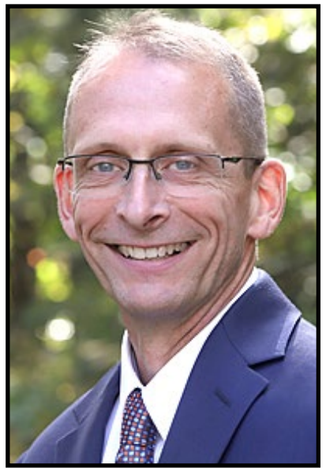
IN MOTION

A semi-annual update on research and innovation at VTRC.

Q3/Q4 2024 Newsletter
Virginia Transportation Research Council
January 2025

VTRC
Virginia Transportation
Research Council

A Note from Our Director



When we first launched *In Motion*, our newsletter designed to highlight research and innovation at VTRC, we distributed it on a quarterly basis. We are excited to announce that we will issue *In Motion* as a semi-annual publication, with this edition covering the third and fourth quarters of 2024. Inside this issue, you'll find updates on key developments at VTRC since July, including:

• Laboratory Enhancements: In previous newsletters, we shared updates on our efforts to upgrade laboratory equipment to improve the service quality for VDOT through research and technical assistance. Our latest enhancements represent a major overhaul, and I'm pleased to report that our labs are once again fully functional. As the transportation industry continues to rapidly evolve, we're committed to meeting the changing needs of the Department. For more details on these improvements, please see page three.

- Research Updates: We are excited to introduce an expanded Research Updates section in I*n Motion* on pages four and five. This feature provides concise summaries of VTRC published research, external publications and initiated research projects from the latter half of last year. We believe this section will be a valuable resource for you and encourage you to explore it. If you'd like a standalone copy of this section for your reference or to share, please feel free to reach out—we'd be happy to provide one.

We hope you find this information helpful, and we look forward to continuing our work together to advance transportation research and innovation across VDOT.

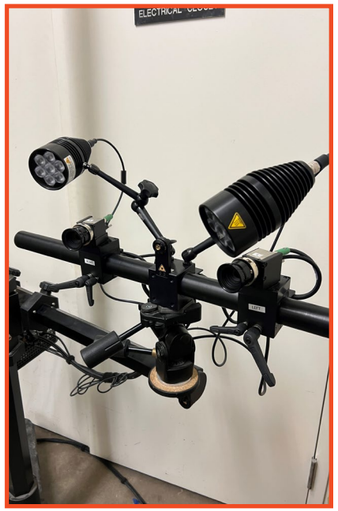
Michael Fitch, Director, VTRC

New Happenings

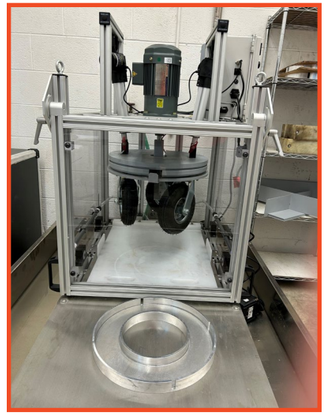
VTRC Research Labs Get an Upgrade

In recent months, VTRC has been adopting new tools and equipment in the research laboratories (labs) to enhance testing capabilities for VTRC's research projects. The outcome of VTRC's research projects help VDOT and other industry clients make more informed decisions to keep pace with the evolutionary practices in transportation.

VTRC has eight labs: Asphalt lab, structures lab, environmental lab, concrete lab, geotechnical lab, non-destructive testing lab, chemical and corrosion lab and a microscopy lab. All eight labs received equipment upgrades. Some of the new equipment includes a digital image correlation system in the structures lab that is used to determine the stress capacity of steel; a thermogravimetric analyzer in the environmental lab to measure changes in the mass of a material under controlled atmospheric conditions; and a three-wheel polishing device, used in the asphalt lab to stimulate the polishing effect of traffic to evaluate material resistance to polishing; among other new additions.



The digital image correlation system can help determine the stress capacity of steel beams for bridges and other infrastructure.



The three-wheel polishing device is used for friction testing in the asphalt lab.

"The new tools are crucial additions to enhance our research practices and understanding in order to provide data needed to make the most informed decisions in the twenty-first century of transportation," said Michael Fitch, VTRC Director. "We are excited to utilize the new tools in our research as we continue serving VDOT and the greater transportation community."

Research Updates

VTRC PUBLICATIONS

Evaluating the Effectiveness and Maintenance of Low Impact Development Designs for Stormwater Management: A Case Study Along Lorton Road in Fairfax County

Zhang, W., Ph.D., Burgis, C.R., Ph.D., Hayes, G.M., Ph.D., Henderson, D.A., Ph.D., and Smith, J.A., Ph.D, P.E.

This project evaluated the stormwater quality and quantity performance of four low impact development stormwater management systems along Lorton Road in Fairfax County: A bioretention basin, a grass channel, a compost-amended grass channel and a bioswale. The study also looked at the maintenance efficiency of these LID's with a focus on public health and environmental preservation.

Asphalt Mixture Variability and Its Effect on Balanced Mix Design Testing from Design to Production

Diefenderfer, S.D., Ph.D., P.E., Boz, I., Ph.D., P.E., Bowers, B.F., Ph.D., P.E., Wright, T.L., Yin, F., Ph.D., P.E., and Moore, N., P.E.

There can be inherent differences in the design of a BMD mixture in the laboratory and the actual production of the mixture through an asphalt plant for field application due to variability of the design mix usually being controlled in the lab. This research evaluated the variability and relationship between the design and plant production of control and BMD mixtures paved in 2019 and 2020 by comparing mixture and test variability determined under controlled lab conditions with variability of actual production conditions.

Mass Concrete Mixtures Optimized for Temperature Control and Workability

Ozyildirim, C.H., Ph.D., P.E., Sharifi, M., and Hossain, S.M., Ph.D., P.E.

Mass concrete is prone to thermal cracking, ultimate strength reduction, and deleterious chemical reactions due to a high temperature rise. Two primary purposes of this study were 1) develop mass concrete mixtures with cementitious materials content low enough to reduce temperature rise yet high enough to produce workable mixtures with good strength and 2) investigate alternative definitions for what constitutes mass concrete applications and propose future investigations that will verify the validity of the proposed alternate definition.

Reconsidering the Impact of Access Spacing on Crash Risk

Xie, K., Ph.D., Yang, H., Ph.D., and Dong, X.

This project investigated the effect of access spacing on crash risk using scientifically rigorous statistical methods and examined VDOT's current access spacing standards focusing on unsignalized access types located on principal arterials, minor arterials and collectors.

Factors Influencing Pedestrian Decisions to Cross Mid-Block and Potential Countermeasures

Xie, K., Ph.D., Yang, H., Ph.D., Ishak, S., Ph.D., Zhai, G., Ph.D., and Yan, Z.

This research examined factors that influence pedestrian decisions to cross at mid-block locations and identified potential countermeasures to enhance pedestrian safety.

Research Updates

EXTERNAL PUBLICATIONS

Assessing Regional Agency Interest in Truck Freight Planning Practices: Insights from Virginia, Transportation Research Record

Miller, J. and Parambil, N.V.

The Mobility Data Revolution: Opportunities, Concerns, and the Future, Roads & Bridges

Young, S., Fontaine, M., Gonder, J., Pack, M., and Turner, S.

Assessment of the Production Variability and Composite Performance Index for Conventional and High Reclaimed Asphalt Pavement Balanced Mix Design Mixtures, Transportation Research Record

Tong, B., Habbouche, J., Flintsch, G., Diefenderfer, S., and Boz, I.

INITIATED RESEARCH

Development of an Evaluation and Acceptance Process for Traffic Count Devices

Lan, C-L., Ph.D., Cho, H.W., Ph.D., P.E., and Zhao, M., Ph.D., P.E.

Evaluation of Moisture Susceptibility of Full-Depth Reclamation (FDR) Mixes

Boz, I., Ph.D., P.E., Diefenderfer, B., Ph.D., P.E., and Bowers, B., Ph.D.

Evaluating the Potential Use of Electric Pickup Trucks in VDOT Using Field Test Data

Robartes, E., Ph.D., and Goodall, N., Ph.D., P.E.

Estimation of the Benefits of Detour Trailblazing Signs on the I-81 Corridor in the Staunton Area

Lan, C-L., Ph.D., and Zhao, M., Ph.D., P.E.

Emergency Management Strategies for Electric Vehicles

Goodall, N., Ph.D., P.E.

Evaluating the Impact of Volumetric Properties and Reheating on the Balanced Mix Design Test Results

Kuchiishi, K., Ph.D. and Boz, I., Ph.D., P.E.

Developing a Framework for Large Animal-Vehicle Crash Risk: A Safe System Approach to Cost-Effective Safety Improvements

Donaldson, B., and Hamilton, I.

Long-Term Maintenance Needs and Costs of Green-Colored Pavement Markings and Flexible Post Delineators

Ohlms, P.B., Chen, T.D., and Brown, J.

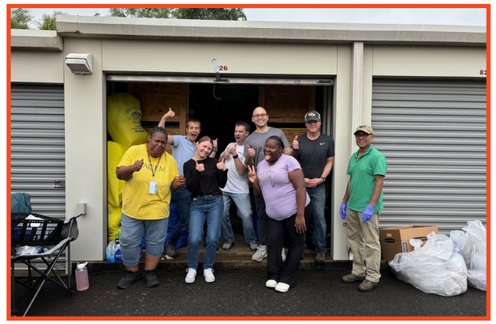
Field Performance of High Reclaimed Asphalt Pavement (RAP) Mixtures

Diefenderfer, S.

Other News

VTRC Lends a Helping Hand

In September, VTRC team members Peter Ohlms, Shabbir Hossain, Lance Dougald, John Miller, Jason Provines, Gabriel Arce and Erin Robartes participated in United Way's 2024 Day of Caring. The team volunteered with People and Congregations Engaged in Ministry (PACEM), an organization that coordinates shelter for the homeless. The team helped with preparing inventory and counting and organizing supplies to determine what is needed for the upcoming winter shelter season. Great job, team!



VTRC team members helped the PACEM team complete necessary inventory work in preparation for the upcoming winter shelter season.

VTRC Leads Lunch and Learns on Latest in Transportation

In partnership with the UVA Transportation Training Academy (VA Local Technical Assistance Program), VTRC organized a series of monthly Lunch and Learn webinars covering various innovative topics. VTRC staff led a Lunch and Learn during each month of the third and fourth quarter.

July: Research scientists Mo Zhao and Chien-Lun Lan presented, *"Congestion Analysis - Identifying Arterial Bottlenecks and Determining the Cost of Congestion Due to Incidents."*

August: Research scientist Brian Diefenderfer presented *"Advances in Pavement Testing and Rehabilitation."*

September: Hari Sripathi, OSI Director, presented, *"Emerging Technologies that Transform the Business of VDOT and the Transportation Industry."*

October: Research scientists Noah Goodall and Erin Robartes presented, *"Evaluation of Electric Vehicles in the VDOT Fleet."*

November: Associate Director Mike Fontaine presented, *"Experiences Using Variable Speed Limits on I-77 and I-95."*

December: Research scientist Ann Miller presented, *"VTRC Cultural Resource Projects,"* covering studies involving historic bridges, early roads and roadside monuments.

Other News

Steve Sharp now serves as the Associate Director for VTRC's Structures Team. Steve previously served as a Principal Research Scientist and has been with VTRC for over 22 years. Congratulations, Steve!

VTRC Leadership Team

Michael Fitch, Director, VTRC
Hari Sripathi, Director, Office of Strategic Innovation
Michael Fontaine, Associate Director, Safety, Operations and Traffic Engineering
John Miller, Associate Director, Environment, Planning and Economics
Steve Sharp, Associate Director, Structures
Hari Nair, Associate Director, Pavements
Kevin Wright, Implementation Coordinator
Donna Cognata, Business Manager

APPOINTMENTS

Kevin Wright was appointed Chair of the National Cooperative Highway Research Program (NCHRP) Project Panel, *Identifying Methods to Qualitatively Value Research for Transportation Agencies.*

John Miller was appointed Chair of the NCHRP Project Panel, *Defining and Assessing Transportation System Health to Achieve a Resilient and Sustainable Transportation System.*

Noah Goodall was selected to serve on the NCRHP Project Panel, *Emergency Management in an Electric Future: Guidelines to Increase Safety*.

Gabriel Arce was selected to serve on the NCHRP Projet Panel, *Concrete Shrinkage Measurement and Management Practices*.

Stacey Diefenderfer was selected to serve on NCHRP Project Panel 20-44(60), *Implementation of NCHRP Project 09-65: Capturing Durability of High Recycled Binder Ratio (RBR) Asphalt Mixtures* and NCHRP Synthesis Panel 20-05/Topic 56-02, *Design, Production, and Construction of High RAP Asphalt Mixture.*

Ilker Boz was selected to serve on the NCHRP Project Panel, *NCHRP 09-73 Guidelines for Storage of Asphalt Mixture and Performance Test Specimens*.

Amir Behravan was appointed an associate editor for the American Society of Civil Engineers Journal of Materials in Civil Engineering.

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