



Victoria F. Sheehan
Commissioner

THE STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION

CAP 19-023
Replacement



William Cass, P.E.
Assistant Commissioner

The Honorable John Cloutier, Chairman
Capital Budget Overview Committee
State House
Concord, New Hampshire 03301

Bureau of Materials and Research
August 12, 2019

REQUESTED ACTION

Pursuant to the provisions RSA 228:12-a, Use of Toll Credits, the Department requests the Capital Budget Overview Committee approve the Department of Transportation's use of Toll Credits to meet funding match requirements for proposed in-house research activities related to highways and bridges as described in the federally approved Department's 2020 State Planning and Research Part II (SPR2) Work Program. This work program includes 2 new projects, as shown in the attachments on pages 7 and 9, requiring the use of Toll Credits to match the Federal program. The estimated cost of research related work is \$165,000. Based on the estimated cost, the maximum amount of Turnpike Toll Credit needed is \$33,000.

EXPLANATION

The Department's Federal-Aid research program includes a blend of in-house and contracted research. Research studies conducted under this program for the Department have led to numerous gains and innovations in the state's highway and bridge industry, including such successes as high performance concrete, improved pavements, alternative materials for bridge construction, rapid construction, increased use of recycled materials, and forensic analysis of transportation facilities.

Research activities included in the requested action for in-house transportation research are undertaken in accordance with federal regulations and state priorities, and include support of contracted research, maintenance of a comprehensive and integrated database of products qualified for use on highway and bridge construction projects, training and certification of technicians, providing inspection and materials testing on highway and bridge projects, identification and prioritization of Department research studies, technology transfer and implementation activities, and related work.

Funding is from the annual State Planning and Research (SPR) program, a mandated federal program set-aside. Your approval of the above action is respectfully requested.

Sincerely,

For Victoria F. Sheehan
Commissioner

Attachments



STEADWIDE
PLANNING AND
RESEARH

PART 2

**SPR2 WORK PROGRAM
FFY 2020**

September 2019

**THE STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION
BUREAU OF MATERIALS & RESEARCH
In cooperation with the
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION**

TABLE OF CONTENTS

September 2019 Estimated Budget – SPR2 Funds	1
Summary of Pooled-Fund Participation	2
Final Budget of SFY 2019 Revenues and Obligations	3
Revenue from Various Sources since Previous Work Program.....	4
September 2018 Estimated Budget - SPR2 Funds.....	5
Active Projects	6
Research Projects proposed since previous Work Programs:	
15260G – Implementation of Research and Technology Transfer	7
15261G – AASHTO Technical Service Programs	8
15262G – Research Related Expenses	9
Research Projects approved in previous Work Programs (active and pending obligation)	
26962G – Structural Support for Tidal Energy Conversion at the Memorial Bridge.....	10
26962J – The Use of Unmanned Aircraft Systems to Increase Safety and Decrease Costs of Transportation Projects and/or Related Task	11
26962N – Layer Coefficients for NHDOT Pavement Design.....	12
26962O – Incorporating Impact of Binder Aging on Cracking Performance of Asphalt Mixtures During Design	13
26962P – Reducing Cracking in New Bridge Curbs	14
26962Q – Iron Oxide Deposits on Highway Construction Projects	15
26962R – Active Transportation Accounting: Developing Metrics for Project Prioritization.....	16
26962T – Airport Paint Study Implementation Evaluation	17
26962U – Improved Practices for Determining the Infiltration Characteristics of Soils for Design of Stormwater BMPs.....	18
26962V – Using Data Analytics to Forecast Future Bridge Conditions.....	19
26962W – Log Jam Monitoring	20
26962X – LED Snowplow Lights	21
26962Y – Assessment of Embedded Culvert Low Flow Hydraulics	22

26962Z – Use of Smart Rocks to Improve Rock Slope Design	23
42372A – Optimization of Bead Application for Painted Pavement Markings Maintenance Application	24
42372B – Unmanned Aircraft Systems (UAS) Program Plan.....	25
42372C – Asphalt Mix Testing Improvements	26

Transportation Pooled Fund Projects:

TPF-5 (XXX) – Core Program Services for a Highway RD&T Program – FFY 2020 (TRB FY 2021).....	27
TPF-5 (317) – Evaluation of Low Cost Safety Improvements Pooled Fund Study.....	28
TPF-5 (353) – Traffic Control Device (TCD) Consortium	29
TPF-5 (373) – New England Transportation Consortium	29
TPF-5 (353) – Clear Roads Winter Highway Operations Pooled Fund (cont'd from TPF-5(218))	30
TPF-5 (389) – Connected Vehicle Pooled Fund Study	30

NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION

Bureau of Materials Research

FFY 2020 SPR2 Work Program

September 2019

ESTIMATED BUDGET - SPR2 Funds

	<u>Federal \$</u>
Uncommitted funds carried forward from FFY 2019 Work Program (from p. 3)	\$ 428,649.63
SPR2 Apportionment - FFY 2020	\$ 900,191.00
	A \$ 1,328,840.63
Funds programmed for NCHRP, FFY 2020 (22% of SPR2 Apportionment)	\$ 198,042.02
Funds committed to FFY 2020 TPF Projects (from p. 2)	\$ 214,730.00
	B \$ 412,772.02
Funds Available for SPR2 Work Program	C=A-B \$ 916,068.61
<u>Annual Administrative (includes 10% for indirect costs except as noted)</u>	
15260G Implementation of Research and Technology Transfer	\$132,000.00
15261G AASHTO Engineering Technical Service Programs*	\$128,000.00
15262G Research-Related Expenses	\$33,000.00
<u>Research Projects (includes 10% for indirect costs)</u>	
26962V Using Data Analytics to Forecast Future Bridge Conditions	\$176,000.00
43272A Optimization of Bead Application for Painted Pavement Markings Maintenance Application	\$55,000.00
43272B Unmanned Aircraft Systems (UAS) Program Plan	\$165,000.00
Total - Programmed Funds for SPR2 Work Program	D \$ 689,000.00
Grand Total of Programmed Federal Funds (FFY 2019)	E=B+D \$ 1,101,772.02
Difference between Available and Programmed FFY 2019 Funds	A-E \$ 227,068.61

Notes:

* AASHTO Technical Service Program costs - No Indirect Costs, No State Match

NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
 Bureau of Materials Research
 FFY 2020 SPR2 Work Program
 Summary of Pooled-Fund Participation

TPF No.	TPF Name	Lead Agency	Federal Fiscal Year	
			2019	2020
TPF-5(397)	Core Program Services for a Highway RD&T Program - FFY 2019 (TRB FY 2020)	FHWA	\$ 74,730	\$ -
TPF-5(xxx)	Core Program Services for a Highway RD&T Program - FFY 2020 (TRB FY 2021)	FHWA		\$ 74,730
TPF-5(317)	Evaluation of Low-Cost Safety Improvements Pooled-Fund Study	FHWA	\$ 5,000	\$ 5,000
TPF-5(316)	Traffic Control Device (TCD) Consortium	FHWA	\$ 10,000	\$ 10,000
TPF-5(373)	New England Transportation Consortium (NETC VII)	Maine	\$ 100,000	\$ 100,000
TPF-5(353)	Clear Roads Winter Highway Operations Pooled Fund (cont'd from TPF-5(218))	Minnesota	\$ 25,000	\$ 25,000
TPF-5(389)	Connected Vehicle Pooled Fund Study	Virginia	\$ 25,000	
Grand Totals			\$ 239,730	\$ 214,730

NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
 Bureau of Materials Research
 FFY 2020 SPR2 Work Program
 September 2019

Final Budget of SFY 2019 Revenue & Obligations

Revenue:	Federal \$
Funds carried forwarded from FFY 2019 Work Program (from p. 5)	\$ 467,736.95
FFY 2019 Apportionment*	\$ 877,809.00
De-obligated Funds from Projects Final Vouched in SFY2019 (from p. 4)	\$ 23.38
Funds Returned to NH from Closed-out Pooled Fund Projects (from p. 4)	\$ -
	A \$ 1,345,569.33
Pooled-Fund Transfers:	
FFY 2019 NCHRP Contribution	\$ 193,118.00
FFY 2019 TPF Projects (from p. 2)	\$ 239,730.00
	B \$ 432,848.00
Obligated Funds for SPR2 Work Program	
<u>Annual Administrative Projects (includes 10% for indirect costs except as noted)</u>	
15258F Annual Research Program Development	\$ (25,000.00)
15260F Implementation of Research and Technology Transfer	\$ 40,000.00
15261F AASHTO Engineering Technical Service Programs**	\$ 5,000.00
<u>Research Projects (includes 10% for indirect costs)</u>	
26962T Pavement Paint Study - Implementation of SPR Project 15680J	\$ 8,636.70
26962U Improved Practices for Determining the Infiltration Characteristics of Soils for Design of Stormwater BMPs	\$ 123,200.00
26962W Log Jam Monitoring	\$ 110,000.00
26962X LED Snowplow Lights	\$ 16,500.00
26962Y Assessment of Embedded Culvert Low Flow Hydraulics	\$ 82,500.00
26962Z Use of Smart Rocks to Improve Rock Slope Design	\$ 110,275.00
43272C Asphalt Lab Improvements	\$ 12,960.00
	C \$ 484,071.70
FFY2019 SPR2 funds carried forward to p. 1 A-(B+C)	\$ 428,649.63

Notes:

* 0.5% of a State's core Federal aid as defined by current legislation.

** AASHTO Technical Service Program costs - No Indirect Costs, No State Match

NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
 Bureau of Materials Research
 FFY 2020 SPR2 Work Program

Revenue from Various Sources since previous Work Program		Unobligated Federal \$
Final Vouchered Projects in SPR2 Work Program		
15261F	AASHTO Technical Service Programs	\$0.00
26962M	Gusset-less Truss Connection Physical and Structural Model to Aid Bridge Inspection and (Available fund carried forward to p. 3)	\$23.38
		\$23.38
Funds Returned to NH from Closed-out Pooled Fund Projects		
		\$0.00
Projects Anticipated to be Final Vouchered		
15258F	Annual Research Program Development	
15260F	Implementation of Research and Technology Transfer	
15262F	Research-Related Expenses	
26962G	Structural Support for Tidal Energy Conversion at the Memorial Bridge	
26962J	The use of Unmanned Aircraft Systems to Increase Safety and Decrease Costs of	
26962N	Layer Coefficients for NHDOT Pavement Design	
26962O	Incorporating Impact of Binder Aging on Cracking Performance of Asphalt Mixtures during Design	
26962Q	Iron Oxide Deposits on Highway Construction Projects	
26962R	Active Transportation Accounting: Developing Metrics for Project Prioritization	

NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
 Bureau of Materials Research
 FFY 2019 SPR2 Work Program
 September 2018

ESTIMATED BUDGET - SPR2 Funds

	Federal \$
Uncommitted funds carried forward from FFY 2018 Work Program	\$ 467,736.95
SPR2 Apportionment - FFY 2019	\$ 879,112.00
	A \$ 1,346,848.95
Funds programmed for NCHRP, FFY 2019 (22% of SPR2 Apportionment)	\$ 193,404.64
Funds committed to FFY 2019 TPF Projects	\$ 238,098.00
	B \$ 431,502.64
Funds Available for SPR2 Work Program	C=A-B \$ 915,346.31
<u>Annual Administrative (includes 10% for indirect costs)</u>	
15258F Annual Research Program Development	(\$25,000.00)
15260F Implementation of Research and Technology Transfer	\$40,000.00
<u>Research Projects (includes 10% for indirect costs)</u>	
26962T Airport Paint Study Implementation Evaluation	\$8,636.70
26962U Improved Practices for Determining the Infiltration Characteristics of Soils for Design of Stormwater BMPs	\$123,200.00
26962V Using Data Analytics to Forecast Future Bridge Conditions	\$176,000.00
26962W Log Jam Monitoring	\$110,000.00
26962X LED Snowplow Lights	\$16,500.00
26962Y Assessment of Embedded Culvert Low Flow Hydraulics	\$82,500.00
26962Z Use of Smart Rocks to Improve Rock Slope Design	\$110,275.00
43272A Optimization of Bead Application for Painted Pavement Markings Maintenance Application	\$55,000.00
43272B Unmanned Aircraft Systems (UAS) Program Plan	\$165,000.00
43272C Asphalt Lab Improvements	\$12,960.00
Total - Programmed Funds for SPR2 Work Program	D \$ 875,071.70
Grand Total of Programmed Federal Funds (FFY 2019)	E=B+D \$ 1,306,574.34
Difference between Available and Programmed FFY 2019 Funds	A-E \$ 40,274.61

Revised 6/24/19

NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION

Bureau of Materials Research
 FFY 2020 SPR2 Work Program
 September 2019

ACTIVE PROJECTS

Project Number	Administrative & Recurring Projects	FFY Work Program	Federal \$	Expenditures to Date
15258F	Annual Research Program Development	2017-18	\$ 16,500	\$ 8,420.67
15260F	Implementation of Research and Technology Transfer	2017-18	\$ 132,000	\$ 89,673.23
15262F	Research Related Expenses	2017-18	\$ 33,000	\$ 8,844.48
<u>Research Projects</u>				
29337	Research Freight Information and Data in NH (orig programmed as 15680U in FY 2014-15)	2014-15	\$ 50,000.00	\$ 50,000.00
29729	Statewide Strategic Transit Assessment Study (orig programmed as 15680T in FY 2014-15)	2014-15	\$ 120,000.00	
26962G	Structural Support for Tidal Energy Conversion at the Memorial Bridge	2015	\$ 100,000.00	\$ 100,000.00
26962I	Stormwater Table	2016	\$ 10,000.00	\$ 3,673.90
26962J	The use of Unmanned Aircraft Systems to Increase Safety and	2017	\$ 85,000.00	\$ 72,057.90
26962N	Layer Coefficients for NHDOT Pavement Design	2017	\$ 150,000.00	\$ 123,996.53
26962O	Incorporating Impact of Binder Aging on Cracking Performance of Asphalt Mixtures during Design	2017	\$ 155,000.00	\$ 104,909.50
26962P	Reducing Cracking in New Bridge Curbs	2017	\$ 56,080.00	\$ 27,747.55
26962Q	Iron Oxide Deposits on Highway Construction Projects	2017	\$ 98,000.00	\$ 54,765.00
26962R	Active Transportation Accounting: Developing Metrics for Project	2017	\$ 55,000.00	\$ 26,819.89
26962T	Airport Paint Study Implementation Evaluation	2018	\$ 44,285.55	\$ 18,050.55
26962U	Improved Practices for Determining the Infiltration Characteristics of Soils for Design of Stormwater BMPs	2019	\$ 112,000.00	\$ 21,510.12
26962W	Log Jam Monitoring	2019	\$ 100,000.00	\$
26962X	LED Snowplow Lights	2019	\$ 15,000.00	\$ 10,916.43
26962Y	Assessment of Embedded Culvert Low Flow Hydraulics	2019	\$ 75,000.00	\$ 1,260.94
26962Z	Use of Smart Rocks to Improve Rock Slope Design	2019	\$ 110,250.00	\$ 12,552.47
43272C	Asphalt Lab Improvements	2019	\$ 12,000.00	\$ 4,460.16

Implementation of Research and Technology Transfer

Admin-SPR 15260G

Project Description:

This project is intended to provide funds for implementation of promising results emanating from federal, regional, or state research activities. The project also covers training and certification of technicians providing inspection and materials testing on highway and bridge construction projects. Inclusive eligible expenses support the following technology transfer activities: travel expenses when the employee is making a technical presentation on a project included in this (or a previous) Work Program; an employee presenting their experience in implementing new technologies resulting from others' research; or gathering information that will benefit the employee's performance of an NHDOT-sponsored research project. Additionally, Project 15260G covers travel expenses for research and technology purposes such as: workshops, conferences, demonstrations, and committee meetings whose primary function includes monitoring regional or national research and/or developing research needs statements. Activities and training related to developing a culture of innovation and improving organizational readiness for adoption of innovative technologies designed to save money, improve safety, or enhance environmental stewardship, such as award programs recognizing innovative individuals are also covered by this project.

A preliminary budget of \$120,000 has been estimated for the project during the next two fiscal years. The project duration extends past the end of FFY 2022 to allow for closure of project.

Funding Notes:

Includes 10% indirect



Project Details

• • •

Title:

Implementation of Research and Technology Transfer

Project #:

Admin-SPR 15260G

Start Date:

10/1/2019

End Date:

3/31/2022

Estimated Obligated Funds:

\$132,000

Estimated Project Budget:

\$120,000

**NHDOT SPR2 Program
FFY 2016 Proposed Projects**

**AASHTO Engineering Technical Service
Programs**

Admin-SPR 15261G

Project Description:

This item provides funding for Department participation in certain AASHTO Engineering Technical Service Programs (TSP). Participation is limited to those programs that demonstrate a direct and tangible benefit to the Department and is subject to review on an annual basis. The following programs will be supported:

- National Transportation Product Evaluation Program (NTPEP)
- Snow and Ice Cooperative Program (SICOP)
- Transportation System Preservation (TSP2)
- Equipment Management Technical Services Program (EMTSP)
- Load and Resistance Factor Design (LRFD) Bridges and Structures Specification Maintenance

The project duration extends past the end of FFY 2022 to allow for closure of project.

Funding Notes:

Managed by AASHTO for Technical Service Programs - No indirect costs. Authorized for 100% Federal funds by FHWA - no match required.



Project Details

•••

Title:

AASHTO Engineering
Technical Service Programs

Project #:

Admin-SPR 15261G

Start Date:

10/1/2019

End Date:

3/31/2022

Estimated Obligated Funds:

\$128,000

Estimated Project Budget:

\$128,000

**NHDOT SPR2 Program
FFY 2016 Proposed Projects**

Research-Related Expenses

Admin-SPR 15262G

Project Description:

This item is intended to provide funds for quick-turnaround research-related expenses or initial investigation of research needs that arise during the federal fiscal year. Participation in miscellaneous research activities not accounted for elsewhere in the SPR2 Work Program can be charged to this project. If a research project develops from initial investigations, future charges will be applied to new project. Previous initial investigation expenses will remain in project 15262G.

Non project-specific costs related to developing the NHDOT's SPR2 Work Program are included under this item. These costs include off-site research meeting expenses; equipment needed for collection of data and materials for managing the research program, research office supplies, computer software associated with the SPR2 program, and marketing activities.

The project duration extends past the end of FFY 2020 to allow for closure of project.

Funding Notes:

Includes 10% indirect



Project Details

•••

Title:

Research-Related Expenses

Project #:

Admin-SPR 15262G

Start Date:

10/1/2019

End Date:

3/31/2022

Estimated Obligated Funds:

\$33,000

Estimated Project Budget:

\$30,000

**NHDOT SPR2 Program
FFY 2016 Proposed Projects**

**Structural Support for Tidal Energy
Conversion at the Memorial Bridge**

Statewide-SPR 26962G

Project Description:

The Memorial Bridge crossing over the Piscataqua River between Portsmouth, NH and Kittery, ME has the capability to serve as an incubator for tidal energy conversion and storage technology. The first step in developing a field incubator site for tidal energy conversion and the Living Bridge is designing and installing a modular support frame that is adaptable to house a variety of turbine-generator systems.

Through this project, an interdisciplinary team of civil, mechanical and ocean engineers would work together to advance the science and engineering of tidal energy conversion and provide an active, community-oriented laboratory for education about sustainability. In the process of testing tidal energy conversion systems, the predictable, renewable, clean energy generated via the tidal turbine would be used to power aesthetic and emergency lighting on the bridge. It would also be used to supplement the power needs of instrumentation, including structural health monitoring instrumentation, and communication systems. Research is required to determine the effects of the modular support frame and operating turbines on this and other bridges.

The University of New Hampshire (UNH) received an award from the National Science Foundation (NSF) on 8/15/14 for its "Living Bridge" proposal, a multi-faceted project that includes the tidal energy system described above. The award was contingent on \$100,000 in matching funds from the NHDOT. **A Sole Source Agreement was executed with UNH on November 18, 2015.**

Funding Notes:

Includes 10% indirect.



Project Details

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Title:

Structural Support for Tidal
Energy Conversion at the
Memorial Bridge

Project #:

Statewide-SPR 26962G

Start Date:

11/18/2015

End Date:

5/31/2019

Estimated Obligated Funds:

\$110,000.00

Estimated Project Budget:

\$100,000.00

**NHDOT SPR2 Program
FFY 2016 Proposed Projects**

Stormwater Table

Statewide-SPR 26962I

Project Description:

The Department is committed to fulfill the federally mandated National Pollutant Discharge Elimination System (NPDES) Phase II regulations. One of the requirements under the Small MS4 portion of this program is an education and outreach component that presents best management practices resulting from research in water quality issues and innovations in storm water management. Storm water simulator tables have allowed personnel from various bureaus within the Department to become actively involved. It has also provides a valuable tool in educating Department personnel, contractors and the general public on point and non-point source pollution. The stormwater table incorporates a variety of Department-related activities to increase water quality awareness by Department personnel.

The original stormwater demonstration table was created under Statewide-SPR 13733U. As the stormwater table is showing signs of wear, this research project will repair and update the table to reflect the current understanding of the science. This project will also provide funds to support the associated outreach activities.

Funding Notes:

Includes 10% indirect.



Project Details

•••

Title: Stormwater Table

Project #: Statewide-SPR 26962I

Start Date: 02/04/2016

End Date: 12/31/2020

Estimated Obligated Funds: \$11,000

Estimated Project Budget: \$10,000

**NHDOT SPR2 Program
FFY 2017 Proposed Projects**

**The Use of Unmanned Aircraft Systems to
Increase Safety and Decrease Costs of
Transportation Projects and/or Related
Task**

Statewide-SPR 26962J

Project Description:

Unmanned Aircraft Systems (UAS) are being used nationwide in an effort to reduce costs and increase safety. There have been many suggestions by NHDOT Directors and Administrators as to how a properly equipped UAS would benefit their specific operations:

- Inspection tools during design, construction, or maintenance
- Routine Rock Slope Inspections
- Evaluation of Storm Damage
- Traffic Incident Management
- Cursory Inspections of Rail Lines
- Property Management Reviews
- Aerial Photos
- Inventory Inspections
- Emergency Response and Reconstruction Evaluations
- Public Information and Communications
- Traffic Control
- Obstacle Data Collection at Airports

With the current budgetary constraints it is necessary for the NHDOT to discover new methods that will decrease costs while maintaining the safety and integrity of the project or task. UAS technology should be tested in NH to ascertain it's abilities to assist the NHDOT with operations, development and execution of transportation-related projects.

UAS technology would be tested for capability and reliability on a NHDOT project along with the current practices. The UAS would be equipped appropriately for the specific project task assigned and complete its tasks in parallel with current practices. The current method is then compared to the UAS method with the analysis focusing on costs, safety, time, practicality, and efficiency. The purpose of the analysis would be to evaluate the cost benefit, data security, and human safety aspects of transportation projects.

Along with the support of the Bureau of Aeronautics, the Director of the University of Vermont's (UVM) Spatial Analysis Lab and Principal of the Vermont Unmanned Aircraft Systems Team presented this problem statement to the NHDOT Research Advisory Council (RAC) Meeting in April 2016. **A Sole Source Agreement was executed with UVM on December 21, 2016.**

Funding Notes:

Includes 10% indirect.



Project Details

• • •

Title:

The Use of Unmanned Aircraft Systems to Increase Safety and Decrease Costs of Transportation Projects and/or Related Task

Project #:

Statewide-SPR 26962J

Start Date:

9/1/2016

End Date:

3/31/2019

Estimated Obligated Funds:

\$93,500.00

Estimated Project Budget:

\$85,000.00

**NHDOT SPR2 Program
FFY 2017 Proposed Projects**

**Layer Coefficients for NHDOT Pavement
Design**

Statewide-SPR 26962N

Project Description:

At present, NHDOT employs AASHTO Empirical Pavement Design procedure for structural design of highways (new construction, reconstruction and major rehabilitations). The AASHTO procedures uses material specific coefficients (commonly called layer coefficients) to account for the structural capacity provide by each pavement layer. The current layer coefficients used by NHDOT are a combination of the original values proposed by AASHTO in the 1960s and research conducted by Janoo in 1994 (CRREL Special Report 94-30).

The asphalt mixtures in use today and vehicle loadings are substantially different from the ones characterized by AASHTO during the development of the 1960's design guide. With use of newer asphalt binder modification technologies, allowance for recycled materials (RAP, ground tire rubber) , and newer manufacturing and construction techniques (such as, cold in-place recycling) there is an urgent need to reevaluate the layer coefficients for materials currently in use for designing pavements. Due to lack of reliable layer coefficient values, there is high potential for over-design of pavements that translate in substantially higher costs.

This study proposes to to characterize the asphalt mixtures currently used by NHDOT for determination of the actual layer coefficient values for those materials.

The University of New Hampshire (UNH) presented this problem statement to the NHDOT Research Advisory Council in April 2016 with support from the Bureau of Materials and Research. A

Cooperative Project Agreement (CPA) was executed with UNH on October 26, 2016.

Funding Notes:

Includes 10% indirect.



Project Details

...

Title:

Layer Coefficients for
NHDOT Pavement Design

Project #:

Statewide-SPR 26962N

Start Date:

9/1/2016

End Date:

3/31/2019

Estimated Obligated Funds:

\$165,000.00

Estimated Project Budget:

\$150,000.00

Incorporating Impact of Binder Aging on Cracking Performance of Asphalt Mixtures during Design

Statewide-SPR 269620

Project Description:

Cracking – both environmental and load related - is a primary concern for asphalt pavements in New Hampshire. Cracking affects ride quality and allows water to penetrate from the surface to underlying soil layers, decreasing the life of the pavement and requiring more frequent maintenance or rehabilitation. It has been well recognized in the literature and through field observations that a mixture's resistance to cracking decreases with time as the mixture ages in the field. The inclusion of already aged material in the form of RAP would also be expected to decrease the cracking resistance. Therefore, it is important to have an understanding of how the cracking resistance of a mixture will change over time at the time materials are selected and mix designs are performed.

Current NHDOT standards rely upon the performance grading of the binder to ensure the appropriate selection of materials to resist cracking in the field. However, recent research presented at various conferences and the FHWA Expert Task Group meetings has shown that the current PAV aging for binders may only represent the condition of in service pavements after 2-3 years. In some cases, this is not adequate to differentiate or screen materials that may age quickly and lead to increased cracking. Also, research has shown the importance of evaluating the mixture properties, to include the effect of aggregate structure and mineralogy, on cracking performance; this is currently not part of the NHDOT specification.

The results of this project will help NHDOT to improve the selection of asphalt mixtures to resist cracking, which would result in long term cost savings and better ride quality. The experimental study will provide the NHDOT and industry with information on cracking characteristics of mixtures including different percentages of RAP, different binder grades, and different aging conditions.

The University of New Hampshire (UNH) presented this problem statement to the NHDOT Research Advisory Council in April 2016 with support from the Bureau of Materials and Research. A **Cooperative Project Agreement (CPA)** was executed with UNH on **October 26, 2016**.

Funding Notes:

Includes 10% indirect.



Project Details

...

Title:

Incorporating Impact of
Binder Aging on Cracking
Performance of Asphalt
Mixtures during Design

Project #:

Statewide-SPR 269620

Start Date:

9/1/2016

End Date:

3/31/2019

Estimated Obligated Funds:

\$170,500.00

Estimated Project Budget:

\$155,000.00

**NHDOT SPR2 Program
FFY 2017 Proposed Projects**

Reducing Cracking in New Bridge Curbs

Statewide-SPR 26962P

Project Description:

The concrete curbs on several new and recently constructed bridge decks exhibit transverse cracking at regular intervals. The cracks appear shortly after the final construction of the deck. The cracks are not large but they do continue down into the fascia of the bridge in many cases. Although concrete will crack, the crack locations along with winter salt usage allows corrosion to begin much sooner.

This project proposes to quantitatively measure the amount, location, and density of cracking in new bridges using projects constructed by the Bureau of Bridge Maintenance. These bridges tend to be similar in size (single-span, two-lane bridges with brush curb and bridge rail). Study bridges will incorporate a single recommendation from PennDOT report (FHWA-PA-2015-006-120103) or other previous research into early age concrete cracking. As a control, the study will evaluate a bridge built consistent with NHDOT practice of recent years.

This project was supported by the Bureau of Bridge Maintenance and selected by the NHDOT Research Advisory Council (RAC) in April 2016.

A Cooperative Project Agreement (CPA) was executed with UNH on October 26, 2016.

- Year 1 (2016-2017) – construction
- Year 2 (2017-2018) – construction and data collection
- Year 3 (2018-2019) – data collection and analysis

Funding Notes:

Includes 10% indirect.



Project Details

...

Title:

Reducing Cracking in New
Bridge Curbs

Project #:

Statewide-SPR 26962P

Start Date:

9/1/2016

End Date:

3/31/2020

Estimated Obligated Funds:

\$61,688.00

Estimated Project Budget:

\$56,080.00

**NHDOT SPR2 Program
FFY 2017 Proposed Projects**

**Iron Oxide Deposits on Highway
Construction Projects**

Statewide-SPR 26962Q

Project Description:

NHDOT has determined that rock fill material placed in wet areas can release iron to surface water resulting in hydrated iron (ferric) oxide compounds with red-orange microbial deposits in drainage ways adjacent to highways. Naturally occurring bacteria commonly catalyze iron reactions and their cellular material is found in the precipitate as a biofilm. The ferric iron compounds and associated microbial deposits accumulate in drainage ways are aesthetically unappealing and can result in adverse environmental impacts to the water body and highway structures.

Iron deposits in surface water downstream of roadways constructed with rock fill are a continuous construction and maintenance challenge for NHDOT (Fowler and Minichiello, 1977). When iron transport occurs after roadway construction, the expected duration and factors controlling the event are not immediately clear, which complicates plans for remediation.

Current NHDOT procedures regarding the use of blasted rock are limited to a qualitative determination of whether or not that rock is suitable for use on site. Moving forward, NHDOT would like to use more quantitative methods based on geochemical characterization and common road construction scenarios in order to determine rock-use suitability and to reduce iron fouling from construction.

The Bureau of Materials and Research Geotechnical Section and the USGS presented this problem statement to the NHDOT Research Advisory Council (RAC) in April 2016. **A Joint Funding Agreement with USGS was executed on September 21, 2016. The USGS contributed an additional \$71,880 to the project.**

Funding Notes:

Includes 10% indirect.



Project Details

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Title:

Iron Oxide Deposits on
Highway Construction
Projects

Project #:

Statewide-SPR 26962Q

Start Date:

9/1/2016

End Date:

3/31/2019

Estimated Obligated Funds:

\$107,800.00

Estimated Project Budget:

\$98,000.00

**NHDOT SPR2 Program
FFY 2017 Proposed Projects**

**Active Transportation Accounting:
Developing Metrics for Project
Prioritization**

Statewide-SPR 26962R

Project Description:

Despite growing interest and momentum in enhancing active transportation, little weight is currently given to active transportation projects. NHDOT projects for infrastructure improvements are largely evaluated based on a suite of criteria that gives little recognition to the impacts of active transportation. This is largely due to the lack of sufficient data. In order to identify key areas for active transportation enhancement, to justify investment, and to measure success, it is necessary to understand where and when people are participating in active transportation (e.g. bicycling).

The proposed project will yield a suite of products that include a conceptual framework to enhance NHDOT's capacity to accurately evaluate active transportation activity and project proposals, data-driven metrics for project prioritization and effective assessment, maps, thematic case study assessments, and technical GIS tools to automate summary of current and future Strava datasets. When considered collectively, we expect this project to improve active transportation accounting during project selection, monitoring, and evaluation which will ultimately lead to a more sustainable transportation network in NH.

Plymouth State University (PSU) presented this problem to the NHDOT Research Advisory Council in April 2016 with the support from the Bureau of Rail and Transit. **A Cooperative Project Agreement (CPA) was executed with PSU on October 26, 2016.**

Funding Notes:

Includes 10% indirect.



Project Details

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Title:

Active Transportation
Accounting: Developing
Metrics for Project
Prioritization

Project #:

Statewide-SPR 26962R

Start Date:

9/1/2016

End Date:

6/30/2019

Estimated Obligated Funds:

\$60,500.00

Estimated Project Budget:

\$55,000.00

**NHDOT SPR2 Program
FFY 2018 Proposed Projects**

**Airport Paint Study Implementation
Evaluation**

Statewide-SPR 26962T

Project Description:

Airport runways are marked with white paint and taxiways with yellow paint to allow pilots to easily identify where to land. NHDOT completed a research study, Project 15680J, in 2015 to identify the cause of staining of paint at airports. Project 15680J determined that iron oxides in the pavement aggregate were discoloring the paint making the white paint appear yellow and, therefore, made it more difficult for pilots to distinguish the runway from the taxiway, which could lead to extremely unsafe conditions.

The objective of this project is to evaluate performance of the recommended paint. Laconia Airport has experienced the paint staining. The recommended paint will be installed during the summer 2017 and this project will evaluate the paint for two complete years to determine the effectiveness of the treatment.

The Bureau of Aeronautics presented this problem statement which was approved by the NHDOT Research Advisory Council. It is anticipated that this work will be accomplished through a work order under an existing on-call contract managed by the Bureau of Aeronautics.

Funding Notes:

Includes 10% indirect.



Project Details

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Title:

Airport Paint Study
Implementation Evaluation

Project #:

Statewide-SPR 26962T

Start Date:

10/1/2017

End Date:

3/31/2020

Estimated Obligated Funds:

\$48,714.10 (Rev. 6/24/2019)

Estimated Project Budget:

\$44,285.55 (Rev. 6/24/2019)

**NHDOT SPR2 Program
FFY 2019 Proposed Projects**

**Improved Practices for Determining the
Infiltration Characteristics of Soils for
Design of Stormwater BMPs**

Statewide-SPR 26962U

Project Description:

Soil infiltration test results are utilized by Design personnel to assess the suitability of a site for various stormwater best management practices (BMPs). With the recent issuance of EPA's final Municipal Separate Storm Sewer System (MS4) permit rules, the need for such testing is expected to increase.

Current practice uses a variation of the borehole infiltration test prescribed in the NHDES Alteration of Terrain (AoT) rules using conventional drilling equipment in order to estimate infiltration rates. Testing protocols are time consuming and inefficient (approximately 4 hours per test interval), particularly when multiple sites or depths must be tested.

The proposed research will evaluate alternative methods for determining the infiltration rate of soils at potential BMP sites including side-by-side comparisons with current test protocols as well as calibration with grain-size analyses and permeability water tests performed in the laboratory. Appropriate formulas for converting field results to design infiltration rates compatible with AoT rules will also be developed.

The Bureau of Materials and Research presented the problem statement that was selected by the NHDOT Research Advisory Council in October 2018. It is anticipated that contracted services will be utilized for this project.

Funding Notes:

Includes 10% indirect.



Project Details

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Title:

**Improved Practices for
Determining the Infiltration
Characteristics of Soils for
Design of Stormwater
BMPs**

Project #:

Statewide-SPR 26962U

Start Date:

11/1/2018

End Date:

12/31/2020

Estimated Obligated Funds:

\$123,200.00

Estimated Project Budget:

\$112,000.00

**NHDOT SPR2 Program
FFY 2019 Proposed Projects**

**Using Data Analytics to Forecast Future
Bridge Conditions**

Statewide-SPR 26962V

Project Description:

Reliable data-driven forecasting models allow for public agencies to plan for future needs and resource allocation. Conditions of bridge assets are managed through maintenance, preservation, rehabilitation and reconstruction. The New Hampshire Department of Transportation documents the appropriate timing of these treatments in Recommended Investment Schedules (RIS). Adhering to a bridge's RIS extends useful service life. Quantification of the service life extension as well as how well bridges have adhered to Recommended Investment Schedules remains a challenge.

This proposed research will develop New Hampshire specific deterioration curves for key bridge elements based on collected bridge element condition data and maintenance records and, additionally, the framework to track adherence to recommended bridge investment strategies and determine the appropriateness of the strategies for New Hampshire.

The University of New Hampshire (UNH) presented this problem statement to the NHDOT Research Advisory Council in October 2018 with support from the Office of Asset Management, Performance, and Strategies (AMPS). It is anticipated that contracted services will be utilized for this project.

Funding Notes:

Includes 10% indirect.



Project Details

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Title:

Using Data Analytics to
Forecast Future Bridge
Conditions

Project #:

Statewide-SPR 26962V

Start Date:

11/1/2018

End Date:

12/31/2020

Estimated Obligated Funds:

\$176,000.00

Estimated Project Budget:

\$160,000.00

**NHDOT SPR2 Program
FFY 2019 Proposed Projects**

Log Jam Monitoring

Statewide-SPR 26962W

Project Description:

Many roads and highways exist close to streams that exhibit lateral instability (bank erosion). Conventional practices were to armor such locations, and these solutions are expensive, do not provide ecosystem value, and result in high mitigation fees. Natural channel design structures, such as engineered log jams, offer a greener, less expensive alternative to armor solutions. Route 16 in Errol, NH is an example. Extreme bank erosion requires road relocation and streambank stabilization. An engineered log jam has been proposed at the site and is to be constructed during the summer 2019. This is the first NHDOT such installation. Identifying the benefits of natural instream structures to replace conventional armoring solutions could result in significant cost savings on all such projects.

Bank and channel impact mitigation costs have been eliminated with the selection of the engineered log jam solution on the Errol project. Had conventional armoring been selected for this project, bank and channel impact mitigation costs were estimated to be \$101,000. At this writing, there is no demonstrated and documented information about engineered log jam solutions in New Hampshire, and although employed in the Pacific northwest, there is very limited information nationally as well.

A three-year project is proposed that includes eight months of pre-construction monitoring and two years of post-construction monitoring. The monitoring is broken into the following facets: hydraulic, structural, flora, and fauna. In addition the monitoring provides inspection to assess any need for maintenance or repairs.

The research objective is to document all salient aspects of engineered log jams relative to road planning, design, permitting, construction, and maintenance. In addition, stream system changes resulting from the engineered log jam will be documented.

The University of New Hampshire (UNH) presented this problem statement to the NHDOT Research Advisory Council in October 2018 with support from the Bureau of Highway Design. It is anticipated that contracted services will be utilized for this project.

Funding Notes:

Includes 10% indirect.



Project Details

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Title: Log Jam Monitoring

Project #: Statewide-SPR 26962W

Start Date: 11/1/2018

End Date: 12/31/2020

Estimated Obligated Funds: \$110,000.00

Estimated Project Budget: \$100,000.00

**NHDOT SPR2 Program
FFY 2019 Proposed Projects**

LED Snowplow Lights

Statewide-SPR 26962X

Project Description:

The NHDOT snowplow fleet currently uses halogen lights mounted on the push frame for night time snowplowing operations. Due to the excessive vibration, frequent bulb replacement is necessary. LED bulbs are less susceptible to vibrations and could reduce long term maintenance cost. Plow drivers have suggested that LED lighting improves their visibility while operating as well as reducing the fatigue experienced during extended hours of plowing. Mechanical Services does not have a firm policy on the use of LED headlamps and needs to determine if the fleet would experience benefits by using LED bulbs.

The proposed project will entail comparing the use of halogen bulbs to heated/non-heated LED bulbs. The in-house research project will target District 1 and 3 because of the available interstate and rural routes. Six operators and trucks per district will be equipped for the trial. The operators will include a variety of drivers who have preference to stay with halogen and those who favor LED. Through social media and/or online surveys, the Department's Districts will solicit feedback from the traveling public. Snowplow operators and supervisors will track the effect and collect feedback.

The results of this will support whether converting the NHDOT snowplow fleet from halogen bulbs to LED bulbs reduces maintenance requirements, increases service life, and improves operator visibility for safer snowplow operations. Additional benefits may include increase of employee morale and traveling public safety.

The Bureau of Highway Maintenance presented the problem statement that was selected by the NHDOT Research Advisory Council in October 2018. It is anticipated that this project will be performed in-house.

Funding Notes:

Includes 10% indirect.



Project Details

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Title:
LED Snowplow Lights

Project #:
Statewide-SPR 26962X

Start Date:
11/1/2018

End Date:
12/31/2020

Estimated Obligated Funds:
\$16,500.00

Estimated Project Budget:
\$15,000.00

**NHDOT SPR2 Program
FFY 2019 Proposed Projects**

**Assessment of Embedded Culvert Low Flow
Hydraulics**

Statewide-SPR 26962Y

Project Description:

In 2010, New Hampshire adopted new rules for the permitting of stream crossings. One aspect is that new culverts should have natural materials located at the stream bed. In culverts that are not open bottom, this means oversizing the culvert and embedding it (burying the bottom of the culvert). Often the material placed in the embedded culvert is specifically sized to match the native material in the stream as well as to be stable. This results in very coarse sediments. Being coarse, at low flows, water can completely disappear into these sediments leaving no aquatic habitat there. Thus, at the same time that culverts are recommended to be embedded, the practice is criticized for its impact on aquatic habitat.

The proposed research has two thrusts: to study constructed embedded culverts in NH as well as to complete literature review and interviews with the many other states requiring embedded culverts. In addition the contracting community will be interviewed to determine if there are limitations in the supply or placement of the embedment material. For the field monitoring portion, embedded culverts at various ages will be inspected at low flows for sediment imbrication. In addition the bed sediment particle size distribution at the time of inspection will be developed and compared to that of the design. Aquatic organism passage will be assessed at low flows.

The products of this research will be a diagnosis of the issue (real or perceived) and the elements of bed sediment design leading to successful embedded culverts that provide passage for aquatic organisms.

The University of New Hampshire (UNH) presented this problem statement to the NHDOT Research Advisory Council in October 2018 with support from the Bureau of Highway Design. It is anticipated that contracted services will be utilized for this project.

Funding Notes:

Includes 10% indirect.



Project Details

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Title:

Assessment of Embedded
Culvert Low Flow
Hydraulics

Project #:

Statewide-SPR 26962Y

Start Date:

11/1/2018

End Date:

12/31/2020

Estimated Obligated Funds:

\$82,500.00

Estimated Project Budget:

\$75,000.00

**NHDOT SPR2 Program
FFY 2019 Proposed Projects**

Use of Smart Rocks to Improve Rock Slope Design

Statewide-SPR 26962Z

Project Description:

Rock slopes pose a hazard to the traveling public when weathering processes dislodge portions of the slope that can fall into the road. Current ditch design practice relies on design criteria developed decades ago in different environments with different rock types. Current hazard rating practice rates the rock slopes based on semi-quantitative measures using a Rockfall Hazard Rating System (RHRS). Both the design of new rock slopes and the hazard assessment of existing rock slopes need improvement to increase safety against rockfall, construct better engineered slopes and reduce short and long term maintenance costs.

This proposed research project will conduct rockfall experiments with a smart rock on 10 rock cuts that are rated A or B according to the New Hampshire RHRS. The smart rock is a sensor system equipped with a 3-axis accelerometer and gyroscope, embedded in a regular rock, to measure impact (acceleration) and rotational velocity (gyroscope). The results of these experiments can be used to calibrate a model for rockfall simulation. Concurrent work funded through the STIC grant program is collecting highly detailed 3D point clouds for 20 A and B rated slopes. The results of the STIC work will serve as input for the smart rock models.

The calibrated rockfall model will be used, in conjunction with structural risk factors from the 3D point cloud, to further refine hazard ratings of rock slopes and prioritize remediation efforts. For new rock cuts, design slopes will be input to the model to refine catchment geometries.

The Bureau of Materials and Research presented the problem statement that was selected by the NHDOT Research Advisory Council in October 2018. It is anticipated that contracted services will be utilized for this project.

Funding Notes:

Includes 10% indirect.



Project Details

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Title: Use of Smart Rocks to Improve Rock Slope Design

Project #: Statewide-SPR 26962Z

Start Date: 11/1/2018

End Date: 12/31/2020

Estimated Obligated Funds: \$110,270.00*

Estimated Project Budget: \$100,250.00*

*revised 2/26/2019

**NHDOT SPR2 Program
FFY 2019 Proposed Projects**

**Optimization of Bead Application for
Painted Pavement Markings Maintenance
Application**

Statewide-SPR 42372A

Project Description:

NHDOT forces perform maintenance applications of painted pavement markings to roadways each year. Retroreflective beads are applied as part of the paint application for nighttime reflectivity. The application rate of beads can vary. Too little and the retroreflectivity wears away before annual re-application; too much and the beads are wasted. This study will research the optimum application rate such that minimum retroreflectivity is achieved for the life of the painted line (12-16 month) without unnecessary expense for beads.

The major tasks are outlined as follows:

- Establish a test deck with a series of painted lines, each with a different application rate of beads (6.0 pound/gallon to 9.0 pound/gal at 1.0 or 0.5 pound increments)
- Subject the test deck to traffic and winter maintenance.
- Test retroreflectivity regularly (2 month intervals)
- Evaluate reduction of retroreflectivity versus time and determine which application rate allowed minimum retroreflectivity to be maintained for 12 months and 16 months

Application rates for future maintenance will be adjusted to the optimum rate.

The Bureau of Traffic presented the problem statement that was selected by the NHDOT Research Advisory Council in October 2018. It is anticipated that this project will be performed in-house.

Funding Notes:

Includes 10% indirect.



Project Details

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Title:
Optimization of Bead
Application for Painted
Pavement Markings
Maintenance Applications

Project #:
Statewide-SPR 42372A

Start Date:
11/1/2018

End Date:
12/31/2020

Estimated Obligated Funds:
\$55,000.00

Estimated Project Budget:
\$50,000.00

**NHDOT SPR2 Program
FFY 2019 Proposed Projects**

**Unmanned Aircraft Systems (UAS)
Program Plan**

Statewide-SPR 42372B

Project Description:

Unmanned Aircraft Systems (UAS) are being used nationwide in an effort to improve safety, increase efficiency, increase quality, and reduce costs. A previous SPR2 funded research project tested UAS technology to ascertain the ability to assist NHDOT with operations, development, and the execution of transportation-related projects. In addition the study assessed UAS uses for other NH state agencies such as the Department of Safety.

In order to facilitate deployment of UAS in the day-to-day activities of NHDOT, a UAS program plan is needed that will outline the organizational structure and program requirements to support implementation of this valuable technology. As many DOTs are ahead or behind on UAS implementation, portions of this plan could be gathered from or shared with other states as well as other NH State agencies.

This proposed research project will develop a UAS program plan that may include but not limited to the following:

- Review regional and national research on UAS application on transportation-related projects
- Develop an internal policy for NHDOT UAS use. (NHDOT currently has a Commissioner Directive)
- Review and determine the ITS needs for UAS Data. (Hardware, Software, Storage)
- Determine current and future UAS budget needs
- Short, medium, and long term alternatives for future UAS uses
- Evaluate hiring a UAS consultant versus NHDOT UAS ownership
- Develop a public outreach plan, include addressing privacy concerns
- Develop a required safety plan for NHDOT UAS missions
- Evaluate and recommend UAS Legislation
- Determine and outline UAS skillset needs for NHDOT employees (current and future) to implement a UAS program.

The Bureau of Aeronautics presented the problem statement that was selected by the NHDOT Research Advisory Council in October 2018. It is anticipated that contracted services will be utilized for this project.

Funding Notes:

Includes 10% indirect.



Project Details

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Title:

Unmanned Aircraft Systems
(UAS) Program Plan

Project #:

Statewide-SPR 42372B

Start Date:

11/1/2018

End Date:

12/31/2020

Estimated Obligated Funds:

\$165,000.00

Estimated Project Budget:

\$150,000.00

**NHDOT SPR2 Program
FFY 2019 Proposed Projects**

Asphalt Mix Testing Improvements

Statewide-SPR 42372C

Project Description:

The importance of evaluating asphalt mix properties, to include the effect of aggregate structure and mineralogy, on cracking performance is being researched in Project 26962O. This evaluation will improve the process for selection and formulation of asphalt mixtures to resist cracking, which would result in long term cost savings and better ride quality.

The objective of this project is to make improvements to the process of testing asphalt mixes in-house to better assess the cracking (aging) characteristics of asphalt mixtures based on information learned from the cracking research project. Asphalt mixes have many variables to account for in testing including the Recycled Asphalt Pavement (RAP) content, the binder grade and content used, and the aggregate type and source. Revising the laboratory testing process to better handle and account for these variables will help improve the Department's ability to determine asphalt mix cracking characteristics, especially in consideration of where the asphalt mix would be used in the state and its position within the pavement structure.

This problem statement, presented by the Bureau of Materials and Research, was approved by the Department's Executive Office. It is anticipated that this work will be planned and completed through the State's Department of Public Works.

Funding Notes:

Includes 10% indirect applied to Federal Funding (80%) only.



Project Details

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Title: Asphalt Mix Testing Improvements

Project #: Statewide-SPR 42372C

Start Date: 1/1/2019

End Date: 12/31/2020

Estimated Obligated Funds: \$12,960

Estimated Project Budget: \$12,000

**Transportation Pooled
Fund Projects**

**NHDOT SPR2 Program
FFY 2019 Proposed Transportation Pooled Fund Projects**

**Core Program Services for a Highway
RD&T Program – FFY 2019 (TRB FY
2020)**

Project Description:

The TRB Core Technical Activities are the historical foundation of the Transportation Research Board (TRB). They consist of standing committee and task force activities, the TRB annual meeting, the state DOT field visit program, TRB publications, the TRB Library, and the Transportation Research International Documentation (TRID) database.

Lead Agency:

FHWA

Partners:

Nationwide participation

**Evaluation of Low Cost Safety
Improvements Pooled Fund Study**

Project Description:

The goal of this research is to develop reliable estimates of the effectiveness of the safety improvements that are identified as strategies in the National Cooperative Highway Research Program (NCHRP) Report 500 Guides. These estimates are determined by conducting scientifically rigorous before-after evaluations at sites in the U.S. where these strategies are being implemented. A steering committee, comprised of the pooled fund State DOT representatives, will provide guidance on the strategies selected for evaluation.

Lead Agency:

FHWA

Partners:

AL, AR, AZ, CA, CO, CT, DC, FL, GDOT, IA, IL, IN, KS, KY, LA, MA, MDOT SHA, MI, MN, MO, MS, MT, NC, ND, NE, NV, NY, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VA, WA, WI, WY



Project Details

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Project #: TPF-5(XXX)

Yearly Commitment: Varies

Commitment to Date: \$786,000.00

Committed Since: FFY 2009



Project Details

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Project #: TPF-5(317)

Yearly Commitment: \$5,000.00

Commitment to Date: \$35,000.00

Committed Since: FFY 2014

**NHDOT SPR2 Program
FFY 2019 Proposed Transportation Pooled Fund Projects**

Traffic Control Device (TCD) Consortium

Project Description:

The TCD Consortium, composed of regional, State, local entities, appropriate organizations, and the FHWA, focuses on establishing a systematic procedure to select, test, and evaluate approaches to novel TCD concepts as well as incorporation of results into the MUTCD. Projects that will evaluate the novel TCDs will be initiated and monitored and the results will be disseminated. The consortium will assist in MUTCD incorporation and implementation of results.

Lead Agency:

FHWA

Partners:

AL, CA, CO, CT, DE, FHWA, FL, GDOT, IA, IL, KS, MA, MDOT SHA, MN, MO, MS, MT, NC, NE, NJ, NV, NY, OR, PA, SC, TX, WI

New England Transportation Consortium

Project Description:

The New England Transportation Consortium (NETC) is a research cooperative where financial, professional and academic resources of the region are pooled to research and develop improved methods of dealing with common problems in the planning, design, construction, maintenance, rehabilitation, reconstruction, and operation of transportation systems in the participating states.

Lead Agency:

Maine

Partners:

CT, MA, ME, RI, VT



Project Details

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Project #: TPF-5(316)

Yearly Commitment: \$10,000.00

Commitment to Date: \$135,000.00

Committed Since: FFY 2007



Project Details

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Project #: TPF-5(373)

Yearly Commitment: \$100,000.00

Commitment to Date: \$1,850,000.00

Committed Since: FFY 1993

**NHDOT SPR2 Program
FFY 2019 Proposed Transportation Pooled Fund Projects**

**Clear Roads Winter Highway Operations
Pooled Fund (cont'd from TPF-5(218))**

Project Description:

The Clear Roads (Phase II) pooled fund project focuses on advancing winter highway operations nationally through practical, practice-ready research related to materials, equipment and methods. The project will address both operational and management research needs, investigating the most effective tools and practices for clearing snow and ice and for managing program resources, budgets and performance measures. Expanded support for implementation and technology transfer will be provided through the development of user manuals, training modules, peer exchanges, and quick turnaround syntheses of the most effective state practices from around the country.

Lead Agency:

Minnesota

Partners:

AK, AZ, CA, CO, CT, DE, IA, ID, IL, IN, KS, MA, MDOT SHA, ME, MI, MN, MO, MT, ND, NE, NV, NY, OH, OR, PA, RI, SD, TX, UT, VA, VT, WA, WI, WV, WY

Connected Vehicle Pooled Fund Study

Project Description:

The Connected Vehicle pooled fund study will provide technology transfer to transportation agencies and manufacturers to prepare for deployment of connected vehicle infrastructure. A multi-phase program will be established to facilitate research, field demonstration, evaluation, and technology transfer of connected vehicle infrastructure, vehicles, and applications.

Lead Agency:

Virginia

Partners:

CT, MDOT SHA, MI, MN, NJ, PA, TX, UT, VA, WI



Project Details

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Project #: TPF-5(353)

Yearly Commitment: \$25,000.00

Commitment to Date: \$250,000.00

Committed Since: FFY 2010



Project Details

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Project #: TPF-5(389)

Yearly Commitment: \$25,000.00

Commitment to Date: \$25,000.00

Committed Since: FFY 2019