forms will allow continued assessment of the procured entities during the project to ensure that they are equipped to conduct the research and that they continue to meet the Bureau of Research requirements. Site visit and telephone review forms have been developed as well to aid in monitoring. The risk

assessment form will assign a rating of low, medium, or high which will determine the appropriate level of monitoring. This risk monitoring will increase the responsibilities of the staff of the Bureau of Research. However, it has been deemed important as it is now required by the US Office of Management and Budget requirements, Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards (2 CFR 200) and the Bureau is committed to its implementation.

Technology transfer is conducted by sharing research results through standardized knowledge transfer practices. The Bureau of Research organizes an annual research showcase, brown bag luncheon and visiting scholar lectures, and disseminates of final reports, technical briefs, and other reports. All reports are posted publicly on the webpage. The Bureau of Research also develops targeted knowledge transfer with training, special presentations, and project-specific videos. Internal and external communications are also used for knowledge transfer, including newsletter articles, website notices, department wide email distributions and the research library, among others as needed.

The Bureau of Research is housed in the Capital Investment Planning & Grant Administration under the Division of Statewide Planning. The Bureau of Research does not provide new product testing. The Bureau is staffed with ten employees comprised of a manager, secretary, research project managers, contract administrator, and librarian (via contract). Ideally, the Bureau would like to have dedicated staff to serve as quality monitor, risk & policy monitor, technology transfer liaison, project implementation coordinator, and performance measurement/management. The skills required for research project managers are time management, organizational, communications, grant management, technical competence, and experience to inform research. Project managers are responsible for the review and approval of deliverables (budget, invoices, technical memos and reports). They are responsible for conducting meetings (pre-proposal, debriefing), updating the project reporting system, and managing the research process from solicitation to implementation.

The Bureau of Research faces challenges similar to many other State DOTs, e.g., workforce demographics, fiscal constraints, change of leadership, and difficulty finding time to train new people. On a positive note, using an electronic system and streamlining the research processes have been very beneficial to the research program. The Bureau of Research seeks to implement methods to reduce a research project manager's workload such as: allowing the Principal Investigator to hire a technical editor, reducing technical report review time; reducing the number of meetings, requesting that all stakeholders attend quarterly meetings at the NJDOT headquarter offices; and using the automation documents in the project management and reporting system. The implementation of automated voting document and e-votes has reduced research user's committee review time.

Pennsylvania Department of Transportation's (PennDOT) SPR Research Program

PennDOT is in the process of revamping its research program to clearly define their process and timeline. The change results from a recommendation by the FHWA Division

Office to clearly document the research process with an explicitly defined timeline. The Research Division manages and coordinates research, education, and technology transfer programs on behalf of PennDOT in alignment with PennDOT's vision, mission, and goals.

The Research Division is housed in the Bureau of Planning and Research under the Deputy Secretary for Planning. The Bureau of Planning and Research has three divisions: Transportation Planning Division, Research Division, and Geographic Information Division. The Research Division is comprised of three sections: Research Program Management, Municipal Research and Outreach, and Research Technology Transfer.

The Research Program Management section, staffed with five employees, is where the research program is housed and is responsible for distributing, receiving and compiling the Innovations Deserving Exploration and Analysis (IDEA) forms, program development, contract initiation, project management, budget and cash flow, invoicing, Disadvantaged Business Enterprise (DBE) reporting, and fiscal closeouts. All research projects are outsourced by utilizing various contracting mechanisms such as: the Transportation, Research, Education and Technology Transfer Invitation to Qualify (ITQ) which is housed in PennDOT's Bureau of Office Services (BOS), the Department of General Services Master Agreements with various Pennsylvania Universities and the Intergovernmental Agreements with Carnegie Mellon University, University of Maryland and Purdue University which are housed in PennDOT's Bureau of Maintenance and Operations and the Bureau of Highway Safety and Traffic Engineering.

The ITQ is a competitive procurement process with approximately 70 vendors that are pre-qualified. A selection committee, composed of at least five qualified PennDOT personnel, is responsible for the review and evaluation of each timely submitted request for quotation (RFQ) proposal. The committee uses the criteria for selection that BOS established to evaluate each proposal. In order for a proposal to be considered for selection for the best and final offers or selection for contract negotiations, the total score for the technical submittal of the proposal must be greater than or equal to 70% of the highest scoring technical submittal. The Technical criterion include: Personnel Qualifications, Understanding the Problem, Contractor Qualifications and Soundness of Approach. There is a Cost criterion which is not normally the deciding factor in the selection process.

The Department of General Services (DGS) Master Agreements and the Intergovernmental Agreements are procurement vehicles that enable the Research Program Management staff to work directly with a University to initiate a work order to conduct a research project. A point of clarification in regard to these Agreements, only Intelligent Transportation System (ITS) related research projects are initiated using the Intergovernmental Agreements.

The Research Technology Transfer section is responsible for the State Transportation Innovation Council (STIC), research implementation activities, national programs, library, and Strategic Highway Research Program (SHRP2) implementation. The State Transportation Innovation Council (STIC) is a multi-stakeholder leadership approach to

facilitate the rapid implementation of proven, well-researched technologies, tactics, and techniques. It is not a venue for unproven, unverified suggestions or ideas.

The research activities receive a high level support at the executive level in the Department. The Research Program Management staff work with the Bureau Directors, District Executives and Deputy Secretaries to prioritize all received Research IDEA forms, before the approved IDEAs are presented at the Executive committee.

For FY 2015-2016, the Research Division budget allocation is approximately \$10.7 million with \$7.1 million allocated to research contracts, \$1.65 million to NCHRP, \$1.25 million to SHRP2, and \$5,000 to TPF participation.

New York State Energy Research and Development Authority's Research Program

The New York State Energy Research and Development Authority (NYSERDA) was established in 1975. NYSEDA's mission is to advance innovative energy solutions in ways that improve New York's economy and environment. NYSEDA has approximately 400 employees in four locations in New York State and a SFY 2015 budget of approximately \$800 million. Funding for NYSEDA is dynamic and comes from multiple sources. In 2013, the transportation sector consumed 80% of all petroleum in NYS and produced 42% of fossil fuel greenhouse gases. To meet the Governor's goals to reduce greenhouse gas emissions economy-wide by 40% by 2030 and by 80% by 2050, the transportation sector will be a focus.

Outside of its research partnership with NYSDOT, NYSEDA has two major programs: product development and product deployment. New products are developed under the product development program. Under the product deployment program, NYSEDA provides support for a limited number of select commercial products that require subsidy. In 2015, NYSEDA managed Congestion Mitigation Air Quality (CMAQ) funds of approximately \$19 million for advanced commercial truck deployment programs and legislative appropriations of approximately \$8 million for electric vehicle supply equipment (EVSE) deployment.

NYSERDA's collaboration with NYSDOT was formalized in 2000, when NYSEDA submitted a proposal to an open NYSDOT RFP to manage a portion of their research without any overhead cost. The proposal was accepted in 2001 and NYSEDA formed an eight-year Transportation Infrastructure Research Consortium (TIRC) comprised mostly of private companies and the Army Corps of Engineers to manage research projects on behalf of NYSDOT.

In 2006, NYSEDA entered into a research partnership with NYSDOT to develop an annual solicitation for joint research projects. There have been 93 projects valued at \$17 million initiated to date under this partnership. The annual solicitation or Project Opportunity Notice (PON) is currently a \$3 million per year program. Each year, a timely theme is selected for the PON in order to attract quality proposals of interest to NYS. In 2015, PON 3090's theme was "Integrated Mobility Solutions for Smarter Cities and Communities." Focus areas were identified: Active Transportation Demand Management

(ATDM) and Integrated Corridor Management (ICM), Freight Transportation & Logistics, Dynamic Mobility Applications, and Sustainable Transportation Alternatives. There are five funding categories: Education & Technology Transfer (up to \$35K per project); Research, Policy & Feasibility Studies (up to \$150K per project); Underutilized Strategy Demos (up to \$200K per project); Collaboration Partnerships (up to \$400K per project); and Underutilized Technology Demos (up to \$500K per project). Cost share is required for all funding categories and it is part of the evaluation process. A panel of staff from NYSEDA, NYSDOT and the metropolitan planning organizations (MPOs) scores, ranks and evaluates the proposals. Proposals with technical merit are funded by their ranking order until the available funds are expended. The selection process is very rigid and pre-approved by the New York Office of the State Comptroller. Therefore the contracting process after selection is considerably faster.

United States Department of Transportation's (USDOT) Research Program

USDOT's two principal functions are administration of federal-aid programs and regulating safety. The USDOT research program is largely driven by safety. Since 1960, total fatalities and injuries data show that there are safety problems across all modes of transportation. Every transportation mode has a different safety management system, structure, and regulatory process as they each have different issues to be addressed. There are common issues also among modes, and USDOT does common crossover research like human factors (distracted drivers), basic pavement and structure. More often, cross modal projects are done, especially in the Intelligent Transportation Systems arena.

USDOT is engaging the public with *Beyond Traffic: US DOT's 30 Year Framework for the Future*, which is a draft framework for the future of the nation transportation system. The Office of the Assistant Secretary for Research and Technology (OST-R) manages the following programs: Bureau of Transportation Statistics; Intelligent Transportation Systems; National Transportation Library; Positioning, Navigation and Timing & Spectrum Management; Research, Development and Technology; University Transportation Centers; Transportation Safety Institute; and the Volpe National Transportation Systems Center.

USDOT tracks the impact of the transportation services on the economy from a policy point of view. USDOT has gathered a large amount of data on economic impacts from other federal agencies. This data is available to State DOTs.

USDOT is not involved in vehicle technologies as it is in the scope of the Department of Energy at the Federal level. USDOT is involved with EPA and provides statistical research to analyze the impact of energy and environment on the transportation sector. USDOT Research Funding by Strategic Goal is as follows: 42% for Safety; 23% for Economic Competitiveness; 13% for State of Good Repair; 13% Environmental Sustainability; 5% for Livable Communities; and 4% for Organizational Excellence.

USDOT recognizes that the Return on Investment (ROI) for improving safety and reducing costs has been decreasing for traditionally funded types of research which

focus on the hard side. Nowadays, everything is about data access and analysis, and “big data.” USDOT has developed a whole suite of programs using existing datasets and is moving to real-time data. A large set of data is derived from the ITS program with Connected Vehicles and Infrastructure, and from the increasing use of mobile wireless devices. There have been a lot of activities related to development and support of transportation/transit apps for users, operators, and managers. The apps are developed to support consumer oriented mobility on-demand. Also, GPS location data is generated from the positioning, navigation and timing systems.

One of the goals of data management is to improve quality and access. The conversation at USDOT focuses predominantly on information management, data collection and data management. It is about making critical data accessible for innovators by opening the data to the public, where it makes sense. By publishing the datasets and making them available for research, USDOT is attaining real value from research done by the private sectors and academic institutions using their data.

USDOT has launched the Research Hub to fulfill a dual role for the Department. Publicly available, the USDOT Research Hub provides access to information on the Department’s research investment to the transportation research community and public. It is also used to conduct cross-modal research reviews and to identify opportunities for inter-agency collaboration.

Integrated communications and information technology (ICT), advanced transportation management and operations, vehicle-to-vehicle or vehicle-to-infrastructure communications, remote sensing and robotic applications, and real-time travel information are all affecting transportation and travel. Dedicated Short-Range Communications (DSRC)-based vehicle-to-vehicle and vehicle-to-infrastructure communications are a key advancement toward vehicles that intercede in human decision-making to prevent crashes and promote enhanced system operations. USDOT has recently selected three sites for the Connected Vehicle (CV) Pilot Deployment program. New York City is among the selected sites. FHWA will issue guidance to state and local governments for infrastructure implementation in 2016. This guidance will be for purchasing ITS Connected Infrastructure under the federal programs and will specify technical requirements for inter-operability and performance in the future environment.

USDOT promotes research in developing remote and robotically controlled inspection tools that can be used on infrastructure systems including bridges, dams, transmission towers, off-shore platforms, and wind turbines. The Long Term Bridge Performance Program (LTBP) is a 20 year or longer research program collecting scientific data to provide a more detailed and timely picture of bridge health, improve knowledge of bridge performance, and ultimately promote the safety, mobility, longevity, and reliability of the nation’s highway bridges.

FHWA has developed a list of basic performance metrics related to technology processes and project results that it uses to rate the results of its Every Day Counts (EDC) initiative, an effort intended to speed up the delivery of highway projects and address the challenges presented by limited budgets.

Focus Area: Creating an Effective SPR Research Program

Open Discussion

The open discussion focused on creating an effective SPR research program and centered on the key functions necessary to carry out an effective research program and how those functions are delivered. NYSDOT developed four main questions to help facilitate the discussion. The panel members and other peer exchange participants addressed these questions by sharing ideas and approaches and describing actual practices, as well as suggested best practices. The four questions and discussion follow:

1. How Do You Manage Your Research Program?

- Contract and in-house projects
- Project selection, prioritization, funding, staffing
- National participation, pooled funds
- Approval authority

2. How is Your Staffing Pattern Determined?

- Available titles, salary grades, number of staff

3. What Training is Available for Research Staff?

- Pooled fund site, RAC 101, etc., but what else?

4. What Do You Look for When You Hire New Staff?

- Experience, expertise and skills/background

Discussion Summary

1. How Do You Manage Your Research Program?

SPR Research Program Management

State DOTs have varied approaches to managing their SPR research programs:

- The NYSDOT SPR research program management is a joint effort between two program areas of the Department utilizing SPR funds: (1) The Research and Policy Studies Section (RPSS) in the Statewide Planning Bureau (SPB) in the Policy and Planning Division and (2) the Transportation Research and Development Bureau (TRDB) in the Engineering Division. Staffing consists of a total of six staff from TRDB in the Engineering Division and four staff from the RPSS in the Statewide Planning Bureau in the Policy and Planning Division.

RPSS administers the SPR Program and manages the contract research program. RPSS develops and manages the FHWA-approved FFY SPR Program, coordinating with TRDB, NYSDOT managers and FHWA staff following established SPR research program management policies and procedures. Research projects are added to the SPR Program through the annual proposed FFY SPR research program to FHWA or via SPR amendments to the FHWA-approved FFY SPR Program. To amend the SPR Program, NYSDOT has an internal approval process based upon approval authority established in the Department's SPR Research, Development, and Technology Transfer (RD&T) Management Process. Project selection criteria are also established in the SPR RD&T Management Process. Project selection criteria include meeting Department priorities and goals. In order to be added to the SPR Program, a proposed research project must also meet SPR funding eligibility criteria and sufficient SPR research funds must be available.

To develop an ongoing contract research program, RPSS executes and manages umbrella research contracts with both university-based research consortia and with consultants. This provides NYSDOT program areas the option to issue an RFP through the research consortia or through consultants under contract with the Department, which saves contract processing time. Coordinating with assigned research project managers, RPSS develops and executes task assignments under the umbrella research contracts, and then monitors project progress by collecting FHWA-required SPR quarterly status reports. RPSS oversees the SPR contract research program of projects from project initiation through implementation of results. RPSS staff requires administrative and technical expertise, as well as contract, fiscal, and program and project management expertise.

TRDB manages NYSDOT's in-house research program, which includes the maintenance of the Department's library, the administration of the Transportation Pooled Fund (TPF) Program for research and the Local Technical Assistance Program (LTAP) and the performance of special projects requiring technical and engineering expertise. In addition, TRDB coordinates and administers the contracts for the AASHTO programs, including the National Transportation Product Evaluation Program (NTPEP), and the American Concrete Institute (ACI). In-house TRDB staff provides technical and engineering support to Main Office and Regional program areas in high-level structural analysis and pavement analysis. TRDB staff also participates in national research activities such as NCHRP panels or TRB committees and coordinate these activities for the Department. Staff participates in the evaluation of proposed technical research projects and assists with the review of National Cooperative Highway Research Program (NCHRP) proposals. TRDB provides funding recommendations on technical / engineering research proposals generated internally, by consultant and at the national level. TRDB staff requires engineering and technical expertise, as well as contract, fiscal, and program and project management expertise.

- The PennDOT SPR research program is managed by the Research Program Management section from the inception of the research project to its implementation. No research projects are done in-house. Research employees must have expertise in contract, fiscal and project management. By making the section a one-stop shop,

managing research projects is more effective as every staff member is familiar and knowledgeable with the whole research process and what is involved to initiate and manage a research project. Also, functioning as a one-stop shop, combining the research program management with the contract and fiscal management has made the research program management more customer friendly and avoids delays for processing budget revisions, processing invoices, scope adjustment, and so on.

PennDOT utilizes the Department of General Services' (DGS) Master Agreements as a procurement vehicle to contract directly with various Pennsylvania universities. To date, seven (7) Pennsylvania universities have their own Master Agreement with DGS. PennDOT has initiated research projects via this procurement mechanism with the following: Penn State University, the University of Pittsburgh, Temple University and Villanova University. Research projects procured utilizing a DGS/University Agreement are all initiated the same way, via a work order. By having the same process for any university that enters into a DGS Master Agreement, affords the research program management staff the ability to manage and administer projects for any university that enters into a DGS Master Agreement. The Agreements are deliverable-based, which means a university is notified to submit an invoice once a deliverable has been received, reviewed and approved by the PennDOT Technical Advisor. In order to avoid any confusion on the project start and end dates, a *notice to proceed* package is issued that states the project start and end dates, along with a copy of the purchase order and a copy of the fully executed work order.

PennDOT's program development process for the fiscal year 2016-2017 SPR research program started with a September 30, 2015 broad email solicitation to PennDOT Bureau Directors, District Executives and the Executive Committee. The solicitation period ran from October 1st to October 30th. The intent of the email was to capture all possible new submissions under the IDEA program for consideration. By establishing a deadline, the Research Program Management staff were able to work with the Deputy Secretaries, Federal Highway Administration and other partners to establish priorities and develop a comprehensive research agenda. As IDEAs were received, a search in the Transportation Research International Documentation (TRID) database was completed to avoid duplicative efforts. All submitted IDEAs were forwarded to the appropriate Deputy for review and prioritization. At the same time, the IDEAs were sent to the Office of Chief Counsel for review and approval of the proposed contracting mechanisms and to the FHWA Division Office for preliminary review and approval to use SPR funds. Once these reviews were completed and approvals received, the Research Program Management staff compiled the prioritized Deputy results and developed the proposed fiscal year 2016-2017 Research Program. The proposed Research Program containing the research project titles and descriptions; recommended contracting mechanism; estimated cost; and supporting PennDOT organization was presented and approved by the Executive Committee. The approved Research Program will be submitted in the July 2016 – June 2018 Work Program.

- The MassDOT SPR research program is structured as a one-stop shop until the initiated research project gets to the MassDOT's Interdepartmental Service Agreement for execution. The service agreement is an agreement with the state

universities. Upon the execution of the agreement, the administration handles the financing and fiscal matters, rather than the research program. The “One Center” is used as an on-call service for initiating research projects. Problem Statements received are reviewed and a literature search is conducted before the project can be moved forward with approval of the project champion. MassDOT has different agreements between the private contractors/private institutions and public academic institutions.

- The NJDOT SPR research program, administered by the Bureau of Research, initiates a competitive procurement process when using Federal aid or state funds, although the state may waive this requirement for state-funded research under certain circumstances. Research activities conducted on behalf of the NJDOT are outsourced while the Research Bureau staff maintains oversight.

National Research Participation; Pooled Fund Program Management

State DOTs have the same or very similar opportunities for participation in national-level research studies and in SPR-funded Transportation Pooled Fund (TPF) programs, but vary in responsibilities and management of national research and SPR TPF programs:

- NYSDOT’s TRDB staff represents and provides liaison to the Department in national transportation research programs and with other State DOTs. Key TRDB functions include: supporting the Department’s representative on the American Association of State Highway and Transportation Officials (AASHTO) Standing Committee on Research (SCOR); supporting the activities of the AASHTO Research Advisory Committee (RAC); acting as the primary contact for the Transportation Research Board (TRB), coordinating the Department’s recommendations regarding national research proposals, panel members for national research projects, and potential national research synthesis topics. TRDB coordinates the input of data for the Transportation Research Information Services (TRIS) and Research-In-Progress (RIP) databases. TRDB administers the Transportation Pooled Fund (TPF) Program for research, including the approval of financial participation in pooled fund projects within the annual SPR funding limit budgeted for this purpose.
- NJDOT Bureau of Research coordinates pooled funds for subject-matter groups who have expressed interest to participate. It also does the coordination for SHRP2, sends information out for NCHRP so those with the technical expertise have an opportunity to vote, and the manager of NJDOT Bureau of Research is on the panel of IDEA. It is not very active in soliciting problem statements and nominating panel members for NCHRP. However, it will support and encourage individuals who express an interest in participating on a NCHRP panel; and, it is usually aware of employees’ participation.
- The MassDOT research program is no longer managing the national research programs, as the MassDOT Administrative office now administers them. However, the funds for the NCHRP will be handled through the research program.

- PennDOT brought up the challenges of transferring pooled fund project commitments, as there are no rules, regulations, or guidelines on how this should be done. Currently, PennDOT waits for the lead agency to ask for the commitment.

Approval Authority

State DOTs have similar requirements and procedures for obtaining approval authority to manage their SPR research programs:

- NYSDOT's SPR RD&T Management Process has a procedure in place that specifies the authority approval by threshold dollar amount for research projects. While the NYSDOT research program prepares the contract documents, it does not have the contract approval authority to execute the contracts. The Director of the Contract Management Office and other executives in NYSDOT have the authority to sign contracts.
- NJDOT requires multiple signatures from the Manager of the Bureau of Research to the Attorney General of New Jersey.
- MassDOT has a tiered-level process depending on the contracted amount.
- PennDOT has a tiered-level signature process depending on the contracting mechanism utilized.

Availability of Funds for Discretionary Use

State DOTs have different mechanisms for fulfilling discretionary needs of their SPR research programs:

- NJDOT can use a quick turn around process to use State funds with a threshold amount of \$25,000 with no competitive procurement.
- NJDOT is waiting to receive clarification from the National Process Review Team on whether State DOTs can allocate funds for a programmatic item using a broad description in the SPR work program and provide more detailed scopes of work once available.
- MassDOT uses One Center to initiate quick services (e.g., literature searches, synthesis, small research projects).
- PennDOT reiterated that SPR funds are not typically used to purchase equipment and the research project management has a policy of not purchasing equipment with SPR funds.
- NYSDOT noted that equipment can be purchased to perform research demonstration and experimental studies.

2. How is Your Staffing Pattern Determined?

State DOTs have established different processes for managing their SPR research programs. The number of research program staff varies among the State DOTs:

- NJDOT's Bureau of Research has a staff of ten employees including a manager, secretary, research project managers, contract administrator, and a librarian.
- MassDOT's research program is administered and managed by four staff members within the Strategic Planning Department who report to the Director of Strategic Planning.
- NYSDOT's SPR research program is managed by six staff from the TRDB and four from the RPSS. The TRDB and RPSS staff include Engineers, Transportation Analysts, Administrative Analysts, Program Analysts, an Administrative Aide and a Secretary.
- PennDOT's research program has five staff members.

3. What Training is Available for Research Staff?

State DOTs have similar staff training needs and available opportunities for training courses to effectively manage their SPR research programs:

- Training for staff is available at the federal and state level. FHWA's National Highway Institute (NHI) offers non-technical courses that could be of use to State DOT research programs.
- The Pennsylvania Office of Administration offers project management and business training classes which PennDOT uses for its training.
- NYSDOT's Policy and Planning Division offers training for SPR project managers covering all phases of the research program.
- The Massachusetts Technical Assistance Program (MTAP) of MassDOT provides training for research program staff.
- The Office of the Assistant Secretary for Research and Technology's (OST-R) Transportation Safety Institute (TSI) offers highway traffic safety and hazardous materials safety courses. The Intelligent Transportation Systems (ITS) Joint Program Office provides free ITS technical training through the ITS Professional Capacity Building (ITS PCB) Program.
- Training areas that were identified as being helpful for research program staff include: project, consultant, and contract management; communication skills, both oral and written, such as public speaking and putting together an effective slide presentation; and accounting and budgeting processes.

4. What Do You Look for When You Hire New Staff?

State DOTs have similar approaches, requirements and criteria for hiring new staff to fill positions in their SPR research programs:

Experience, Expertise and Skills/Background

- Good candidates for research program positions must understand the federal fund program in general; have research experience, and writing skills. Other qualifications mentioned are good ethics, good judgment, be a proponent of research, possess solid communication skills, supervisory experience, contract management, project management, program development, fiscal management, understand purchasing rules, software skills, integrity, and group facilitation skills.
- Issues with retaining and promoting staff in the research program were discussed. A key to retaining staff and keeping them interested in their work is to help them grow and expand their knowledge. FHWA has implemented the hybrid position where staff can simultaneously have responsibilities in two different areas. This hybrid position has allowed younger workers to expand their knowledge, which helps with staff retention, but it may also result in losing workers if they decide to go exclusively into one or the other area.
- There can be challenges in finding staff with the specific skills needed for the research program, particularly in states with a prescribed civil service process.
- Although the skills of the candidates may vary, the use of hypothetical scenario cases/questions during the interview process to assess how the candidate would handle situations and issues that they are likely to face in the position can be helpful.

Observations

Key Functions Necessary to Carry Out an Effective SPR Research Program

The State DOT panel members were in agreement on the key functions necessary to carry out an effective SPR research program, but had varied, individual approaches and challenges to delivering those key functions. The following observations, challenges, and issues related to the key functions were shared:

Program Management

- It was restated that knowing the rules and regulations is a key function of the SPR research program management process and it was recommended to get FHWA involved early in the process of developing research plans, projects and external funding proposals, so that questions of FHWA eligibility across funding streams and FHWA administration are resolved before program plans and reports are submitted. For SPR research program management, State DOTs must know their own program

management functions that are documented in their RD&T management process and associated policies and procedures within their respective agencies.

- A major challenge noted by NYSDOT is the loss of experienced staff due to attrition and the limited ability to hire new staff.
- It is also important to understand the new accessibility requirements for publishing and posting final reports on the State DOT websites. Research staff must be acquainted with these requirements.
- FHWA shared suggestions for streamlining research processes: (1) use templates starting with request for proposals (RFPs) forms, to solicit proposals from different sponsors and customers, and ending with reports that are expected as a product from the projects. Templates clearly define the information that is needed at each stage; (2) develop standards and procedures, which would help to define roles and responsibilities; (3) conduct a risk assessment for the research program to help identify needs, weaknesses, and skills required to manage a research program. A risk assessment would also help to align the State DOT's goals with FHWA's goals. FHWA also stated that sharing best practices has been made more difficult because of staff reductions at State DOTs, as well as the inability to travel.
- NYSDOT acknowledged the importance of utilizing templates and noted that it currently uses templates in its research program management. NYSDOT also has an SPR RD&T management process in place that defines the roles and responsibilities of the research program staff. This process is updated and shared with FHWA biennially per mutual agreement. Risk assessment for the NYSDOT SPR research program has also been undertaken as part of the internal controls process for the Statewide Planning Bureau managed out of the NYSDOT Office of Audit.
- NJDOT noted that it is developing a risk assessment tool to monitor contractors.

Financial Management

- Financial management is a key function and directly related to accountability in the use of SPR funds. The financial management of an SPR project requires a number of procedures which research program staff must understand and be able to complete. Among these procedures is reporting on SPR project status to the FHWA. One of the challenges of this reporting is that it requires navigating different fiscal years (e.g., state, federal, universities).
- Research staff must have the financial management skills needed to set up funding and manage SPR project budgets, including the ability to use a database tool to fiscally manage the SPR program funding.
- Another function of research program staff is to develop and provide guidance to project managers on how to financially manage their SPR projects.

Project Management

- A major issue in project management is finding qualified people to act as project managers in light of the perception of program area research sponsors that this position entails a great deal of work and time. NYSERDA observed that senior staff are reluctant to get involved with managing research projects because they are too busy. NYSDOT said that they sometimes had trouble finding people with the technical expertise to manage projects.
- One suggestion was to consider younger, newer staff as project managers since it would give them a great opportunity to become familiar with the research program processes.
- Another suggestion was to develop a promotional brochure to describe the SPR research program and to foster recruitment of project managers and secure more buy-in from program area sponsors and executive management who are asked to dedicate staff resources to manage SPR-funded projects.
- A third suggestion was to utilize the university contract services to hire a Principal Investigator to survey the various program area sponsors and technical advisors to gain a better understanding of their research needs and get feedback as to their knowledge of how the research program functions and learn what can assist them in their research needs.
- Another challenge can be coordinating with the Federal Highway Administration (FHWA) representative and other technical working group members for the development of RFPs and project scopes of work and for the review and approval of project deliverables and/or products. FHWA's participation is needed to meet the requirement that FHWA be included in SPR research technical working groups.

Findings

In accordance with federal regulation 23 CFR 420.209 (a) (7), NYSDOT, the host state, conducted a research peer exchange onsite in Albany, NY. The peer exchange consisted of a two day agenda. The University Transportation Research Center (UTRC), Region 2, developed the agenda jointly with NYSDOT and organized and facilitated the meeting. The overall objective of the peer exchange was to improve the quality and effectiveness of NYSDOT's state planning and research (SPR) research program and research, development and technology (RD&T) management process. The intent was to benefit both NYSDOT and the peer team participants through an open exchange of experiences, ideas, and best practices. The NYSDOT research peer exchange focus was on creating an effective SPR research program, examining the key functions necessary to carry out an effective SPR research program and how those key functions are delivered by other State DOTs. The peer exchange panel members presented their research programs and then UTRC facilitated an open discussion in which the panel members and other peer exchange participants were encouraged to share their experiences, expertise, knowledge, ideas, approaches, and best practices as related to their SPR research programs and RD&T management processes.

This NYSDOT research peer exchange was timely in that each of the participating State DOTs expressed similar challenges in managing their respective SPR RD&T (research) programs citing demographics, an aging or changing workforce, and fiscal constraints as contributors. It was mutually agreed that lessons learned from this peer exchange can help the participating State DOTs to deliver more effective SPR research programs in a fluid environment.

This research peer exchange provided NYSDOT, the host state, and three other participating State DOT panel members the opportunity to discuss, examine and evaluate their respective SPR research programs as peers and with the added value from the panel participation of NYSDOT, USDOT and FHWA. The panel members and other peer exchange participants represented a range of state, federal, university, consultant, partner, and stakeholder exchange of experiences, expertise, knowledge, ideas, approaches, and best practices. Some of the panel members had participated in previous research peer exchanges and were able to share both their expertise and prior peer exchange experiences. A summary of the research peer exchange panel and participant findings, suggested best practices, and recommendations follows.

Research Program Management

- A number of possible ways to streamline research processes was identified. One is using templates in all phases of the process which will clearly define the information needed at each stage. Another is to develop standards and procedures, which help to define roles and responsibilities. A third way is to conduct a risk assessment of the program to identify needs, weaknesses, and skills required for research program management. PennDOT's research program is set up as a one stop shop in which the research program management is combined with the contract and financial management making the process more effective and efficient. This set-up requires employees to be familiar and knowledgeable about the entire process including the

initiation and management of contracts. MassDOT's research program uses project champions.

- Finding, training, and retaining staff are all crucial to a successful research program. This is a particularly important issue given that research programs are often understaffed at all levels. Focusing on the program's core mission and on the skills and expertise of its staff will help to achieve as much as possible with limited resources. A key to retaining staff is to keep them interested in their work by helping them grow and expanding their knowledge. It also helps to have a diverse staff, at various stages in their careers, with different experiences and expectations to draw upon.
- Although research programs are a small part of a DOT's overall budget and personnel, they perform a key function. It is crucial that these programs promote their activities both within and outside of the department and ensure other DOT programs understand how the research program can help them.
- Several practices common to the research programs included:
 - Research showcases
 - Ad hoc research solicitations
 - Posting research results
 - Publishing research newsletters and reports
 - Obtaining executive-level support
 - Adhering to State DOT's and USDOT's strategic direction
- Some unique but beneficial practices included:
 - Full-service contracting
 - Strong in-house consultant services to enable the best use of research results, whether created within the State DOT or at another organization

Key Functions

- **Program Management** - It is important for SPR staff to understand how a program of projects is developed, funded, monitored and adjusted to deliver quality results meeting federal and state requirements. Staff must be knowledgeable of state and federal requirements, rules and regulations associated with SPR research, funding, contracting and procurement. In most cases, it is also important for staff to be familiar with various national research programs. Managing the SPR funding program and the projects within this program requires multiple skill sets.
- **Project Management** - It is important for SPR staff to possess or acquire project management knowledge and expertise. It is equally important for SPR staff to have project management processes in place to guide and ensure SPR project managers have the knowledge and tools to deliver projects on-time and within budget, manage in-house staff and/or consultants, deliver quality products and final reports, and prepare and submit mandatory project status reports for FHWA and executive management. Project Managers need to know the processes associated with developing, financing, advertising, and managing projects, including overseeing in-house and/or consultant staff, monitoring and reporting on a project. Scheduling,

budgeting, monitoring, reporting and oral and written communication are essential skills for good project management. It also helps for staff to have a basic understanding of the subject matter.

- **Contract Management** - It is important for SPR staff to understand how a project is put under a Task Assignment Order or contract or is secured via a Purchase Order in the DOT. There are many internal/external processes involved in advertising, funding, contracting and monitoring and essential skills needed to develop a contracting scope of work with a Technical Working Group (TWG) internally/externally with a consultant or Principal Investigator from a university research consortium agreement. Staff must understand the processes and federal/state requirements in order to execute a timely and high quality contracting agreement. The scope of work must be based upon the original advertisement criteria or request for proposals (RFPs), be written in clear language as to the roles and responsibilities of the DOT sponsor and the winning proposer(s). It must consist of tasks and deliverables, a budget table and schedule and cover important issues such as project reporting, project deliverable format and review/approval process, federal and state requirements, payment requirements, technical requirements, equipment specifications and consequences of schedule slippage, quality of deliverables, inactive project status.
- **Financial Management** - It is important for SPR staff to understand the processes and procedures required to fund an SPR project. This includes review/approval of SPR funding criteria eligibility, review/approval of availability of state and federal funds, obtaining project and budget approval, obtaining federal project authorization, obligating federal funds, encumbering state funds, obtaining Attorney General and State Comptroller review/approval as required, and contract approval. Financial management also entails monitoring and reporting on SPR project status to FHWA and ensuring that SPR funding is being expended to meet FHWA's annual 25% minimum SPR expenditure requirement. In addition, participants suggested that key staff should develop and provide guidance to project managers on how to fiscally manage their SPR-funded projects and the processes to do so, including, but not limited to, establishing task assignment budgets and milestone deliverable payments in the original scopes of work, processing scope and budget amendments, monitoring and reporting on project progress by expenditures, or preparing purchase requisitions/orders and documents such as sole source or single source justifications. Financial management requires many skill sets, a database tool to fiscally manage the SPR program funding and staff with knowledge, expertise and attention to detail.
- **Resource Management** - It is important for SPR program directors and managers to recruit and train qualified staff to perform the research program functions.

Critical Skill Sets and Knowledge

- **State and Federal Requirements** – Knowledge of the statutory and regulatory requirements associated with state and federal research programs is necessary to carry out those programs. An understanding of client expectations is also essential.

- **SPR Funding** – A good understanding of SPR funding and the associated requirements is critical. A basic understanding of other funding sources is also helpful.
- **Contract Management** – A fundamental understanding of the contract management process is necessary, as well as a working knowledge of the process. In most instances, the research staff relies on and works closely with others in the agency that have contract management expertise, but in some instances the research staff has developed that contracting expertise themselves. Both approaches can be effective.
- **Resource Management** – Research staff must have basic resource management skills to effectively deliver in-house and contract research, as well as to address basic administrative functions associated with the program.
- **National Programs** – Most state research programs have some responsibility for overseeing their state’s involvement in various national research programs. Some take a more direct and centralized role and others serve more in a monitoring capacity. A more active role can allow the state to optimize its involvement and to best align national projects with overall state priorities.
- **Project Management** -- Research staff must have project management skills to be able to manage SPR projects and train and guide assigned Program Area SPR Project Managers.
- **Financial Management** – Research staff must have financial management skills in order to set up funding and manage SPR project budgets and provide guidance to SPR Project Managers.

Recommended Training

The State DOT panel members and other peer exchange participants recommended the following types of training as useful in managing SPR research programs:

- Project management - available through the DOT’s internal employee development and training services and FHWA regional Division Office
- Consultant management
- Contract management
- Communication skills, both oral and written
- Accounting and budgeting processes
- Team building and teamwork
- Problem solving
- Research and documentation
- Public speaking
- How to make effective slide presentations
- Overview training such as AASHTO RAC 101- FHWA SPR Funds, Pooled Fund and NCHRP Programs

Appendix A: Agenda

NEW YORK STATE DEPARTMENT OF TRANSPORTATION RESEARCH PEER EXCHANGE – SEPTEMBER 23-24, 2015 ALBANY MARRIOTT, ALBANY, NY AGENDA

Focus Area: “*Creating an Effective SPR Research Program*”

- Key functions necessary to carry out an effective research program;
- How do other State DOTs currently deliver these key functions (e.g., within one program office, delivered with support from across the agency, outsourced);
- What training is or should be provided to ensure staff have the necessary skills to effectively deliver the program;
- Experience/best practices/lessons-learned to share with others.

Wednesday, September 23rd

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| 8:00 – 8:30 AM | Continental Breakfast in meeting room |
| 8:30 – 9:00 AM | Welcome, Logistics, and Peer Exchange Overview – UTRC/Robert Sack |
| 9:00 – 9:30 AM | NYSDOT Research Program Overview – Gary Frederick/Deborah Mooney |
| 9:30 – 10:00 AM | Mass DOT’s Research Program – Curtis T. Bradley |
| 10:00 – 10:30 AM | Beverage Break |
| 10:30 – 11:00 AM | NJDOT’s Research Program – Camille Crichton-Sumners |
| 11:00– 11:30 PM | PennDOT’s Research Program – Lisa Tarson |
| 11:30 – 12:00 PM | Q and A; discussions on presentations |
| 12:00 – 1:00 PM | Lunch |
| 1:00 – 1:30 PM | NYSERDA’s Research Program – Joseph Tario |
| 1:30 – 2:00 PM | USDOT’s Research Program – Tim Klein |
| 2:00 – 2:30 PM | Q and A; discussions on presentations |

2:30 – 3:00 PM	Creating an Effective SPR Research Program - Discussion
3:00 – 3:15 PM	Beverage Break
3:15 – 4:00 PM	Day 1 review of key functions/ program delivery/staffing and training, and ideas and opportunities related to the focus area
4:20 PM	Leave hotel for RPI Lighting Research Center Tour, Troy, NY (optional)
6:30 PM	Dinner (optional)

Thursday, September 24th

UTRC to facilitate final report discussion, takeaways and Peer Exchange wrap up:

8:00 – 8:45 AM	Continental Breakfast in meeting room
8:45 – 10:00 AM	Overview of previous day/ Goals for Day 2 / Continuation of Day 1 Discussion
10:00 – 10:15 AM	Beverage Break
10:15 – 12:00 PM	Condense and discuss recommendations for final report
12:00 – 1:00 PM	Lunch
1:00 – 3:30 PM	Final report preparation, beverages brought in about 2:00 PM Final thoughts, takeaways, Peer Exchange wrap up

Appendix B: Peer Exchange Contact List

<p>Curtis T. Bradley Transportation Program Planner MassDOT: Office of Transportation Planning Research Section Transportation Program Planner II 10 Park Plaza, Room 4150 Boston, Massachusetts 02116 Phone: (857) 368-8851 Email: Curtis.Bradley@state.ma.us</p> <p>Camille Crichton-Summers Manager, Bureau of Research New Jersey Department of Transportation P.O. Box 600 Trenton, New Jersey 08625-0600 Phone: (609) 530-5637 or (609) 530-5966 Email: camille.crichton-summers@dot.nj.gov</p> <p>Gary A. Frederick Director, Transportation Research and Development Bureau NYSDOT 50 Wolf Road Albany, NY 12232 Phone: (518) 457-4645 Email: Gary.Frederick@dot.ny.gov</p> <p>Timothy Klein Senior Policy Advisor U.S. Department of Transportation Office of the Assistant Secretary for Research and Technology (OST/R). 1200 New Jersey Avenue, S.E. Washington, DC 20590 Phone: 202-366-0075 Email: Timothy.Klein@dot.gov</p> <p>Deborah L. Mooney SPR Program Administrator Head, Research and Policy Studies Statewide Planning Bureau NYSDOT 50 Wolf Road Albany, NY 12232 Phone: (518) 457-6011 Email: Deborah.Mooney@dot.ny.gov</p>	<p>Marty Neveu Acting Director, Statewide Planning Bureau, NYSDOT 50 Wolf Road Albany, NY 12232 Phone: (518) 457-3438 Email: Marty.Neveu@dot.ny.gov</p> <p>Valeriya Remezova, Ph.D. Planning and Environmental Team Leader Federal Highway Administration Leo W. O'Brien Federal Building 11 A Clinton Avenue, Suite 719 Albany, NY 1220 Phone: (518) 431-8862 Email: Valeriya.Remezova@dot.gov</p> <p>Robert Sack Director, Office of Technical Services, NYSDOT 50 Wolf Road Albany, NY 12232 Phone: (518) 457-4445 Email: Robert.Sack@dot.ny.gov</p> <p>Joseph D. Tario, P.E., Senior Project Manager Transportation and Power Systems Research NYS Energy Research and Development Authority 17 Columbia Circle, Albany, NY 12203 Phone: (518) 862-1090 ext 3215 Email: Joseph.Tario@nyserda.ny.gov</p> <p>Lisa A. Tarson Section Manager, Research Program Management, Pennsylvania DOT 400 North Street, 6th Floor East Harrisburg, PA 17120 Phone: (717) 787-5796 Email: ltarson@pa.gov</p>
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Appendix C: Peer Exchange Panel Member Bios

Curtis T. Bradley Transportation Program Planner, MassDOT

Curtis T. Bradley is a Transportation Program Planner for the Massachusetts Department of Transportation (MassDOT): Office of Transportation under the Research Section. Curtis has been an employee of MassDOT since December 2013. Curtis is responsible for the oversight and coordination of Massachusetts Technical Assistance Program (MTAP), Local Technical Assistance Program, Highway Research and Transit Research initiatives.

Gary Frederick Director of Transportation Research and Development, NYSDOT

Gary has been the New York State Department of Transportation's Director of Transportation Research and Development for the past twelve years, which includes the Department's library services and Local Technical Assistance Program. Gary serves on the AASHTO Research Advisor Committee and currently oversees the AASHTO master agreement and payments. Gary is a registered Professional Engineer and has been with the Department's Office of Technical Services for his entire career, (thirty five glorious, fun-filled years).

Camille Crichton-Sumners Public Manager, NJDOT

Camille Crichton-Sumners has earned dual bachelor degrees in Civil Engineering and Architectural Engineering, a Masters in Engineering Management and is currently an Engineering Management Doctoral Candidate in the School of Systems and Enterprises at Stevens Institute of Technology. As a Certified Public Manager within the New Jersey Department of Transportation, she has worked in the Bureaus of Environmental Analysis, Project Management, Utilities, Preliminary Engineering and the Bureau of Research where she currently oversees a multimodal transportation research program and knowledge transfer activities for customers within NJ state government.

She serves on the American Association of State Highway Transportation Officials, Research Advisory Committee and as State Representative for the National Academies, Transportation Research Board and participates in numerous task forces, panels and committees.

She enjoys undertaking DIY projects, the beach, and sweep rowing.

Timothy A. Klein
Senior Policy Advisor, USDOT, OST/R

Timothy A. Klein is the Senior Policy Advisor for the U.S. Department of Transportation's (DOT) Office of the Assistant Secretary for Research and Technology (OST/R). He supports the Assistant Secretary on multiple policy and program issues affecting OST/R's missions:

- Advancing intermodal transportation research, development and deployment of innovative technologies;
- Leading university education and research in transportation and transportation-related fields; and
- Coordinating, facilitating, and reviewing the Department's research, development and technology programs and activities.

Mr. Klein is responsible for OST/R's international, technical standards, and Ombudsman programs. He is active as OST/R's representative to the AASHTO Standing Committee on Research (SCOR) and Research Advisory Committee (RAC). Mr. Klein has received numerous honors, including the Secretary's Silver Medal (for exceptional accomplishment) and Secretary's Transportation Safety Award. Right now, he is Acting Director of Technology Policy and Outreach, with responsibility for all Congressional, external, and public affairs activities in addition to his regular duties.

Deborah L. Mooney
SPR Program Administrator / Head, Research and Policy Studies, NYSDOT

Deborah is the State Planning and Research (SPR) Program Administrator for the New York State Department of Transportation. In her current position as a Sr. Transportation Analyst, Deborah is the Section Head of the Research and Policy Studies Section, in the Statewide Planning Bureau of the Policy and Planning Division. She is responsible for overseeing and administering the Department's SPR Program, which includes planning and research in-house staff projects and consultant contract projects, pooled funds, and other SPR-funded programs. Her responsibilities include the development, funding, management and assessment of the annual SPR Program of projects, with an annual budget of \$32 million in federal funds, of which \$8 million (25%) is annually apportioned to research, development and technology (RD&T) funding. She supervises a staff of three who assist her in the SPR program and project management activities. Deborah is also NYSDOT's consultant manager of the University Transportation Research Center (UTRC) research consortium contract and the New York State Energy Research and Development Authority (NYSERDA) Research Partnership Agreement, each \$10 million contracts.

Deborah has been with the New York State Department of Transportation since 1985. She has worked in NYSDOT operations, personnel, planning, resource and risk management, planning and program management, strategic planning,

quality improvement, and transportation research. She has held positions as a Transportation Analyst, Civil Engineer I, Project Manager, and Department Researcher. Deborah has worked in the SPR Program for over fifteen years as a Research Project Manager. She has been the SPR Program Administrator for seven years. Deborah is a graduate of SUNY at Albany with a B.A. in English Education.

**Joseph D. Tario, P.E.,
Senior Project Manager, NYSERDA**

Joseph D. Tario is a Senior Project Manager with the New York State Energy Research and Development Authority (NYSERDA). Working in their Transportation Research Department, he primarily manages projects focused on transportation demand management and advanced transportation infrastructure.

In addition to his duties at NYSERDA, Mr. Tario also manages a collaborative research program with the New York State Department of Transportation and is a past president and a current director of the Intelligent Transportation Society of New York. A graduate of Rensselaer Polytechnic Institute in Troy, NY, he holds an M.E. in environmental engineering, a B.S. in civil engineering, and he is a licensed professional engineer in the state of New York.

**Lisa A. Tarson
Research Program Management Section Manager, PennDOT**

Lisa Tarson is the Research Program Management Section Manager in the Research Division at the Pennsylvania Department of Transportation. She is responsible for managerial transportation planning and research work in the development, administration, monitoring and evaluation of PennDOT's Research Program which consists of both contracted and in-house projects with an annual budget of \$6-7 million. In addition she is responsible for the development, management, monitoring and evaluation of the annual Research State Planning and Research (SP&R) Work Program.

Lisa has been with the Pennsylvania Department of Transportation for over 26 years. She has worked for over 7 years in the Research Division as a Project Manager and has held her current position for over 2 years. She graduated from Pennsylvania State University with a Bachelor's Degree in Public Administration. Outside of PennDOT, she is the chairperson for the Butler Township Planning Commission.

Appendix D: Resources

USDOT/OST-R

- *Beyond Traffic: US DOT's 30 Year Framework for the Future* - See more at: <https://www.transportation.gov/BeyondTraffic>
- *About the CV Pilots Deployment Program* -- <http://www.its.dot.gov/pilots/>
- *2015 OST-R Transportation Technology Scan: A Look Ahead* -- http://www.rita.dot.gov/publications/technology_scan
- *USDOT Research, Development and Technology Strategic Plan, 2013-2018* -- http://www.rita.dot.gov/rdt/sites/rita.dot.gov.rdt/files/rdt_strategic_plan_2013.pdf
- *Federal Highway Administration Research and Technology Agenda* -- <http://www.fhwa.dot.gov/research/fhwaresearch/agenda/>