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NCHRP and Domestic Scan Programs

As fall approaches, it is time to consider if you have an idea for two great national programs: **NCHRP** ([the National Cooperative Highway Research Program](#)) and the Domestic Scan Program.

NCHRP is seeking ideas of National and supra-regional import. These should be ideas that are of critical importance in improving the quality of the highway and intermodal transportation systems.

NCHRP Problem submittals must be completed by October 14, 2016.

This is a firm due date. The R&D unit is here to assist with development of statements and our staff librarian can provide literature review services. NCDOT has been a long-time active participant and funder of the NCHRP program and this annual problem statement solicitation provides an opportunity to build research from the ground up that addresses state, regional and national needs.

A word document covering creation and submittal of problem statements can be found at [this NCHRP link](#).

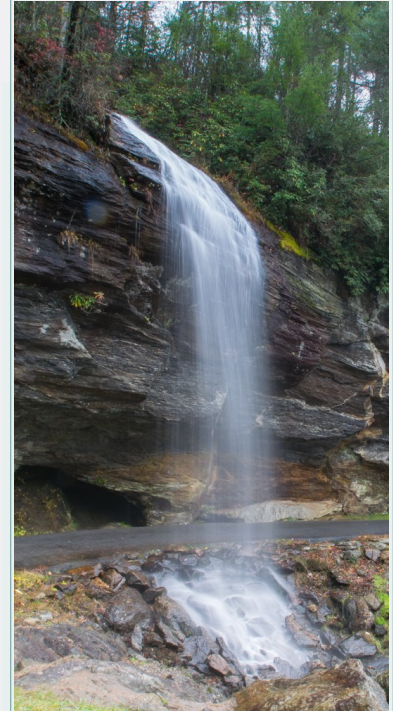
Domestic Scan ideas are due by October 15, 2016. Again, this is a firm date.

Domestic Scans are essentially traveling peer exchanges that encourage rapid dissemination of great ideas and best practices from agencies across the country. Please visit the websites below to explore the Domestic Scan Program. If you need assistance, R&D can help get your thoughts down and submitted. Note that a scan is neither a small research project nor a comprehensive survey of current practices but is focused on rapid deployment and learning.

Resources to help you prepare your proposal:

- [U.S. Domestic Scan Program](#)
- [What Makes a Good Scan Topic Proposal](#)
- [Domestic Scan Proposal Form For CY 2017](#)

Neil Mastin
Research & Development Unit Manager



The Waterfall Byway in Transylvania County



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Meet the Researcher

Dr. Youngsoo “Richard” Kim

By Lamara Williams-Jones

“This is the first in a planned series focusing on long term researchers who have conducted substantial work with NCDOT. “



Time flies when you are having fun, or in the case of Dr. Youngsoo “Richard” Kim when you have conducted as much research and mentored as many students as he has since coming to North Carolina State University in 1989. Now, some 27 years later, Kim is the [Jimmy D. Clark Distinguished University Professor](#) in the Department of Civil, Construction, and Environmental Engineering. Professor Kim has been an active and prolific researcher for the North Carolina Department of Transportation and national agencies throughout his career.

Dr. Kim’s academic and career paths, which led him to North Carolina, began in Seoul, South

Korea where he received his B.S., in Civil Engineering from Seoul National University in 1980. After three years of working as a Construction Engineer with Dong-Ah Construction, Kim and his family immigrated to the United States in 1982, landing in Fairfax, Virginia. After a series of odd jobs, he would be off to Texas A&M for graduate school with plans to return to South Korea after a Master’s Degree. To his surprise he found research in pavement so interesting that he decided to continue his studies and pursue his Ph.D. in Civil Engineering at Texas A&M.

Professor Kim did not have a plan to become one of the most active researchers in asphalt materials in the country, but instead wound up on that path by chance and necessity. His mother had given him \$3,000 for school and told him “that was it” and that he would need to figure out how to survive after that money was gone. Kim quickly learned after paying tuition and other fees that he needed to find a way to pay for school. The Construction Division of the Civil Engineering Department at Texas A&M did not offer assistantships to graduates in their first semester, but he received a bit of advice from alumni of Seoul National University in the area: Apply with the material group at Texas Transportation Institute. He followed that advice and ended up being

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Meet the Researcher

(continued)

offered three assistantships at TTI, ultimately choosing to work with Dr. Dallas Little. Little became his advisor as well as a lifelong mentor. Kim would go on to earn his Ph.D. in mechanistic modeling of asphalt mixtures, becoming the first Korean to do so.

With graduate school complete, Kim decided to stay in the U.S. but wanted to relocate to be near family in Virginia. He applied for and received a position at N.C. State University. His many years of experience in both the laboratory and field aspects of the performance and evaluation of asphalt materials and pavements is recognized by a total of \$ 15 million from national and international agencies including the National Science Foundation (NSF), Federal Highway Administration (FHWA), United States Department of Transportation (USDOT), National Cooperative Highway Research Program (NCHRP), NCDOT and private industry.

His first NCDOT Project was in 1989 as a co-principal investigator on a large stone mixture asphalt project with fellow NC State professor, Dr. Paul Khosla (also an active researcher for the NC Department of Transportation). In 1992 Professor Kim began his first NCDOT project as the Principal Investigator (PI), examining the structural condition of timber piles. Timber piles are large, debarked, pressure-treated logs that are driven into the ground as foundation support. Although this project was not in the area of asphalt research, he

enjoyed it and learned much about material behavior and non-destructive testing methods.

When asked what he enjoyed most about working on NCDOT Research projects (at least 28 so far), he responded, “I like that the projects allow me to work with people where things really matter and gain practical experience and input.” He cites [chip seal research](#) as an example, saying collaborating with DOT field engineers and chip seal crews who have worked with the products for 30 years gave him practical experience that informed the research and that he could take back to the classroom.



Picture: Chip Seal Construction

This practical experience, says Kim, is of tremendous value to his students because they can get lectures with actual applications rather than something from an outdated textbook. His students can then push the envelope from using what he has learned through his research for the NCDOT. In addition to the practical experience, the consistent

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Recently Completed Research Projects

[Delay and User Cost Estimation for Work Zones on Urban Arterials](#)

This report developed a methodology for quantifying delay and user cost impacts of arterial work zones in North Carolina in an analytical framework, supported by NC-specific empirical performance data of arterial work zones. NCDOT recently acquired a similar methodology for the evaluation of significant work zones on freeways, and this research aims to build on that prior effort to develop a companion tool for arterial streets.

[Evaluation of Life Cycle Impacts of Intersection Control](#)

This report provides guidance for NCDOT conversions of two-way stop controlled intersections to other intersection types to enhance the effective allocation of public funds. The findings of this project have been incorporated into the study's primary deliverable, the spreadsheet-based NCDOT Intersection Life Cycle Cost Comparison Tool, which combines enhanced HCM 2010 methodologies and standard cost benefit analysis methodologies to calculate the long-term net benefits of converting a two-way stop controlled intersections to three different intersection options.

[Exploring Corridor Operations in the Vicinity of a Diverging Diamond Interchange \(DDI\)](#)

This research effort examined the corridor impacts of various signal timing and geometric strategies to improve the operational challenges observed at DDIs. A microsimulation analysis was conducted using a calibrated and validated DDI modeled after the National Avenue and US-60 interchange in Springfield, Missouri. Four heavy volume scenarios were tested in combination with seven categories of strategies. These strategies were selected from a larger pool of strategies under the guidance of the NCDOT research panel and national expert recommendations.

[Performance Evaluation of 29-inch and 31-inch W-beam Guardrails on Six-lane, 46-foot Median Divided Freeways](#)

This report summarizes the research efforts of using finite element modeling and simulations to evaluate the performance of single-faced and double-faced NCDOT W-beam guardrails for different heights under MASH Test Level 3 (TL-3) impact conditions. A literature review is included on performance evaluation of W-beam guardrails as well as applications of finite element modeling and simulations in roadside safety research.

[Smartlink – Baseline for Measurement of Benefits](#)

The project included a comprehensive review to the state of the practice and research in ATMS performance measurement and provided justification, data needs, and calculation methods for eighteen recommended performance measurements. The project also developed and tested a method for categorizing route performance based on analysis of full travel time distributions and developed and prototyped a multi-level reporting system for ongoing monitoring and assessment of ATMS performance.

[Synthesis of Contemporary Guidance and Recommendations for \(A\) Pedestrian Signal Provisions and \(B\) Marked Crosswalks at Uncontrolled Approaches](#)

This research report is geared at providing guidance to NCDOT for when to consider marking crosswalks at uncontrolled approaches for pedestrians, installing pedestrian signal heads at existing signalized intersections, or providing supplemental treatments at a crossing location. The primary deliverable of the project, the crosswalk assessment flowchart, is intended to be a self-contained, wall-mounted poster that fully describes most aspects of the evaluation and decision-making process.

Meet the Researcher

(conclusion)

funding from state and national sources has helped to produce a steady stream of excellent graduate students who have worked on Kim's projects. He has advised at least 51 Ph.D. Students and 50 Master' students, with approximately 2/3 being supported from NCDOT funding.

Other by-products include 3 books, over 200 journal publications, and about 80 conference papers. These publications have contributed to the rising ranking of the NC State College of Engineering. This productivity has also benefitted the NC Department of Transportation with implementable research products, education of future DOT employees (some students go on to work for the agency and consultants after graduation), and national recognition of research, including high value research projects.

Highway Administration's [Performance Related Specifications](#)), mechanistic-empirical pavement design, chip seal design and specifications, and non-destructive testing analysis among others.

He sees many challenges remaining in the field of pavement technology for state agencies. Among the biggest is taking modern research and building workable, practical specifications and design practices. Since pavement is a system and built in layers, these interactions must be carefully considered in any design and specification developed.

Dr. Kim's research efforts for NCDOT can be found at [Research and Development's online archive](#).



Picture: Dr. Kim's Research Group

Dr. Kim specializes in many aspects of pavement engineering including performance modeling of asphalt materials (a basic concept in Federal

Dr. Kim shares some Interesting Facts about Asphalt Materials:

- Asphalt concrete heals itself, just like human skins heal.
- Asphalt materials behave very much like silly putty, which indents at just the slightest touch of the finger under long time but can be bounced on a hard floor and keep its shape.
- Asphalt concrete is very sensitive to temperature. The colder it is, the harder the material becomes and the less it deforms.

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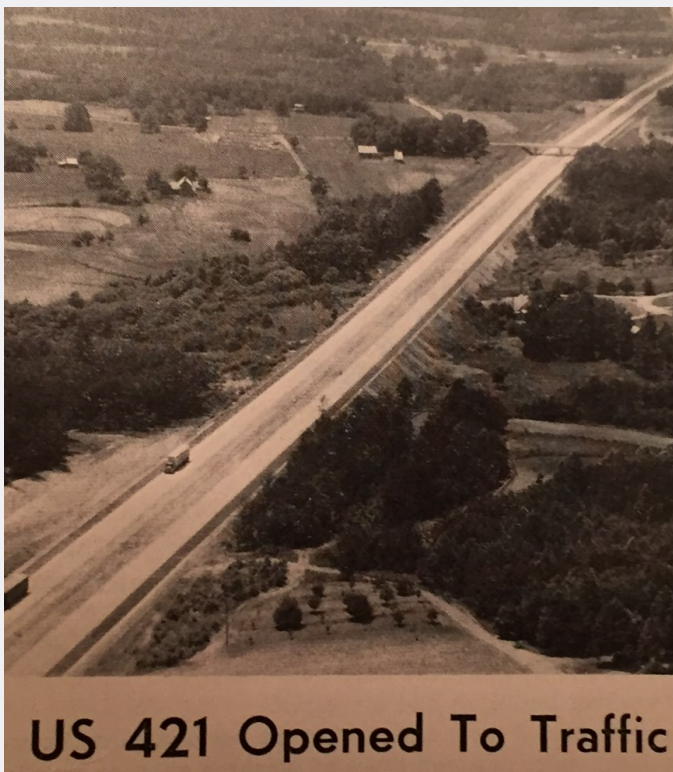
Lamara Williams-Jones, Research Librarian

From the Archives

Roadways Magazine

“A Magazine For Employees of the State Highway
Commission”

September-October, 1958



US 421 Opened To Traffic

US 421, from a point east of Kernersville to Greensboro, was officially opened to the public on Friday morning, August 1.

Of dual-lane construction, the 16.3 mile section of US 421 will eventually be incorporated into North Carolina's Interstate Highway network as [Interstate Route 40](#), which will extend from Greensboro to Los Angeles, California.

The highway is constructed according to the high design standards of the Interstate System, featuring 24-foot wide pavements with a 30-foot median

featuring 24-foot wide pavements with a 30-foot median stripe, 9-inch concrete and 10-foot stabilized shoulders.

There are seven diamond-type, one partial clover, one full clover and two fly-over type connections on the new highway.

The contracts for this project were let in two sections, with work beginning on September 6, 1955 and July 8, 1955. The first grading contract was awarded to J. K. Cecil & Son of Lexington at a contract value of \$537,300.71. Beaver Construction Company was awarded the contract for moving buildings at a cost of \$21,850.00; and John H. Brinkley of Thomasville was awarded the contract for structures at a cost of \$601,600.00.

W.E. Graham & Son was awarded the second contract at a cost of \$63,269.20. Jesse M. Coble was awarded the contract for structures for \$247,700.68; and Bare Brothers of West Jefferson was awarded the contract for moving buildings for \$13,000.00. Total paving contract for the project went to Ballenger Paving Company of Greenville, South Carolina for \$2,694,940. Right of Way costs for the job involved some \$771,000.00.

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.

New Publications from Transportation Research Board

[Emergency Communications Planning for Airports: Airport Cooperative Research Program \(ACRP\) Synthesis 73](#) This report explores emergency communications planning and is specifically designed for use by airport senior management, public information officers, and first responders and emergency managers.

[Estimating Highway Preconstruction Services Costs: National Cooperative Highway Research Program \(NCHRP\) 826](#) These two volumes present guidance for state departments of transportation (DOTs) and other agencies for estimating preconstruction services (PCS) costs for transportation project development.

Volume I: Guidebook addresses principal sources and components of PCS costs, PCS estimating methodologies, trends likely to affect PCS costs, and advice on agency policies and practices that can help control program risk through improved PCS cost estimation.

Volume II: Research Report documents the development, testing, validation, and packaging of an accurate, consistent, and reliable method for estimating PCS costs.

[Minimizing Roadway Embankment Damage from Flooding: National Cooperative Highway Research Program \(NCHRP\) Synthesis 496](#) This synthesis highlights major issues and design

components specific to roadway embankment damage from flooding. It documents the mechanics of damage to the embankment and pavement, and the analysis tools available.

[Self-Consolidating Concrete for Cast-in-Place Bridge Components: National Cooperative Highway Research Program \(NCHRP\) 819](#) This report presents recommended guidelines for the use of self-consolidating concrete (SCC) in cast-in-place highway bridge components

[Use of Reclaimed Asphalt Pavement and Recycled Asphalt Shingles in Asphalt Mixtures: National Cooperative Highway Research Program \(NCHRP\) Synthesis 495](#) Summarizes current practices for the use of reclaimed asphalt pavement (RAP) and recycled asphalt shingles (RAS) in the design, production, and construction of asphalt mixtures. It focuses on collecting information about the use, rather than just what is allowed, of high RAP, RAS, and/or a combination of RAP and RAS.

Please note: The National Academies Press; publisher of TRB publications now requires an email before downloading a publication 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 2016

October 2016

- NC DOT Board of Transportation Meeting, October 5-6, 2016

November 2016

- NC DOT Board of Transportation Meeting, November 2-3, 2016



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