

## Minnesota Department of Transportation (MnROAD) National Center for Asphalt Technologies (NCAT)

### Partnership to Advance Research and Implementation

MnROAD and NCAT have partnered to advance pavement preservation research. Sharing resources and expertise will improve coordination of experiments and expand evaluation of pavement performance in both northern and southern climates, providing cost-effective solutions that can be implemented nationwide.

### National Effort to Validate Pavement Performance

Recognizing that improved pavement performance is an immediate nationwide goal, MnROAD and NCAT are interested in facilitating the validation of promising technologies through accelerated pavement testing. MnROAD and NCAT are full-scale test tracks that use real-world pavement construction, full-scale truck and live interstate traffic, all under actual climate conditions that effect pavement performance. The combination of traffic loading types and the range in climate conditions provide unique opportunities to address pavement performance issues.

### Knowledgeable Technical Staff

A closer relationship between NCAT and MnROAD is a logical progression in developing and evaluating new sustainable technologies, pavement systems and construction methods that lead to safer, quieter, lower cost and longer-lasting roads. Both organizations have core staff members with extensive experience in the operation and analysis of full-scale accelerated pavement testing. Furthermore, staff is continually engaged in technical committees and conferences related to pavement testing, analysis and performance, forming relationships with local, national and international pavement engineering experts. This provides access to breakthrough findings and technologies that can be utilized to conduct more effective and efficient research.

### Established Test Tracks

Both test tracks monitor pavement performance routinely for rutting, fatigue cracking, roughness, texture, friction, noise, and structural capacity. All test sections have instrumentation to measure dynamic vehicle load and/or environmental response. The data generated from the physical measurements and instrumentation is used for the development of pavement response models and, ultimately, improved mechanistic-empirical design procedures.

#### NCAT



The National Center for Asphalt Technology was established in 1986 as a partnership between Auburn University and the National Asphalt Pavement Association Research & Education Foundation to provide practical R & D for maintaining America's highway infrastructure.

NCAT has 46 different test sections on its 1.7-mile oval track. Sections are sponsored on three-year cycles by state DOT's, FHWA and industry. Sponsors have specific research objectives for their sections and shared objectives for the whole track.

#### MnROAD



MnROAD is owned and operated by the Minnesota Department of Transportation in Albertville, Minnesota. Established in 1994, the test track consists of a 3.5 mile Interstate (I-94) roadway and a 2.5-mile closed loop low volume road (LVR) simulating rural roads. The Interstate diverts live traffic for its loadings and the LVR uses a fully loaded 80K 5-axle semi driven five days a week.

MnROAD has 50 different test sections. Research is sponsored by state DOTs, Minnesota Local Road Research Board, FHWA and industry. MnROAD is in its 2<sup>nd</sup> phase of research and developing its 3<sup>rd</sup> phase, scheduled for 2016.

## Building on Successful Research and Implementation

Both MnROAD and NCAT have both completed projects with a national impact on improved pavement technology and performance. Each project has demonstrated a high rate of return on customer investments.

NCAT	MnROAD
<p><b>Superpave mix design methodology</b> was refined to improve durability using results from the Pavement Test Track to lower gradation levels, shift to fine-graded blends, and establish best practices for the use of modified binders.</p> <p><b>Warm Mix Asphalt</b> implementation was accelerated in the 2003 research cycle in some of the oldest and best documented test sections in the United States.</p> <p><b>SMA and OGFC mix use</b> was expanded by redefining aggregate quality specifications to improve availability and by utilizing reclaimed and recycled materials.</p> <p><b>Thin overlays</b> were shown to provide enhanced cracking resistance and excellent rutting performance.</p> <p><b>Structural pavement design</b>, using E, M-E, and stochastic methods, were calibrated to modern methods/materials.</p> <p><b>Reclaimed and recycled materials</b> in high binder replacement mixes were proven to have the potential to reduce construction cost and extend pavement life.</p> <p><b>Life-extending benefit of pavement preservation</b> is being defined for an array of flexible pavement preservation treatments and treatment combinations.</p>	<p><b>Low temperature cracking</b> has been greatly reduced for new roadways using MnROAD findings. Mixture fracture energy (DCT Testing) is being implemented.</p> <p><b>Warm Mix asphalt</b> is performing very well at MnROAD and is the standard asphalt specification used in Minnesota.</p> <p><b>Innovative diamond grind</b> has been demonstrated to improve ride and reduce noise on concrete pavements and is being used in Minnesota and nationally.</p> <p><b>Stabilized Full Depth reclamation</b> was shown to be an effective rehabilitation method. Improvements made to materials have been made and MN has increased its usage.</p> <p><b>Whitetopping</b> (concrete over asphalt) has proven to be a valuable rehabilitation option. Training is being prepared for national implementation.</p> <p><b>Drainage</b> has been shown to affect both HMA and PCC pavement deterioration if not properly accounted for.</p> <p><b>Timing of preventive maintenance (PM)</b> studies indicate that aging impacts asphalt mixtures within one year. Key findings to determine when to apply PM techniques.</p>

### Pavement Preservation

Pavement preservation techniques are very cost-effective when applied to the right road at the right time, with benefit-cost ratios as high as 10:1. Accelerated testing at MnROAD and NCAT provides unique opportunities to determine the field performance of breakthrough materials and pavement preservation concepts without the risk of failure that local and state agencies are unwilling to accept. Each facility has a history of evaluating the performance of pavement preservation treatments, including chip sealing, micro-surfacing, crack sealing and thin overlays. To address needs in both northern and southern climates, similar test sections are being developed at each facility to address national issues. Recognizing the long-term nature of measuring the impact of some pavement preservation treatments, both MnROAD and NCAT are pursuing off-site test locations on existing roads and highways that can be easily monitored.

### Asphalt Pavement Advancements

NCAT and MnROAD have long histories advancing asphalt technologies. Both have been involved in comprehensive laboratory testing and analyses, the development of new asphalt testing methods and field validation of laboratory findings with full-scale accelerated pavement testing. Through this partnership, future asphalt technologies will be developed more efficiently over a wide range of climate and traffic factors.

### Become a Partner

MnROAD and NCAT have established histories of producing cost-effective research findings with a national impact. We invite you to consider this partnership when soliciting organizations to conduct your research. Our combined strength will provide the most cost-effective solutions to the national issues that public agencies are facing.