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Participating in National Transportation Pooled Fund Studies

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The first question usually asked is “What is a Pooled Fund?” Quoting from the website <http://pooledfund.org>, “*The Transportation Pooled Fund (TPF) Program has existed for more than 20 years. It is a popular means for State Department of Transportation (DOT), commercial entities, and Federal Highway Administration (FHWA) program offices to combine resources and achieve common research goals. Pooling resources reduces marginal costs, and provides efficient use of taxpayer dollars. It also provides greater benefits to participating interests as compared to individual entities conducting or contracting for research on their own.*”

The TPF program is similar to the NCHRP (National Cooperative Highway Research Program), in that large resources can be made available and the scope of a project is often national or super-regional. It’s a bit different in that topics are directly chosen by peer states and the study is often more targeted. The program also has a wider mission including research, technology transfer, training and implementation than is as common in the Cooperative Research Programs.

It’s important to note that TPF studies must be sponsored by either a State DOT or the FHWA. That often lends a certain practicality to the work being performed. The Pooled Fund program is also cost-efficient with state funds as most projects can have a matching contribution exclusively from federal funds, meaning no state dollars are required. Each Pooled Fund lead agency manages all contract related and funding issues for the project, freeing the other members to focus on the technical content.

NCDOT Research and Development actively encourages employee participation in national and regional Pooled Fund Studies. In fact,

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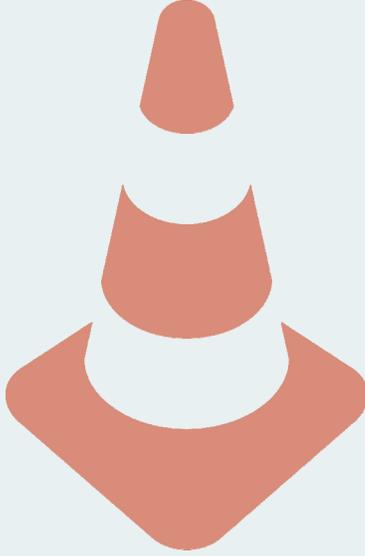


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Pedestrian and Bicycle Accommodation on Superstreets

Research Project 2012-13. Principal Investigator: Joseph E. Hummer, Ph.D., P.E., Professor and Chair
Department of Civil and Environmental Engineering Wayne State University (formerly with North Carolina State University)

Ernest Morrison

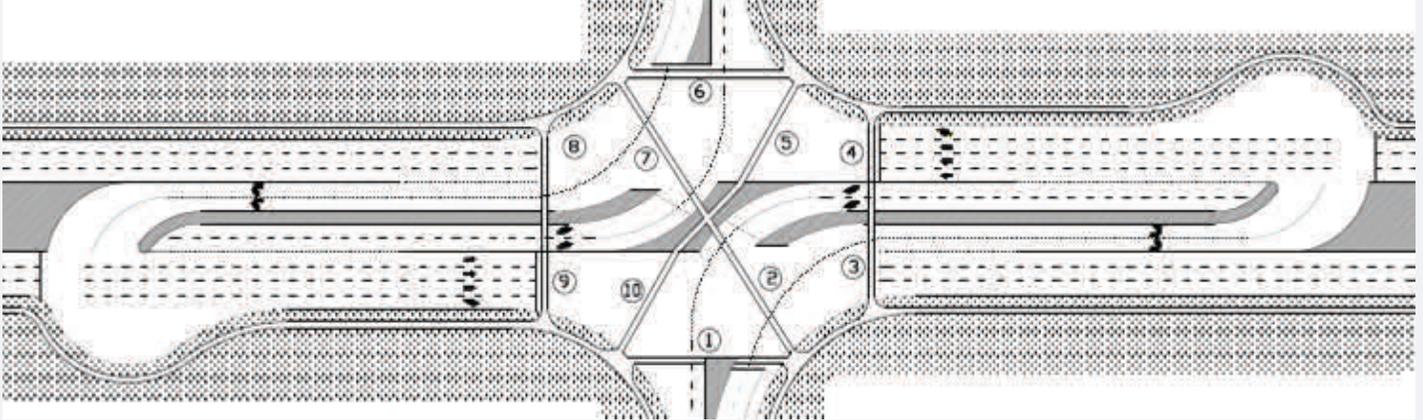


Figure: Two-stage Barnes Dance Cross

Superstreets, also known as J-turns or restricted crossing U-turns, have grown in popularity throughout North Carolina and other states in both rural and urban locations, primarily due to the benefits the intersection design brings to motor vehicles, which include decreased delay and a reduction in collisions. However, the intersection poses unique challenges to pedestrians and bicyclists that need to be addressed so that all roadway users may benefit from this intersection design. The objective of the research was to consider the unique challenges for pedestrians and bicyclists at signalized superstreet intersections and recommend crossing alternatives for both users. For pedestrians the options included the diagonal cross, median cross, two-stage Barnes Dance cross and midblock cross. For bicyclists the options included the bicycle U-turn as well as bicycles using the vehicle U-turn, the bicycle direct cross and the midblock cross. These options were analyzed through computer modeling

(microsimulation) based on average stopped delay per route, average number of stops per route, and average travel time per route. Furthermore, various parameters were analyzed for each of the crossing geometries including two signal cycle lengths, two signal splits, two signal offset designs, and two midblock distances.

The results for pedestrians showed that the two-stage Barnes Dance crossing produced the lowest values for average stopped delay, average number of stops, and average travel time. However, since the Barnes Dance is designed for an intersection with high volumes of pedestrians, the pedestrian option recommended for the typical signalized superstreet was instead a combination of the diagonal cross with the midblock cross.

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Pedestrian and Bicycle Accommodation on Superstreets (continued)

The levels that ultimately influenced travel time for pedestrians were a signal cycle length of 90 seconds rather than 180 seconds, a signal split of 60/40 rather than 75/25, and an offset signal design where the vehicle platoons arrived at different times rather than simultaneously. The results for bicyclists showed that the bicycle direct cross had the lowest average number of stops and the lowest average travel time. The bicycle option with the lowest stopped delay was the vehicle U-turn. The levels that produced lower travel time values for bicyclists included a cycle length of 90 seconds, a signal split of 75/25, and situations where the vehicle platoons arrived at different times rather than simultaneously. The recommended bicycle options for the superstreet were the bicycle direct cross and the midblock cross implemented together. Additionally, the research provided suggestions for public outreach materials in the form of a brochure developed with input from discussions with public focus groups.



Figure: View of crosswalks from mounted camera height at the intersection of University City Blvd. and Broadrick Blvd. in Charlotte, NC.

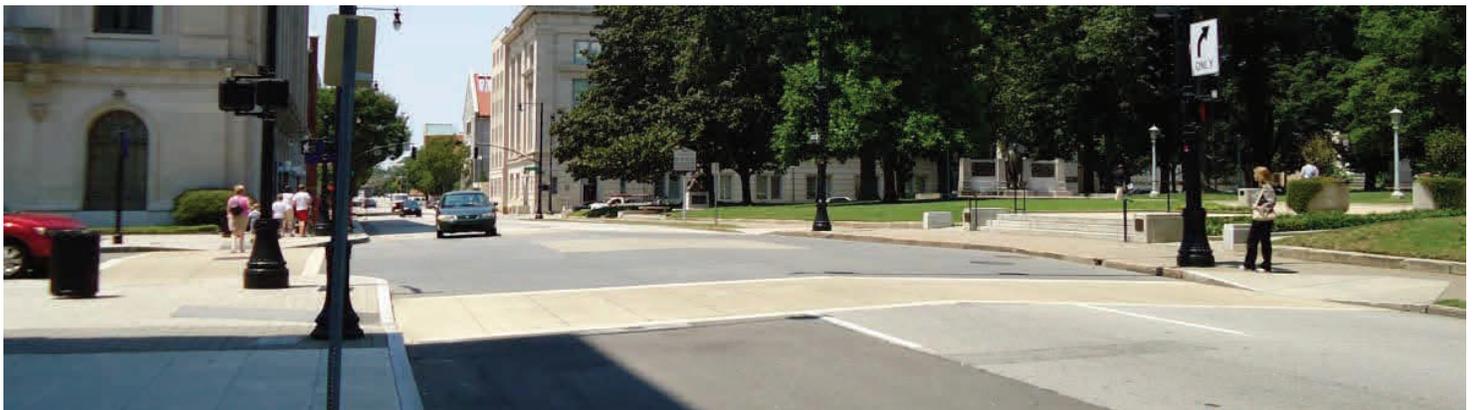


Figure: View of crosswalks from the base of the pole at the intersection of W. Morgan St. and Fayetteville St. in Raleigh, NC.

National Transportation Pooled Fund Studies (continued)

NCDOT Research and Development actively encourages employee participation in national and regional Pooled Fund Studies. At present, NCDOT personnel are currently engaged in over 30 Pooled Funds. Typically, a senior NCDOT Engineer or Manager will serve as a member of the Technical Advisory Committee (TAC) for each Pooled Fund project. TAC membership requires regular participation in review of documents, quarterly teleconferences and typically at least one annual face-to-face meeting. These face-to-face meetings are often arranged in conjunction with other national events and the travel costs are covered by the Pooled Fund. NCDOT Employees may receive active Pooled Fund solicitations from peers in other states or various AASHTO (American Association of State Highway and Transportation Officials) and TRB (Transportation Research Board) committees. The Pooled Fund website also has a list of [open solicitations](#) for browsing. If a solicitation has closed, but you have received a request to participate in a study, I can access the entire list of active projects and request the addition of NCDOT funding and personnel. Approval to join a Pooled Fund is subject to available funding in any given year, and if a request is exceptionally large, Research Executive Committee approval will be required for participation.

If you are interested in joining a Pooled Fund Study, a request can be made by completing and submitting a [Pooled Fund Participation Request Form](#) available on the Research [Connect Site](#). If you are interested in NCDOT potentially acting as a lead agency for a Pooled Fund, please contact me directly at jmastin@ncdot.gov or 919-508-1865.

Next Quarter: Making Use of NCDOT Research Web Resources

Determination of Bridge Deterioration Models and Bridge User Costs for NCDOT Bridge Management System

Research Project No. 2014-07 (Key Researchers: Tara L. Cavalline, Ph.D., P.E., Matthew Whelan, Ph.D., and Brett Tempest, Ph.D., UNC-Charlotte, Department of Engineering Technology and Construction Management / Department of Civil and Environmental Engineering)

F. Rasay Abadilla, Jr., P.E.

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. 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

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Determination of Bridge Deterioration Models (continued)

components and culverts that provide significantly improved predictive accuracy and precision over prior deterministic models. These models include transition probability matrices that account for the effects of design, geographic, and functional characteristics on deterioration rates over different condition ratings. These models were found to provide significantly improved prediction accuracy and precision over typical planning horizons used in network analysis. However, while this advanced model was found to best fit the historical condition rating data and provide unique insight on factors influencing deterioration over the life-cycle of each bridge component, it was also discovered that a simplified implementation of the probabilistic deterioration model was able to achieve similar performance without rigorously incorporating the effects of external factors on deterioration rates.

Inputs and methodologies utilized to compute user costs in NCDOT's BMS were updated and enhanced using relevant, current resources that were locally or regionally sourced when possible. Specifically, the updates and enhancements to the user cost models address ADT(Average Daily Traffic) growth rates, vehicle operating cost, vehicle distribution, vehicle weight distribution, vehicle height distribution, accident injury severity, accident cost, and an equation useful in forecasting the number of annual bridge-related crashes. Analysis performed to generate the bridge-related crash prediction equation resulted in the identification of seven bridge characteristics that are most associated with bridge-related crashes. A sensitivity analysis on user costs indicated that, in NCDOT's BMS, user costs are most sensitive to accident costs.

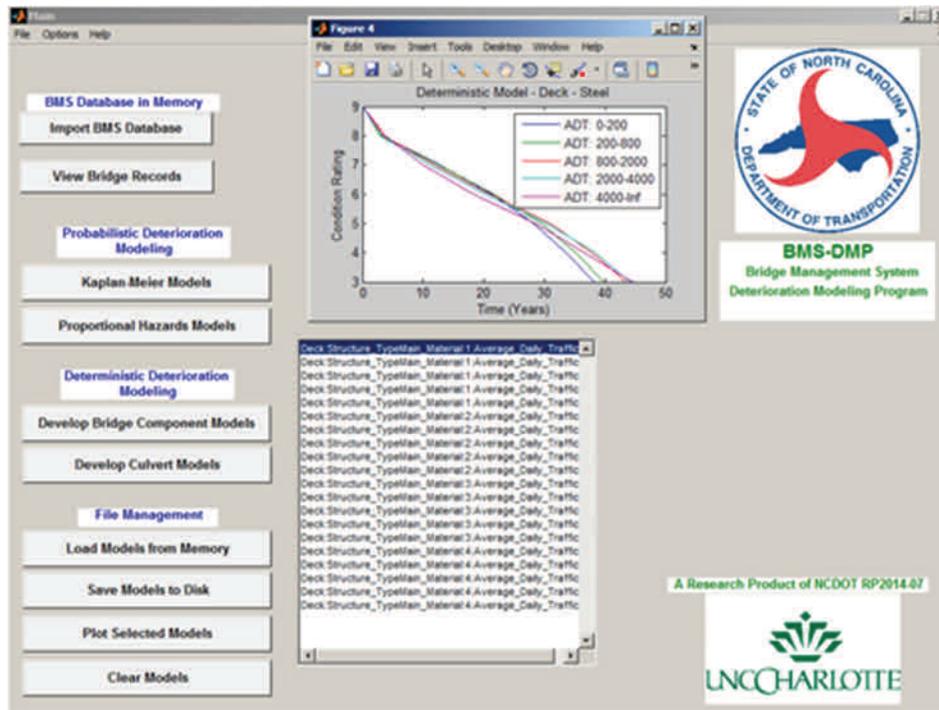


Figure: Screenshot of developed Windows-based graphical user interface (GUI) software for deterioration model updating

The revised deterioration models (both updated deterministic models and proportional hazards-based probabilistic models) and user cost inputs and methodologies developed as part of this work will increase the effectiveness of the BMS's ability to effectively perform economic analyses of bridges to establish MR&R priorities and to assess intervention options. This will assist in project candidate selection and MR&R decision making on the network-level and project-level.

New Publications from TRB

[Between Public and Private Mobility: Examining the Rise of Technology-Enabled Transportation Services](#): TRB Special Report 319

This special report analyzes how innovative transportation services, including ridesharing, carsharing, bikesharing, and microtransit, are changing mobility for millions of travelers. Such services could reduce congestion and emissions from surface transportation if regulated wisely to encourage concurrent, rather than sequential, ride sharing.

Construction 2015: Transportation Research Record (TRR) No. 2504*

This TRR consists of papers related to construction in the transportation sector. Titles such as Mapping of Practices of State Transportation Agencies for Consultant Oversight of Construction Engineering and Inspection Services and Comparison of Density Tests for Thin Hot-Mix Asphalt Overlays are just a sampling of the 18 papers in this journal.

***Please contact NCDOT Research [Librarian](#) for access to this publication.**

[State Practices for Local Road Safety](#): National Cooperative Highway Research Program (NCHRP) Synthesis 486

This synthesis focuses on changes in local road safety programs since the legislation of Moving Ahead for Progress in the 21st Century (MAP-21), and the use of Engineering, Enforcement, Education and Emergency Services (4E) approaches to local road safety.

[Training and Certification of Highway Maintenance Workers](#): National Cooperative Highway Research Program (NCHRP) Synthesis 483

Training and Certification of Highway Maintenance Workers documents front-line maintenance worker training and certification practices for highway transportation agencies in the United States and Canada.

[Transportation for Sustainability : An International Conference](#)

TRB's Transportation Research Circular E-C203: Transportation for Sustainability: An International Conference is the proceedings of a May 2015 conference held in Washington, D.C. that explored ways in which transportation systems can promote sustainability.

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

Calendar of Events 2016

April 2016

- NC DOT Board of Transportation Meeting, April 6-7, 2016
- National Library Week, April 10-16, 2016

May 2016

- NC DOT Board of Transportation Meeting, May 4-5, 2016

June 2016

- NC DOT Board of Transportation Meeting, June 1-2, 2016



By Lamara Williams-Jones

As transportation professionals, you should be aware and make use of the Transportation Research Board's (TRB) Transport Research International Documentation (TRID) database. It is the world's largest and most comprehensive transportation research database with more than 1.1 million records all of which are curated for their relevance to transportation. Starting your research with TRID gives you a head start with TRB/HRB (Highway Research Board) publications dating back to 1923, AASHTO (American Association of State Highway and Transportation Officials) publications, Federal/State DOT reports, University Transportation Center (UTC) reports and Research in Progress (RIP) project records as just some examples of its many resources.

TRID offers efficient searching and the easy-to-use advanced search tools allow for further tweaking. A basic keyword search can often produce too many results, as shown below, but the **modify** link in TRID allows for refining of results with options such as subject areas, source, result type and date range.

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| <input type="checkbox"/> | PROJECT: Life Cycle Cost Analysis of Pavement Preservation Treatments in Arkansas Arkansas State Highway and Transportation Department, \$170400, 2016, Programmed Actions: Preview Abstract | 2016-07-01 | Keywords: <input type="text" value="pavement preservation"/> Go |
| <input type="checkbox"/> | Expedient airfield runway repair using folded fibreglass mat International Journal of Pavement Engineering, Volume 17, Issue 4, 2016, pp 283-299 Actions: Preview Abstract View Full Document | 2016-04 | Languages: <input checked="" type="checkbox"/> English <input checked="" type="checkbox"/> German Go <input checked="" type="checkbox"/> French <input checked="" type="checkbox"/> Spanish |
| <input type="checkbox"/> | PROJECT: Roadside Vegetation Management of Invasive Plants to Benefit Biodiversity and MDOT Management Programs Maine Department of Transportation, 2016, Programmed Actions: Preview Abstract | 2016-03-31 | Date: <input type="text"/> to <input type="text"/> Go <small>Use YYYY or YYYYMM format</small> |
| <input type="checkbox"/> | Comparing the mechanical properties of cold recycled mixture containing coal waste additive and ordinary Portland cement International Journal of Pavement Engineering, Volume 17, Issue 3, 2016, pp 211-224 Actions: Preview Abstract View Full Document | 2016-03 | Sort by: <input type="text" value="Published / Start Date"/> |
| <input type="checkbox"/> | Extraction of Bridge Frequencies from a Moving Test Vehicle by Stochastic Subspace Identification Journal of Bridge Engineering, Volume 21, Issue 3, 2016, Content ID 04015053 Actions: Preview Abstract View Full Document | 2016-03 | Sort order: <input type="text" value="Descending"/> |
| <input type="checkbox"/> | Environmental and Economic Consequences of Permanent Roadway Infrastructure Commitment: City Road Network Lifecycle Assessment and Los Angeles County Journal of Infrastructure Systems, Volume 22, Issue 1, 2016, Content ID 04015018 Actions: Preview Abstract View Full Document | 2016-03 | Records per page: <input type="text" value="25"/> |
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Or And

Paper, Report, Contract, or Grant Numbers

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Result Type

- Subject Areas can ensure your results are in the proper context
- Source can limit to TRB, US DOT, State DOT among others
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|--------------------------|--|-------------|--|
| <input type="checkbox"/> | 1. Development of Performance-Based and Cost-Effective Rehabilitation Strategies for High-Traffic-Volume Flexible Pavement Transportation Research Board 95th Annual Meeting, 2016, 20p Actions: Preview Abstract | 2016 | Keywords: <input type="text" value="pavement preservation"/> <input type="button" value="Go"/> |
| <input type="checkbox"/> | 2. Hybrid Modeling Approach for Quantifying Maintenance and Rehabilitation Treatment Effectiveness of Asphalt Pavements Transportation Research Board 95th Annual Meeting, 2016, 17p Actions: Preview Abstract | 2016 | Result Type: <input type="text" value="All publications and pr..."/> <input type="button" value="v"/> |
| <input type="checkbox"/> | 3. Research on cracking mechanism and repair techniques of epoxy asphalt on steel bridge deck pavement Transportation Research Board 95th Annual Meeting, 2016, 15p Actions: Preview Abstract | 2016 | Subject Category: <input type="text" value="Maintenance and Preservation"/> |
| <input type="checkbox"/> | 4. Precision Study on Handheld Retroreflectometers for Measurement of Pavement Markings Transportation Research Board 95th Annual Meeting, 2016, 14p Actions: Preview Abstract | 2016 | Source: <input type="text" value="TRB - Transportation ..."/> <input type="button" value="v"/> |
| <input type="checkbox"/> | 5. Evaluating Needs of Road Maintenance in Sweden with the Mixed Proportional Hazards Model Transportation Research Board 95th Annual Meeting, 2016, 15p Actions: Preview Abstract | 2016 | Languages: <input checked="" type="checkbox"/> English <input checked="" type="checkbox"/> German <input type="button" value="Go"/> <input checked="" type="checkbox"/> French <input checked="" type="checkbox"/> Spanish |
| <input type="checkbox"/> | 6. Validation of Staged Construction Pavement Design Using the Falling Weight Deflectometer Transportation Research Board 95th Annual Meeting, 2016, 13p | 2016 | Published/started date range: <input type="text" value="201502"/> to <input type="text" value="201605"/> <input type="button" value="Go"/> <small>Use YYYY or YYYYMM format</small> |

☆☆ **Coming Soon**
New Library
Resources including
some PE Study
Materials

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.

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.

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RESEARCH & DEVELOPMENT