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## Surviving the TRB Annual Meeting

So you've decided to go to the 2017 Transportation Research Board Annual meeting? If you've been before, great! If you haven't – well, hold on and be prepared to do a lot of walking and experience huge levels of mental exhaustion.



The single best resource for TRB attendees is the Annual Meeting Website: <http://www.trb.org/AnnualMeeting/AnnualMeeting.aspx>

This site will allow you to browse all of the sessions and create a schedule of potential sessions to attend. You can also download a smartphone app (see page 6 for link) for iPhone or Android that will let you keep on schedule and navigate the venue. I highly suggest you over-program your schedule for each time slot. Why? You may sit down in a session and realize that it isn't exactly the topic you were hoping for – or maybe it's just flat-out boring. Having another alternative ready to go means you can just slide out and over to a new room. *Note that most topics are grouped near each other, making it easy to get to the next session.*

**For first-timers:** Attend the Orientation at 2:30PM on January 8th.

**Take a few notes:** All of the content from the meeting will be published online. However, if there is a key point or a key person you want to follow-up on, it's best to jot it down or type it up for later reference.

**Go to a committee meeting, and policy/hot topic sessions:** Most attendees are focused on particular technical tracks. Committee meetings can be useful because you learn about national initiatives and can meet key players in your technical areas. Policy and hot topic sessions help keep you informed on trends that affect our business and state. A lot of relevant information is communicated through these sessions.

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Meteor Lakes Byway  
Bladen Lakes State Forest

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## Recently Completed Research Projects

### [RP2014-32 - NCDOT Assessment of Automated Sign Retroreflectivity Measurement](#)

The Institute for Transportation Research and Education at North Carolina State University conducted a follow-up study to a previous North Carolina Department of Transportation (NCDOT) project, comparing mobile inventory data collection vehicles to manually-collected data techniques. In the previous studies, sign retroreflectivity readings were either captured with low degrees of accuracy or not captured at all. The follow-up study focused mainly on automated sign retroreflectivity capture, but also looked at vendor capabilities regarding other sign features.



**Image: Manual retroreflectivity measurement**

The results show that vendors can accurately locate the majority of signs. However, while vendors were unable to consistently capture sign retroreflectivity readings within 10% accuracy, a comparison of MUTCD pass/fail ratings for signs for these vendors showed that they captured ground-mounted signs with 88% and 97% accuracy, and overhead signs with 100% accuracy. Combining the sign location rates and the accuracy of the pass/fail comparison results in an overall accuracy ranging from 63% to 70% which is comparable to the accuracy achieved by other sign management methods.

Vendors also showed some consistency in capturing the lower retroreflectivity readings, which should be more important to the NCDOT, as MUTCD thresholds for failing signs are set at the lower level readings. Following location of the sign, vendors showed promise collecting many of the other sign features, such as MUTCD code and roadside orientation, which showed significant improvement from the previous study. This study shows that there is still room for improvement, but also exhibits the improvements that vendors have already made in capturing all sign features.

### [RP2014-07 - Determination of Bridge Deterioration Models and User Costs for NCDOT Bridge Management System](#)

The North Carolina Department of Transportation (NCDOT) currently oversees the design, construction, operation, maintenance, repair, rehabilitation, and replacement of more than 17,000 bridges. As funding to match the growing need for new infrastructure and for maintenance, repair, and rehabilitation (MR&R) of existing infrastructure becomes more difficult to obtain, maximizing the service life of existing bridges becomes increasingly critical. In support of data-driven planning, NCDOT's bridge management system (BMS) stores inventory data, including bridge characteristics, inspection data, and rating information, and uses deterioration models and economic models to predict outcomes and to provide network-level and project-level decisions.

The objectives of this project were to provide NCDOT with revised, updated deterioration models and user cost tables for use in the BMS software. Existing data in NCDOT's BMS was reviewed and steps to address data anomalies were identified and implemented.

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## Recently Completed Research Projects (continued)

Updated deterministic deterioration models were developed for the existing data on the family level, with components grouped into families using established *a priori* classifications. Additionally, a unique statistical regression methodology applying survival analysis techniques to better address characteristics of the historical condition rating data was developed and resulted in probabilistic deterioration models for bridge components and culverts that provide significantly improved predictive accuracy and precision over prior deterministic models.

### [RP2014-01- Improved Climatic Data for Mechanistic-Empirical Pavement Design](#)

In an effort to improve pavement design for North Carolina roads, NCDOT has adopted the AASHTOW are Pavement ME Design software. A critical component of the software is the Enhanced Integrated Climatic Model (EICM), which accounts for environmental effects. The EICM requires hourly historical climate records for the entire expected lifespan of the road, yet NCDOT presently has access only to small 5-year samples of climatological data from select locations. These short records must be repeated to fill in data for long analysis periods. Studies have shown that repeating small samples of climatic data may adversely affect pavement performance predictions.

This report describes the development of long-term, high-quality, historical climate data (HCD) files for use by the EICM at multiple locations across North Carolina. Ordinary kriging and other spatial and short-term temporal interpolation techniques address the significant gaps in data coverage present in the observational record so that the new HCD files consist of continuous hourly data that span a period of 35 years. Sensitivity tests assess the impact of the improved HCD files on

pavement performance predictions and reveal statistically significant differences in concrete pavement performance measures between Pavement ME Design simulations with and without the new HCD files. The new climate data more subtly influence pavement performance predictions for flexible pavement designs. Nevertheless, the poor quality of the original climate data samples warrants a recommendation that NCDOT use the improved climate files in the development of future pavement designs to boost confidence in pavement performance predictions.

### [RP2015-25- Maintenance Cost Index](#)

Maintenance activities account for a substantial portion of the life cycle costs of a roadway and are categorized by means of performance: contract maintenance by outside forces or in-house maintenance by DOT personnel and equipment. The nature and timing of the in-house maintenance tasks can be planned based on currently available asset performance models, but estimating the cost of future work requires knowledge of the current maintenance costs and the trends in maintenance costs.

The purpose of this research was to develop a set of maintenance cost indices that can be updated annually and used to quantify trends of in-house maintenance costs. Indices were developed for the Roadside, Maintenance, Traffic, and Bridge categories of the Standing Maintenance budget. A composite index was also developed to represent overall Roadway Maintenance. The indices were developed in a fixed base, Laspeyres index form with 2014 selected as the base period. A total of 20 maintenance tasks were selected for the basket of goods and collectively

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## Recently Completed Research Projects (continued)

accounted for 76 percent of recorded costs in the base year. The unit cost data recorded in work order records was not normally distributed and the median value was selected for use in the calculations. The total quantity for each task was also calculated from the work order records.

### [RP 2014-10- Retaining Wall Inventory and Assessment System](#)

Under Section 1106 of the "Moving Ahead for Progress in the 21st Century Act," also commonly referred to as "MAP-21," State agencies are required to "develop a risk-based asset management plan for the National Highway System to improve or preserve the condition of the assets and the performance of the system" [23 USC 119(e)(1)]. Thus, it is mandated that measures are put into place for highway assets that may potentially fail with aging. In the past, retaining walls were such assets that were often excluded from inventory programs and were regarded as non-critical or "lost" assets. With the recognition that wall failures may be detrimental to the roadway and the surroundings, and may pose a potential hazard to the safety of the public, sever-



**Figure: Enter New Retaining Wall data Menu**

al highway agencies have begun to incorporate retaining walls into their inventory and inspection programs. The primary goal of the research described herein was to develop a systematic means for cataloging and assessing the condition of permanent highway retaining structures for the NCDOT. The research products de-

veloped as a result of this study include a literature review of highway agencies with the most notable contributions in wall asset management, the development of data collection forms for inventory and condition assessment, a pilot study of (15) geographically distributed wall locations, short concise summaries of each field inspection, a field application study of (32) walls, and the design and development of a prototype database. Each of these products will be useful in providing the NCDOT the ability to establish effective and sustainable retaining wall maintenance and replacement priorities in support of MAP-21.

### [RP2014-06 - Quantifying Incidental Bicycle & Pedestrian Costs in Highway Projects](#)

Bicycle and pedestrian infrastructure is growing in importance to the public, and increasingly being incorporated into highway and bridge projects. However, systems have not been in place to track "incidental" expenses for bicycle and pedestrian accommodations within highway, bridge and interchange projects. This has made it difficult to understand the scope of the bicycle and pedestrian elements such as bicycle lanes, pedestrian sidewalks and bridge widening that has been included in highway projects and the cost of those improvements.

Incidental bicycle and pedestrian costs are those costs included in the budgets of larger, scheduled highway improvement projects. They can include bicycle lanes, sidewalks, intersection improvements, and widened shoulders. Adding pedestrian accommodations to bridges requires additional bridge width, increasing their structural costs. Projects funded exclusively for bicycle and pedestrian improvements (considered "independent" bicycle and pedestrian projects) are not included in this research. A detailed analysis of incidental bicycle and pedestrian expenses or guidance on quantifying incidental costs for bridge accommodations was not available to

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Lamara Williams-Jones, Research Librarian

## Some Recommended Resources in Transportation from the Eastern Transportation Knowledge Network



[Google Scholar](#) indexes hundreds of open access and subscription journals, books from the World-Cat database, conference papers and proceedings, white papers, and other academic materials posted on the Web. Google Scholar is not as comprehensive as many subject databases, but it is useful in that it provides one handy place to search across many different disciplines and subject areas.



The NCDOT Library is a member of the [Eastern Transportation Knowledge Network](#) (ETKN) which is a group of Transportation libraries and organizations from the Eastern U.S. AASHTO Regions 1 and 2. The group which formed in 2007 provides leadership in the implementation of strategies for transportation information management for the 21st century. ETKN collaborates with other regional networks and the [National Transportation Knowledge Network](#) (NTKN) in its effort to support the advancement of research and best practices for our nation's transportation infrastructure. ETKN has created a list of recommended resources including [TRID](#) which was covered in a previous newsletter. Other recommendations include:

### [US DOT Research Hub](#)



This database is a central location on projects funded by 10 U.S. Department of Transportation agencies. Database provides links to research reports and other products generated by completed projects.

[National Transportation Library](#) hosts a full-text digital repository of significant transportation resources. NTL collects and maintains electronic copies of research reports and statistical documents that have long-term usefulness and value to federal, state, and local transportation decision-makers, transportation analysts, and researchers.

### 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: 919-508-1820, Monday through Friday from 8:30 to 4:30. Since there is only one Librarian, customers should call before visiting the Library.

## Recently Completed Research Projects (conclusion)

researchers or other interested groups.

This report attempts to fill in these gaps and provide guidance and greater understanding of incidental expenses for bicycle and pedestrian elements. This report quantifies the costs for incidental bicycle and pedestrian elements in a sample set of North Carolina highway and bridge projects. NCDOT highway and bridge projects that contain bicycle and pedestrian elements and have sufficient data for analysis have been identified from July 1, 2011 to June 30, 2014. For those identified projects, detailed cost data have been summarized to analyze the bicycle and pedestrian incidental costs.

## Surviving the TRB Annual Meeting

**Don't forget the poster sessions!** Poster sessions are in a huge exhibition hall on the north end of the convention center and are also conveniently located near food vendors and exhibitors. Poster sessions have one big advantage over presentation sessions: You can interact freely with the presenters. Having a conversation can be a great way to learn more about a topic in more detail vs passively absorbing a presentation

**Take time to decompress:** Meetings, sessions and events are scheduled from 7:30am in the morning until 10:00pm at night. Make sure to take some time to recover and organize your thoughts. You will be exhausted at the end of the trip, and won't remember anything unless you give yourself time to recharge, most people can't just bounce from session to session to session without it all being a blur.

**Eat:** Be sure to eat or you will run out of steam. The Washington, D.C. Convention center is huge by any standard. Luckily, there are quite a few food options in the venue, including a permanent food court and vendors and food carts brought in for the meeting. In ad-

dition, there are fast food, fast casual and full-service restaurants within walking distance in all directions

Overall, enjoy the experience. Each annual meeting provides an opportunity to figure out how you plan to better survive and thrive the next time around.

Neil Mastin

Research & Development Unit Manager

### "There's an App for That"

**Get full session details:** The app provides more-detailed information than appears in this Final Program—including descriptions, individual presentation titles, and speaker names for all lectern sessions, poster sessions, and workshops.



# New Publications from Transportation Research Board

## [13th National Light Rail and Streetcar Conference: Transforming Urban Areas](#) :TRB Transportation Research E-Circular 213

Papers and discussions from a conference in November 2015 in Minneapolis, Minnesota which focused on how investments in light rail and streetcars may strengthen the entire transit network, contribute to regional mobility, and integrate successfully into the built environment. Sessions explored ways to plan, design, construct, maintain and operate light rail and streetcar systems.

## [Application of Pedestrian Crossing Treatments for Streets and Highways](#) :National Cooperative Highway Research Program 498

This synthesis compiles information on the state of existing practices regarding application of pedestrian crossing improvements, and does not produce new guidance. The report includes a survey of state departments of transportation (DOTs) and local transportation agencies, a synthesis of current recommended practice and policy guidance, and a literature review of safety evidence for more than 25 pedestrian crossing treatments.

## [Assessing, Coding, and Marking of Highway Structures in Emergency Situations](#) : National Cooperative Highway Research Program (NCHRP) 833 (3 Volumes)

**Volume 1: Research Overview:** Provides background information and an overview of the process, supporting manuals, and training materials used to help agencies assess highway structures in emergency situations.

**Volume 2 : Assessment Process Manual:** This manual is intended for managers who will oversee emergency response situations. The volume addresses prioritization, coordination, communication, and redundancy within the assessment process. The volume also identifies technologies that could be used to assess highway structures in emergency situations.

**Volume 3: Coding and Marking Guidelines:** A field manual for responders evaluating highway structures in emergency situations. The volume presents specific assessment procedures for structure types and example photos of damage that can be used to rate the damage level of each element of a structure.

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**Please note:** The National Academies Press; publisher of TRB publications now requires an email before downloading some publications to view. An account with [My NAP](#) is encouraged.

Many more publication links can be found on [NCDOT's TRB News Feed](#)

## Calendar of Events 2017

### January 2017

- NC DOT Board of Transportation Meeting, January 4-5, 2017
- TRB Meeting Annual Meeting, Washington, D.C. January 8-12, 2017

### February 2017

- NC DOT Board of Transportation Meeting, February 1-2, 2017



# NCDOT Research and Development Unit General Information

## How to find us:

We are located at 104 Fayetteville Street, Raleigh, in the Transportation Technology Center (formerly The Raney Building).

The Research & Development [web page](#) contains more information about the Unit and what we do.

The Research Library's [catalog](#) is also available on the web.

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## NCDOT RESEARCH AND DEVELOPMENT

The Research & Development Unit 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 listed on this page if you have questions.



## RESEARCH & DEVELOPMENT