NCDOT Research Overview
Neil Mastin, P.E. – R&D Manager

October 17, 2019
NCDOT Research Program Basics
# Components of the NCDOT Research Program

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<th>Contract Research – Primarily with Universities</th>
<th>In-house Research</th>
<th>Technology Transfer ($T^2$) and Implementation Support</th>
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<td>Short-term Technical Assistance</td>
<td>State and National Program Coordination and Support</td>
<td>Research Library and Reference Services</td>
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</table>
Why do we conduct research?

- Improve Planning, Engineering and Business Practices
- Support NCDOT Operations and Maintenance Activities
- Produce Innovative Usable Products and Processes
- Develop relationships with researchers and workforce development
What do we research?
Who conducts research?

Universities
Consultants
Annual Research Program

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

Initiate \(~20 - 30\) new projects per year

More than 100 active research projects and programs

Nearly all NCDOT activities are eligible for research funding
Research and Development Office Roles

- Contract Research with Universities and Consultants
- In-house research and implementation efforts with business units
- National Research Coordination
  - TRB, NCHRP, Pooled Funds
- Library and reference services (documents, research etc)
Research Library Services

Located in Century Center, Building B

On-staff Librarian, Lamara Williams-Jones, provides reference and research services

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
Universities Engaged in Research

- Appalachian State*
- East Carolina*
- Elizabeth City State*
- Fayetteville State*
- NC A&T*
- NC Central*
- NC State*
- UNC-Asheville*
- UNC-Chapel Hill*
- UNC-Charlotte*
- UNC-Greensboro
- UNC-Wilmington*
- Indiana State*
- Michigan State*
- Virginia Tech*
- Central Florida*
- Illinois
- Auburn

* Master Agreements

Current Research
Master Agreements – A Key Component

CONTRACT MA 2019-01

STATE OF NORTH CAROLINA

COUNTY OF WAKE

MASTER AGREEMENT FOR SERVICES FOR
RESEARCH, STUDIES AND TRAINING PROJECTS

This Agreement is entered into as of the 8th day of April 2019, by the NORTH CAROLINA DEPARTMENT OF TRANSPORTATION, (hereinafter called the “Department”), and NORTH CAROLINA STATE UNIVERSITY, a nonprofit educational institution organized and existing under the laws of the State of North Carolina, (hereinafter called the “University”),

Establishes basic contract terms with an individual school

Allows for very quick turnaround of Project Authorizations

Simplifies subcontracts across universities
How is NCDOT Research Funded?

- Federal State Planning and Research (SPR)
- Federal Grants
- State Highway Funds
- Federal Project Funds
- State discretionary funds
Program Development
Frequently Asked Questions about Research Projects

**How long do Research Projects Last?**
- 2 years is typical (Masters Program Length)
- Can be as short as 3 months or as long as 3 years
- Goal is to get the work done in an appropriate timeframe

**What do we pay for in projects?**
- PI Salary/Release Time
- Graduate and undergraduate student and postdoc Stipends
- Graduate student tuition
- Equipment / Supplies / Materials

**How are Projects managed?**
- Research Unit handles fiscal and contract portion
- Steering Committee oversees every project and reviews technical content
- Committee Chair is often the idea submitter
Research Program Annual Timeline

- **May-June**: Solicit Research Ideas from DOT Employees, Partners and Universities
- **July-August**: Research Ideas Evaluated by Research Committees
- **September-October**: Partner Universities Develop Proposals
- **November-December**: Proposals Evaluated by Research Committees
- **December-January**: Research Executive Committee Review
- **February**: Award Notifications
- **March-May**: FHWA Reviews Final Program
- **May-July**: Project Authorizations Signed - Projects Start August 1
- **August 1**: RFPs Issued
- **May-July**: Ideas collected by web form
- **RFPs Issued**: Ideas collected by web form
Project Selection Oversight

Research and Development Unit Oversees Overall Program

- Solicits Ideas
- Research Engineers Manage Projects
- Coordinate 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
Example Recent Projects
2017-15 Rail Corridor Trespass Severity Assessment

2018-16 Mechanically Fastened CFRP to Retrofit Prestressed Concrete and Steel Bridge Beams

RP2020-023: UAV Enabled Bridge Inspection

Investigating the use of UAV bridge inspection as a safe and economical alternative.

Testing and evaluating the performance of commercially available platforms for bridge inspections.

Developing flight control techniques to enhance the performance of UAVs in high turbulent flows.

https://connect.ncdot.gov/projects/research/Pages/ProjDetails.aspx?ProjectID=2020-023
RP2020-037: Economic Impacts of Transit Investments, Social Challenges, and Strategies for Sustaining High Ridership

Understanding the transformations expected to occur in urban areas due to transit investments.

Quantify spatial distribution of economic impacts of transit investments.

Estimate expected socioeconomic changes in the regions close to the proposed projects.

Technical Assistance and Implementation
Technical Assistance*

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<th>Quick Hit Efforts</th>
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<tr>
<td>Lab testing?</td>
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<td>White paper writing?</td>
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<tr>
<td>Survey conducted?</td>
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<tr>
<td>Short Project?</td>
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Try our technical assistance program and tap into university researchers across the state!

- Managed by ITRE
- Contract w/ Expertise across NC
- Limited to 120 hours of investigator time

*Has been a great way to engage new researchers in a low-risk, low-cost scenario
Implementation and Technology Transfer ($T^2$)

**What is Implementation?**
- Moving completed state and national research into practice.

**How is this accomplished?**
- Training
- Workshops
- Development

**Why is this program important?**
- Assist NCDOT in using research products and processes.

National Transportation Research Opportunities
National Initiatives

- Long-Term Pavement Performance Study
- Pooled Fund – NCDOT Manager
- National Center for Asphalt Technology (NCAT)
- TRB: Transportation Research Board
- AASHTO: American Association of State Highway and Transportation Officials
- SHRP2: Strategic Highway Research Program
- Research Advisory Committee Representative
- Coordinator for NCHRP Pooled Funds
Engagement Efforts and Resources
Research Office Works to:

- Connect researchers and DOT technical experts
- Hold meetings and roundtables at DOT locations to facilitate introductions and connections
- Visit campuses and laboratories to meet researchers and gain an understanding of expertise and facilities
- Establish long term relationships with talent
Thoughts on starting a new program:

- Develop an organized way to gather ideas – could be a website, could be a simple PDF form via email.
- Identify key champions in the organization – who is genuinely interested in research and would actively participate?
- Invite researchers for discussions with staff – this should include short presentations by the researchers on their work and interests.
- Start small – shorter, inexpensive projects that help everyone understand capabilities and what defines a successful outcome.
- Make it someone’s job responsibility to organize, track and manage. If this isn’t formalized, it will fall by the wayside quickly due to day to day fires.
NCDOT Web Resources

https://connect.ncdot.gov/projects/research/Pages/default.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”
## Contact Info

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Phone Number</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neil Mastin</td>
<td>Research Manager</td>
<td>919-707-6661</td>
<td><a href="mailto:jmastin@ncdot.gov">jmastin@ncdot.gov</a></td>
</tr>
<tr>
<td>Lisa Penny</td>
<td>Mobility, Safety, Roadway Design, etc.</td>
<td>919-707-6663</td>
<td><a href="mailto:lepenny@ncdot.gov">lepenny@ncdot.gov</a></td>
</tr>
<tr>
<td>John Kirby</td>
<td>Stormwater, Environment, Planning</td>
<td>919-707-6662</td>
<td><a href="mailto:jkirby@ncdot.gov">jkirby@ncdot.gov</a></td>
</tr>
<tr>
<td>Mustan Kadibhai</td>
<td>Pavement, Materials, Maintenance, Structures, Construction, Geotech</td>
<td>919-707-6667</td>
<td><a href="mailto:mkadibhai@ncdot.gov">mkadibhai@ncdot.gov</a></td>
</tr>
<tr>
<td>Curtis Bradley</td>
<td>Implementation Manager, Planning, Policy, Multimodal</td>
<td>919-707-6664</td>
<td><a href="mailto:cbradley8@ncdot.gov">cbradley8@ncdot.gov</a></td>
</tr>
<tr>
<td>Lamara Williams-Jones</td>
<td>Research Librarian</td>
<td>919-707-6665</td>
<td><a href="mailto:lcwilliams2@ncdot.gov">lcwilliams2@ncdot.gov</a></td>
</tr>
<tr>
<td>General Contact</td>
<td>Research</td>
<td>919-707-6660</td>
<td><a href="mailto:research@ncdot.gov">research@ncdot.gov</a></td>
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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)

Research Directory Page:
Thank You