

WARM MIX ASPHALT (WMA)

Background and Motivation



Warm mix asphalt (WMA) is a general term describing the use of any additive or technology that allows for lower asphalt plant mixing temperatures. Developed in Europe, WMA was brought to the United States in 2004 and has since gained widespread use around the country. Environmental benefits experienced with WMA include reduced emissions, fumes, and odors. With a cooler work environment enabled by WMA technology, reduced production temperatures add up to energy savings. The

Minnesota Department of Transportation (MnDOT) saw the promise in this technology, especially the anticipated benefit of reduced low temperature and reflective cracking because of the reduced binder aging at the plant.

WMA Use in Minnesota

Warm mix asphalt in Minnesota was initially driven by the asphalt paving industry, with parallel work being conducted in MnDOT research. Mathy Construction built the first WMA demonstration projects in 2007 on several county roads in the southeast portion of Minnesota. Anderson Brothers shortly followed suit by building several WMA projects in Crow Wing County. The county's early experience led them to quickly allow for alternate WMA bids in new construction projects. More recently, several local contractors have installed foaming nozzles on at least six asphalt plants around the Twin Cities and greater Minnesota.

MnDOT paved the first WMA project on a state highway in 2008 at the MnROAD research facility. The following year WMA was used on a mill and overlay project on TH 95 to complete a late season paving project. In 2010 warm mix was required on two district paving projects per the District Materials Engineers' requests. One of these jobs on TH 169 also incorporated intelligent compaction and the MOBA IR temperature measurement system, which gave MnDOT additional insight into the behavior of WMA during construction. WMA use in Minnesota has skyrocketed in 2011, with a conservative estimate of 200,000 tons on state highways as part of the Federal Highway Administration's Every Day Counts initiative.



MnDOT Policies and Specifications

MnDOT's warm mix asphalt policy is captured in a 2009 Position Memo written by the Bituminous Engineer. It states in part, "MnDOT is interested in considering the use of WMA as an option to HMA and will proceed on a case-by-case basis." The 2360 asphalt paving specification is a permissive spec, essentially saying nothing about WMA and therefore permitting its use. RAP and recycled shingles are allowed in WMA mixtures at the same quantities as typical hot mix asphalt mixtures, and the Department has no pre-approved list of WMA technologies. MnDOT staff developed a list of Frequently Asked Questions in 2010 to aid in the implementation by many contractors and local agencies.

WMA Frequently Asked Questions

What is Warm Mix Asphalt?

The contractor has approached us (local agencies) about substituting WMA for HMA. Should we use WMA on our project?

Should we pay an additional cost for warm mix?

Are there any pavement performance issues with WMA?

With the increased use of RAP and/or shingles, are we getting complete blending between the recycled and virgin binders?

Are there any different procedures required for QC/QA testing?

How do I perform a WMA mix design?

Can modified binders be used with WMA?

What traffic levels can WMA be used on?

Where can I get more information on WMA?

Implementation Support

MnDOT has been engaged in multiple technology transfer activities in recent years regarding warm mix asphalt. These include presentations at local and regional conferences and workshops, publications, information and data sharing with outside groups, and advising a university undergraduate student group on a warm mix asphalt synthesis project.

MnDOT Research and Bituminous Office staff have been actively supporting state and local agencies as they implement warm mix asphalt on their projects. We began by supporting our own MnDOT District material and construction personnel. We have helped to write specifications, be present during construction to observe and help solve any issues, answer questions regarding quality control and quality assurance testing, and track WMA pavement performance over time.

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<http://www.dot.state.mn.us/mnroad/WMA/WMA%20Index.html>



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