An Introduction to State and National Transportation Research
Neil Mastin, PE – R&D Manager
June 2017
Covered in this Presentation

• NCDOT Research and Development Program Basics
• Finding Completed Research
• National Activities
• Successful and Ongoing Projects
• How you can be involved!
Research Program Basics
Annual Research Program

Match NCDOT research needs with expertise at universities and transportation research centers

Initiate ~20 - 30 new projects per year

More than 80 active research projects and programs

Nearly all NCDOT activities are eligible for research funding
Annual Research Program Goals

- Improve NCDOT Planning, Engineering and Business Practices
- Support NCDOT Operations and Maintenance Activities
- Conduct research that can be implemented
- Develop relationships with researchers so they understand the needs and operations of NCDOT to maximize research benefits
Annual Program FAQ

Who typically submits Research Needs?

- Anyone at NCDOT, with manager approval
- University researchers in coordination with DOT business units

Who decides on what projects are funded?

- NCDOT selects all projects through a multi step process

How long does it take for an Idea to become a project?

- Typically 1 year from close of solicitation period*
- *Contingency funds are available for rapid / off cycle needs
How long do Research Projects Last?

*Variable*

2 years is typical, can be as short as 6 months or as long as 3 years.

What types of Projects are common?

- Laboratory / Field Testing and Analysis
- Policy / Practice / Design
- Best Practice Synthesis
- Etc, etc.

How are Projects managed?

- Research Unit handles fiscal and contract portion
- Steering Committee reviews technical content
- Committee Chair is often the idea submitter
Project Selection Oversight

Research and Development Unit Oversees Overall Program

- Solicits Ideas
- Research Engineers Manage Projects
- Coordinates all Activities

Research Subcommittees Review and Recommend Proposals for Funding

- Environmental
- Structures and Geotech
- Pavement, Materials, Maintenance
- Planning, Policy and Transit
- Traffic, Mobility and Safety

Research Executive Committee Approves Work Program

- Senior Management
- Executives
How is Research Funded?

State Planning and Research (SPR) Part 2 – (0.5% of Annual Federal Allocation)
- Annual Work Plan (80% / 20% Match)
- NCHRP Studies (100%)
- AASHTO Pooled Fund Program (100%)

Federal Discretionary Funds
- Typically Grants - (Often 100% Federal)

State or Other Federal Funds
- TIP Projects
- Maintenance/Resurfacing Funds
- HSIP Funds etc
Updated Research Program Annual Timeline

May-July
Solicit Research Needs/Ideas from DOT and Universities

July-August
Research Needs Evaluated by Research Committees

August-September
Partner Universities Develop Proposals

October
Proposals Evaluated by Research Committees

November/December
Executive Committee Review

January
Award Notifications

March-May
Project Authorizations
FHWA Reviews Final Program

May-July
Program Implementation
Projects Start August 1

May-July
Program Implementation
Projects Start August 1

May-July
Program Implementation
Projects Start August 1

May-July
Program Implementation
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Past and Present University Participants

- Appalachian State*
- Duke
- East Carolina*
- Elizabeth City State
- NC A&T*
- NC Central*
- NC State and ITRE*
- UNC-Asheville*
- UNC-Chapel Hill and HSRC*
- UNC-Charlotte*
- UNC-Greensboro
- UNC-Wilmington
- Indiana State*
- Michigan State*
- Virginia Tech*
- Central Florida*
- Illinois
- Auburn
- Current Research

* Master Agreements
Technical Assistance

Need a quick hit project?

Lab testing?  White paper writing?  Survey conducted?

Try our technical assistance program

Managed by ITRE  Easily contract with expertise across the state  Limited to 80 hours of investigator time
NCDOT Web Resources

https://connect.ncdot.gov/projects/planning/Pages/ResearchAnalysis.aspx

Research Forms

Quarterly Newsletter

Current and Past Projects and Reports are Online

Easiest way to find us: Go to google and search for “NCDOT Research”
Finding Completed Research
Online Transportation Report
Research Resources

NCDOT Project Page
- https://connect.ncdot.gov/projects/planning/Pages/ProjectSearch.aspx

TRID Transportation Research Database
- Largest of its kind in the world
- https://trid.trb.org/

Google Scholar
- It’s Google, so you know there is a lot of data
- https://scholar.google.com/
Research Library Services
(If you need help finding it)

- Completely revamped and reorganized library
- On-staff Librarian provides Research Services - Has access to national databases
- Many engineering and transportation related books, journals, specs and other documents
- Historical information to the 1920s
- Board of Transportation Minutes

Online Catalog: [http://ncgov.nccardinal.org/eg/opac/home](http://ncgov.nccardinal.org/eg/opac/home)
National Research Activities
National Initiatives

- LTPP
- SHRP2
- AASHTO
- NCHRP

Long-Term Pavement Performance Study
Pooled Fund – NCDOT Manager
Research Advisory Committee Representative
Coordinator for NCHRP Pooled Funds

National Representative

ncdot.gov
NCDOT Research Overview
Transportation Research Board (TRB)

http://www.trb.org/Main/Home.aspx

- Largest Organization of Transportation Professionals in the World. Part of NASEM*
- Annual Meeting Brings together 12,000 practitioners, researchers and policy makers. Attendance is free to NCDOT employees
- Create a MyTRB count and become a Committee Friend or Member to stay on top of technical developments
- Sign up for free topical newsletters
- **Free** webinars! These often include PDHs and you can subscribe to notifications by topic
- Hundreds of journals and articles free to download with your DOT email address. Hard copies available as needed.

*National Academies of Sciences, Engineering and Medicine
NCHRP
National Cooperative Highway Research Program

[Link to website]

Managed by TRB, supported by States and FHWA

Approximately $44M annual budget (NC sends about $1.1M)

YOU can submit ideas

YOU can participate in project panels

Practical expertise needed to guide projects and move research into practice

NCHRP Project 20-44 design to help with that
Pooled Funds

http://www.pooledfund.org/

Managed by FHWA with NCHRP Support

A group of states decides that “XYZ” needs researching.

Proposal is written, funding is solicited from peers. If commitment is met, research is advertised

Each paying state gets at least 1 Technical Advisory Committee (TAC) Member

NCDOT currently participating in about 20.

• If you see something on the website above and have questions or wish to participate, let me know
AASHTO Technical Service Programs (TSPs)

http://sp.www.transportation.org/Pages/Programs.aspx

Funded by R&D and covers many support activities including:

- Lab Certification
- Continue access and update to LRFD
- Approved products evaluation
- Snow and ice support groups etc

DOT reps are assigned to each program
Local Technical Assistance Program (LTAP)

https://itre.ncsu.edu/focus/ltap/

Managed by ITRE

Technical and policy training for local agencies

“Roads” Scholar Program to train transportation workers and supervisors

NCTROADS is a mailing list for information exchange
Successful Projects and Ongoing Research

https://connect.ncdot.gov/projects/planning/Pages/ProjectSearch.aspx
RP2012-34
Enhancements to Precipitation Alerts

http://www.nc-climate.ncsu.edu/dot

This page shows a list of all projects that you are subscribed to receive precipitation alerts from. Each project has a list of associated sites. Accumulated MPE values are listed for all sites in text format. You can also view all projects.
994 pedestrian rail trespass casualties in U.S. last year – 23 in N.C.

Cameras installed along Piedmont rail corridor – Charlotte to Raleigh

Predictive model to estimate trespassing occurrences in high trespass locations
Storm Water Infiltration and Pollinator Habitat Zones Along Highways

Research plots to evaluate Vegetated Storm Water Control Measures (SCM) - critical for reducing storm water runoff

Quantify net benefits of roadside infiltration strips & SCMs

Monitor pollinator populations to quantify benefits of SCMs to pollinator communities
Multiple Projects
Finite Element Analysis of Guardrail Vehicle Impact

Are guardrail designs safe for different types of vehicles?
Non-corrosive Carbon Fiber-reinforced Polymer Reinforcement (CFRP) in Pre-stressed Cored Slabs

Internal steel reinforcement corrodes – especially bridges in marine environments

CFRP alternative to steel reinforcements

Destructive full-scale testing at NCSU CFL

RESULTS: complete design procedure developed

RESULTS: reduce frequency of maintenance, repair and replacement
RP2013-13

Improvements to NCDOT’s Wetlands Prediction Model

Desired improvements and automation in GIS predictive modeling based on NC Wetland Assessment Method (NCWAM)

Leading to automated identification/mapping riparian areas

Speeding the ability to characterize and develop high-level functional assessment of predicted wetlands based on NCWAM

Overall Goal: Improved LiDAR-based wetland prediction models with **highly automated, reliable** and **user-friendly** tools based on ArcGIS
Initial savings on one project = $350K

Cost of Project = $287K

Project has paid for itself

2-3 projects per year x 20 Years = $14M + in Savings

RP2013-13 Return on Investment
Pavement Research

Chip Seals

- Optimizing Gradations for Surface Treatments
- Quantifying the Benefits of Improved Rolling of Chip Seals
- Performance-Based Analysis of Polymer-Modified Emulsions in Bituminous Surface Treatments
- Over $5M expended over last decade to improve preservation technology

Seal Improvement Research
Examples of New Projects Kicking off in FY2018
New Initiative: Technology Transfer (T^2)

Beginning an effort to rapidly move completed state and national research into practice with a focus on implementation and field deployment

One project manager has been converted to an Implementation Manager to facilitate T^2 activities and track deployment across the agency of other projects

Officially Soliciting Tech Transfer Projects

New T^2 project to field test and validate the “Tack Lifter” developed during RP2014-03
One research project can have a large impact in several areas: Material Performance, Safety, Environmental Management, Congestion Management, Project selection, Policy Goals

A well designed project results in cost savings, efficiency improvements, longer lasting materials, safer highways – and more
Getting Involved
We Need Research Ideas!

R&D can help develop and refine need statements (or find someone that can)
Look for follow-up emails with reminders and info

Link to Research Need Form
Link to Research Need Form Instructions
## Getting Involved

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| Submit Research Needs Statements                             | - The Research and Development Unit is available to assist  
  - Forms are available on our [website](http://www.pooledfund.org)                                                        |
| Review Active AASHTO and FHWA Pooled Funds                    | - [www.pooledfund.org](http://www.pooledfund.org)  
  - Are there any in which you think NCDOT should participate?                                                            |
| Submit NCHRP Ideas                                            | - Projects that are large, national issues  
  - The R&D can assist in formulating ideas in detail                                                                 |
| Targeted research using Branch/Division/Unit funds and Master Agreements with Universities | - These agreements are low overhead  
  - Projects can be established quickly                                                                                     |
| Surveys: Need information on practices in other states?       | - We can distribute survey requests to all 50 states + AASHTO                                                                      |
**Contact Info**

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Research Connect Page (for Forms, completed and active projects and more): [https://connect.ncdot.gov/projects/research/Pages/default.aspx](https://connect.ncdot.gov/projects/research/Pages/default.aspx)

Thank You