RESEARCH & DEVELOPMENT NEWS

Fall 2019 Vol. 5, no. 1

FROM THE MANAGER

NCDOT Research and Development Office

Update – Fall 2019

Photo: Historic Stagville Enslaved Family Dwelling

2019 has been a big year for the Research and Development Office. The first item of note is the relocation of the Research Office to Century Center Building B from our old offices in the Raney Building. While the staff misses many aspects of downtown, this move provides several business advantages:

1. We are now better located for many customers
2. Rooms and parking are more plentiful for meetings
3. The library is much more accessible and we'll be expanding the collection. (Look for an open house in the next few months!)

In May, we held our first Research and Innovation Summit. Nearly 200 attendees spent the day on the campus of NC A&T State University learning about research activities and innovations occurring across the state. The summit included a great mix of public, private and academic representation, including Secretary Trogdon and Chief Deputy Secretary Howard. This event is expected to be the cornerstone of outreach and program development efforts going forward.

R&D welcomed Lisa Penny to our team this summer. She will primarily be managing Traffic, Safety and Design projects. Lisa spent nine years working on Process Improvement and Lean Six Sigma projects with the NCDOT Governance Office and brings a great new perspective to research. We look forward to her contributions to the research program.

Finally, the R&D office is in the process of launching 44 research projects for FY2020. This is a new record for the program that likely will not be broken any time soon. Theses projects cover the gamut of NCDOT activities. In addition to this, we'll soon be awarding grants for the new Centers of Excellence university consortiums. Look for news on this exciting development in the near future.

As always, if you have any questions or research needs, you can reach me at jmastin@ncdot.gov or 919-707-6661.

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NCDOT Hosts first-ever Research & Innovation Summit at North Carolina A & T University

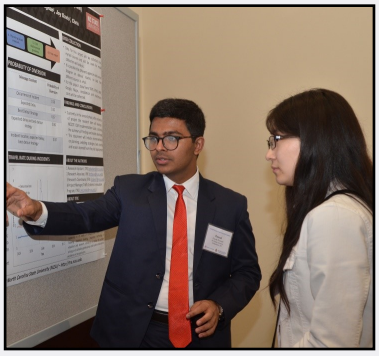
The NCDOT Research & Development Office hosted its first *Research and Innovation Summit* at North Carolina A&T State University on May 7, 2019. The purpose of the Summit was to showcase research results, innovative technologies and practices, provide an atmosphere to collaborate and discuss relevant transportation issues and archive/document next steps in addressing transportation related issues.

There were over 50 presentations and posters on a variety of subjects including:

- Traffic: Design & Safety
- Environmental & Hydraulics
- Multi-Modal Efforts: Bicycle & Pedestrian, Transit, Freight, and Rail
- Pavement Design
- Construction

Some of the morning breakout session presentations included *Innovative Data Collection & Analysis of Pedestrian Trespassing*, *Selection, Installation, and evaluation of zoysia grass for NC Roadsides* and *Sign Service Life.*

Afternoon breakout presentations included *The Economic Contribution of NC Ferry System, Maximizing First/Last Mile Transit Access and Capturing* the *Value of NCDOT Research* just to name a few.



One of the highlights of the event were the 20 posters presented by transportation research graduate students from across the state. The poster sessions allowed these students to engage and present their ideas directly with transportation decision makers.

Speakers for this event included Thomas P. Harman, Director for the Center for Accelerating Innovation at FHWA, NCDOT Chief Deputy Secretary David Howard. The lunch keynote was delivered by Secretary of Transportation, James Trogdon.

Curtis T. Bradley, Ph.D.

Research Implementation Manager

Recently Completed Research Projects

RP 2017-15 "Rail Corridor Trespass Severity Assessment ": Principal Investigator: Christopher Cunningham, Institute for Transportation Research & Education (ITRE), North Carolina State University

Project Manager: John Kirby

Photo: Camera Set-up

The NCDOT Rail Division currently has no baseline data on the universe of trespassing along the railroad right-of-way in North Carolina beyond limited data on trespass incidents resulting in fatalities and injuries as reported by railroads and the FRA. An analysis of historic trespass strike data, associated environmental features, and survey data provided by Amtrak train crews who travel along the portion of the North Carolina Rail Road under study, the communities with the highest trespass risk were identified as Durham, Mebane, Elon/Burlington, and Greensboro. Based on these previously identified hotspots this project involved the testing and deployment of a static thermal detection system for capturing railroad trespassing events and initial piloting of a dynamic thermal detection system.

The preliminary results from the event-based data collected at the Elon, Greensboro, Mebane, Durham, and Salisbury sites indicate that 1) the magnitude of trespassing at hot spots along the corridor is much greater than indicated by FRA incident reporting and Amtrak train crew surveys, 2) the majority of trespassing events are short in duration and involve crossing the tracks rather than movement along the right-of-way, 3) variability in time-of-day/day-of week/month-of-year patterns appear to be influenced by local environmental and population factors and 4) the profile of the average trespasser represented in the event-based data may not be consistent with the profile as defined with FRA incident data, particularly when analyzed at the local level rather than as a regional or state level aggregate.

Photo: Durham Trespassing Event

Image: Heat Map Trespassing Incidents

Additional analysis of the event-based data including model development is on-going and further testing of the dynamic thermal detection system is being completed in a separate effort.

Recently Completed Research Projects (continued)

RP 2017- 17 "North Carolina License Plate Production": Principal Investigator: James B. Martin, Institute for Transportation Research & Education (ITRE), North Carolina State University

Project Manager: John Kirby

Image: Georgia standard license plate background "Peach State."

The purpose of this study was to gather information related to the current North Carolina license plate production process. North Carolina employs the emboss-and-paint method, with the use of labor from the NC Correctional Institution for Women (NCCIW), which is owned and operated by Correction Enterprises. To compare associated costs and other criteria between North Carolina and states using an alternative process, digital printing for the production of all license plates (rather than using digital printing for only specialty and sometimes personalized license plates, like in North Carolina). To gather information related to the current NC license plate process, several tours, meetings and interviews between the research team and the DMV/DOT officials took place. To gather information about the digital printing process, three peer states were selected for their transition to a digital printing system for the production of all license plates – Indiana, Georgia, and South Carolina. In-person and/or telephone interviews took place with representatives of all three peer states, and tours of the license plate facilities were arranged, except in the case of Indiana, which was the furthest from us geographically. Additionally, a survey was disseminated through AAMVA (American Association of Motor Vehicle Administrators) to state DMV representatives; out of 50 states that were solicited, 28 responded to the survey, the results of which are included in the report. Although digital printing can produce high quality graphics, the current North Carolina license plate production process is cost-effective.

NCDOT R&D Participates in Arizona DOT Peer Exchange

Photo: Peer Exchange Attendees

The Research and Development (R&D) Unit of the North Carolina Department of Transportation (NCDOT) recently participated in Arizona DOT's *Engaging Internal Stakeholders Peer Exchange*. The peer exchange was attended by approximately 15 representatives from FHWA, Washington State DOT, Montana DOT, Mississippi DOT, and Iowa DOT. Each state DOT gave a presentation of their Research, Development and Technology Program, and how it operates; as well as how each state engages both internal and external stakeholders. Discussing how each state DOT, solicits, selects, values, funds, implements, each other's research projects is important to improving NCDOT's annual Research Program.

The three primary topics for discussion after each state DOT discussed their programs were;

- Identifying Research Needs
- Collaborate on Research Process
- Making Use of Research Findings

These three subject areas led to several key takeaways from this Peer Exchange; including:

- Best practices for engaging both internal and external stakeholders in the research idea process
- Structuring and formalizing the research process
- Proven practices for making use of research findings and narrating success stories

The group decided that increased visibility of our research programs within each respective state DOT would greatly enhance the quality and quantity of research ideas submitted every

(Continued on page 6)

Arizona DOT Peer Exchange (cont.)

year. And that once these ideas are selected and turned into completed projects, creating quick one-page research summaries for some of the more prominent projects would be helpful in disseminating the information to both internal and external audiences. The group believes that greater participation in the research idea process from a wider array of participants would result in a greater visibility and understanding of the importance of the research program in general.

Peer exchanges are required by the Federal Highway Administration (FHWA) for every state to host their own every five (5) years. Each Peer Exchange generally consists of between four (4) to six (6) state DOT representatives, a Transportation Research Board (TRB) representative, as well as FHWA officials from both their local state division office, and the national research office.

The primary philosophy of Peer Exchanges is for each state DOT Research and Development (R&D) program to *"examine and evaluate their own programs through a collaborative team of peers experts, and persons involved in the process, where the exchange of vision, ideas, and best practices could be fostered to benefit both their program and the program of the peer team participants"* – FHWA.

John Kirby

Planning, Environment and Transit Engineer

Librarian's Corner

by Lamara Williams-Jones

From the Archives

Foreign Visitors Study N.C. Roads- - From *North Carolina Highways and Public Works* Newsletter, September 1946

Raleigh—Four highway engineers from India and one from South Africa visited State Highway and Public Works Commission headquarters as part of a study of highway methods in North Carolina.

The five visitors were under the guidance of the Public Roads Administration. They spent much of their time in the materials and test laboratory with the engineers from India being particularly interested in soil research and research administration.

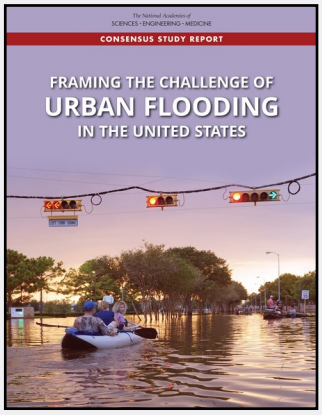
The group will next travel to Florida for study of roadwork there. Discussing road conditions in India, one of the engineers explained that his country had only 450,000 miles of roads as compared with 3,500,000 in the United States. The Indian government has a $300,000,000 postwar road building program planned, he added.

Library Notes

- Come across a resource you need that's not available in our Online Catalog? I may be able to get the item for you via Interlibrary Loan at minimal or no cost to you.
- Contact the NCDOT Librarian, Lamara Williams-Jones, for assistance: 919-707-6665, Monday through Friday from 8:30 to 4:30. Since there is only one Librarian, customers should call before visiting the Library.

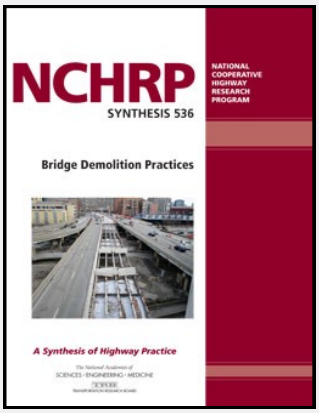
New Publications from Transportation Research Board

Framing the Challenge of Urban Flooding in the United States



The National Academy of Sciences, Engineering, and Medicine report Framing the Challenge of Urban Flooding in the United States examines real-world examples of the economic and social impacts of flooding in specific metropolitan areas. This report identifies commonalities and variances among the case study metropolitan areas in terms of causes, adverse impacts, unexpected problems in recovery, or effective mitigation strategies, as well as key themes of urban flooding. It also relates causes and actions of urban flooding to existing federal resources or policies.

Bridge Demolition Practices



Each year hundreds of bridges are rebuilt or are entirely replaced as part of highway construction projects. Bridge reconstruction or replacement work often entails demolition of part or all of the bridge structure. Unintended events resulting in injury, project delays, and traffic disruptions can occur and have occurred during bridge demolition activities. The intention of this synthesis report is to assist in better understanding how to reduce risk associated with bridge demolition. This synthesis documents practices used by bridge owners to manage and administer bridge demolition in construction projects.

Many more publication links can be found at TRB Publications by Subject

Calendar of Events

October 2019

- **NC DOT Board of Transportation Meeting, October 2-3(Meeting will be held in Division 11).**

November 2019

- **NC DOT Board of Transportation Meeting, November 6-7.**

NCDOT Research and Development Office General Information

How to find us:

We are located at

1020 Birch Ridge Dr, Building B

Raleigh., NC 27610

The Research & Development web page contains more information about the Office and what we do.

The Research Library's catalog is also available on the web.

NCDOT RESEARCH AND DEVELOPMENT

The Research & Development Office oversees transportation-related research that investigates materials, operations, planning, traffic and safety, structures, human environments, natural environments, and more. Please contact one of our engineers or the transportation librarian listed on this page if you have questions.

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RESEARCH & DEVELOPMENT