

MnROAD – 2014 UPDATE

The Minnesota Department of Transportation will be celebrating MnROAD's 20th anniversary this summer, August 6, 2014. Over the years MnROAD has been very successful in producing implementable research that has provided benefits for its research partners. As phase-II draws to a close, MnROAD is again looking to its research partners within the Local Road Research Board, TERRA members, other States, industry and academia to help develop and fund the future MnROAD test sections and research expected to begin in 2016.



MnROAD consists of three unique road segments consisting of nearly sixty 500 foot test sections:

- 3.5-mile [mainline](#) interstate roadway with "live" traffic (29,000 vehicles/day with 13% trucks)
- 3.5-mile bypass interstate roadway carrying "live" traffic when not on the mainline.
- 2.5- mile closed- loop, [low- volume](#) roadway loaded with an 80,000 pound 5-axle tractor-trailer.

Phase-I (1994-2006) research theme was focused on the structural design of concrete, bituminous, and gravel pavement designs. Outcomes showed that our past pavement designs were too conservative and environmental factors were not fully taken into account when selecting materials. The benefits included a reduction in thermal cracking around the state, scientific based seasonal load policy, reductions in required surface thickness, along with the importance of sealing pavement cracks and shoulder joints.

Phase-II (2007-2015) research included over 20 initiatives that included seven national pooled fund studies and a major reconstruction of MnROAD test cells. Some of the benefits included:

- **Concrete Overlay Designs.** Multiple studies related to improving the design for both unbounded concrete overlays and concrete overlays of asphalt pavements "whitetopping". This includes computerized design software and recommendation for long life overlays.
- **Recycled Unbound Pavement Materials.** Strength, deformation, and material performance of recycled aggregate base applications were studied. Includes recycled concrete and asphalt pavements.
- **Full Depth Reclamation Stabilized with Engineered Emulsion.** Study of the structural design and field performance of stabilized full-depth reclamation layers built from a highly cracked asphalt roadway. Excellent performance for only having a three inch asphalt surface layer.
- **Field Investigation of Polyphosphoric Acid Modified Asphalt.** MnROAD is studying the effects of acid (PPA) binder modification in laboratory and field performance of modified asphalt mixtures and to date have not seen a difference in performance to typical SBS modified asphalt.
- **Composite Pavement Study.** Two studies including SHRP-II R21 have been completed to help demonstrate this sustainable design and low maintenance long lasting roadway.
- **Effects of Implements of Husbandry "Farm Equipment" on Pavement Performance.** Large and heavy farm equipment stress and strain behavior was compared to the MnROAD 5-axle semi on two test sections. Cost effective solutions have been developed to minimize damage.
- **Pervious Concrete and Porous Asphalt studies.** Five test cells were built on the low volume road and have outperformed the expectations related to pavement performance and drainage. Areas with sand subgrades are optimal for long term performance of these pavements.



- **Surface Characteristics of both new concrete and asphalt pavements.** Optimal new surfaces have been identified for optimized noise, friction (wear), and ride quality.
- **Surface characteristics of diamond grinding of concrete pavements.** This study implemented laboratory developed configurations into the field with the use of industry. Innovative diamond grinding has been developed for optimized noise, friction (wear), and ride quality.
- **Warm Mix Asphalt** - now a standard specification used in Minnesota and is performing well.
- **Low Temperature Cracking** - created a test that allows us to characterize mix fracture energy which is being implemented to further improve the performance of asphalt pavements.
- **Preventive Maintenance of HMA Pavements** – study ongoing but indications show the best time to apply PM treatments are early in a pavements life to delay the effects of environmental aging. MnROAD will be hosting a national open house in September 2014.

2013 MnROAD Construction and Research Efforts.

- **7.5” Sustainable Economical Concrete Design** - Reuse all the existing roadway materials for new construction. At least 50% of the coarse aggregate will be used in the concrete mix. Benefits include less dependency on virgin materials and using available materials on site.
- **3” Thin Fiber Reinforced Unbonded Concrete Overlay** – Study the benefits of structural fibers and thin/thick fabric bond breakers for thinner unbonded concrete overlays without dowel bars.
- **4”-5” Fiber Reinforced Whitetopping** – Fiber reinforced concrete will be studied without the use of dowel bars. This study is a follow-up to a 2004 study with non-fiber reinforced concrete.
- **Thin Concrete Repair** – Faulted concrete repairs will be studied including full depth patching, dowel bar retrofits, and diamond grinding.
- **Diamond Grinding of Pervious Concrete** – Study the effect of diamond grinding to improve ride quality while maintaining pavement porosity.

Phase-III (Starting 2016) is expected to focus on maintenance and rehabilitation. Research members are currently developing a list of prioritized ideas that will be marketed to fund the research needs. In April 2014 MnDOT will hold a national peer exchange with other states to gain their perspective and help gain the funding required. If interested in getting involved with MnROAD please contact us. We are looking for additional partners nationally to participate in MnROAD’s future.

Phase-III Timeline

2013				2014				2015				2016				2016-202X
Quarter	3	4	1	2	3	4	1	2	3	4	1	2	3	4	Phase-III Experiment	

Visit our web site www.mndot.gov/mnroad/ for more updated information including our latest data release.

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MnROAD is a state of the art cold weather pavement and transportation testing facility located in Minnesota