LTRC RESEARCH PROJECT CAPSULE

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TECHNOLOGY TRANSFER PROGRAM

JUST THE FACTS

Evaluation of Warm Mix Asphalt Technology in Flexible Pavements

Start Date:
March 15, 2009

Duration:
24 months

End Date:
March 15, 2011

Funding:
SPR

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SPECIAL POINTS OF INTEREST:

- Problem Addressed
- Objectives of Research
- Methodology Used
- Implementation Potential

PROBLEM

More than 90 percent of the roads in the United States are surfaced with asphalt. The asphalt industry produces 500 million tons of HMA annually in the US. Highway construction consumes a great amount of material (aggregates and asphalt) and energy (production and transportation). In general, required mixing temperatures for HMA between 290°F and 330°F can be reduced 50°F -100°F by using warm mix asphalt (WMA) technology. The proposed research will focus on utilizing WMA technology that allows a reduction in temperatures at which asphalt mixes are produced and placed. This technology also promises to enable the use of higher reclaimed asphalt pavement (RAP) contents due to lower mixing and compaction temperatures required of these mixes. Furthermore, the decrease in energy required in producing and placing HMA mixtures will have a positive economic impact particularly with rising petroleum prices that will very likely persist well into the future. One key advantage to lowering mixing temperatures is that it reduces the effects of premature aging of HMA mixtures during production, thereby increasing the fatigue life. Another key advantage of using WMA technology is the reduction in emission levels, which makes it ideal for non-attainment areas that are struggling to meet the strict air quality standards. However, it is noted that lowering the mixing temperatures in WMA technology may increase the risk of a higher moisture level within the aggregate structure. This can cause a weakening of the asphalt mixture due to stripping.

OBJECTIVES

The primary goal of this research project is to quantify the performance of field produced and placed mixtures that utilize WMA technology and develop a framework for design, construction, and implementation of this technology in Louisiana. This research also proposes to examine moisture effects in WMA mixtures as a result of lowering mixing temperatures.

METHODOLOGY

A suite of mechanistic laboratory tests and field performance tests will be conducted to evaluate the performance of warm mix asphalt. These tests include the asphalt binder content test, asphalt mixture performance test (E*, F_n- Flow Number, and F_t-Flow time), indirect tensile stress/stain test, semi-circular bending test, dissipated creep strain energy test, loaded wheel tester (LWT or Hamburg test), boil test, modified lottman test (ITS ratio), and thermal stress restrained specimen test. In addition to a laboratory evaluation, a series of in-situ tests will be conducted and evaluated. These include density (PQI and/or nuclear density), light weight deflectometer (LWD), and the portable seismic pavement analyzer (PSPA). A comprehensive statistical analysis will be performed and the results published in a final report. The project is scheduled for completion in approximately two years.

Figure 1
Foaming attachment added to mixer

Figure 2
Warm mix demonstration project

IMPLEMENTATION POTENTIAL

This research will attempt to address issues related to new WMA technology and provide the asphalt community with answers needed for implementation of this innovative technology. The completion of this research will allow successful WMA technology to be specified for use in the state of Louisiana.

This research will potentially impact HMA producers, asphalt cement producers, and the public in general. All could conceivably benefit from the utilization of WMA technology to reduce the cost of highway construction and develop more environmentally friendly practices. In addition, a new industry could develop in the state to produce the required additives for the WMA process.

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