

North Central Superpave Center News

**Volume 1, Number 3
Summer 1999**

Inside this issue

Regional News

Superpave Use Continues to Grow	1
Summary of Implementation	2
Training Calendar	2
North Central States Investigate Superpave Issues	11
Calendar of Events	12

National News

Asphalt Institute Announces a Super- pave Event for the 21st Century	3
Performance of Superpave Mixes Surveyed	3
Superpave Specifications for Surface Treatments	4
Mixing and Compaction Temperatures for Modified Asphalt Binders	6
Superpave Usage Doubles Nationwide	7
Restricted Zone in the Superpave Aggregate Gradation Specification	8
AASHTO Approves Superpave Changes	10



Superpave Use Continues to Grow

A busy construction season is underway in the North Central region. La Nina weather patterns and increased highway funding mean many projects are being constructed in each state. A large percentage of those projects involve Superpave.

The table below summarizes the responses to a survey of planned implementation in the region conducted by the NCSC in April. The survey showed that every state in the region is using Superpave and has set a target date for full implementation. All of the states in the region are using the PG specifications. Indiana and Michigan have already fully implemented Superpave. The rest of the states plan to fully implement Superpave by 2000 or 2001.

In this region alone, over 340 projects will utilize Superpave mix design procedures in 1999. Plans call for over 10 million tons of Superpave mix to be placed this season. In 1997, only 355 projects were planned in the entire United States. That is a large increase in only two years. (See also the article on the national implementation survey on page 7.)

For the most part, the states are implementing Superpave without major modifications. Illinois, Iowa, Minnesota and Ohio report some deviations in their specifications from Superpave "by the book." Illinois, Minnesota and Ohio use modified gyrations during compaction. Illinois developed an N_{design} table based on gyratory characterization of current successful mix designs.

Minnesota uses an N_{des} of 90 and N_{max} of 140 for 3-10 million ESAL designs. Ohio reduced gyrations levels slightly due to concerns over the possibility of getting "lean" mixes when comparing Superpave mixes to Marshall mixes at equal air voids.

Illinois allows only SBS and SBR polymers. In addition, Illinois uses existing requirements for coarse and fine aggregate angularity and clay content; they do not use the flat and elongated requirement.

Aggregate requirements also vary somewhat; Ohio does not require fine aggregate angularity to be run on angular materials like stone and slag. Coarse aggregate angularity requirements are determined by the districts in Ohio and may be either the current Marshall requirements or the Superpave requirements. Iowa replaced coarse aggregate angularity with percent crushed and has retained their film thickness criteria.

Ohio will also use a more restricted gradation band to exclude overly coarse gradations, require a loaded wheel test if over 15% natural sand is used, retain the maximum dust to asphalt ratio of 1.2 and require a four-hour design curing time.

Other states in the region are combining the implementation of Superpave with other items. Several states are implementing QC/QA along with Superpave. As another example, Nebraska is requiring an ignition oven, in addition to a Superpave gyratory, in

Continued on Page 2

NCSC Superpave Training

the contractors lab. Nebraska will be comparing asphalt contents determined from the oven to tank stab results. They are also comparing fine and coarse aggregate angularity and gradation on cold feeds and plant produced mix.

Local agencies and private work in the region are still not making use of Superpave to any great extent, although they have heard of it through paving conferences and publications. Many of the state asphalt paving associations, such as those in Kansas and Missouri, have been educating locals and consultants about Superpave. There have been a few instances where a local agency has used Superpave, such as Iowa where there are six to ten voluntary projects. Many local agencies have had to adjust to using PG binders instead of AC's.

Marvin Traylor of the Illinois Asphalt Pavement Association pointed out that industry will drive the Superpave system into non-state work when Superpave and QC/QA are fully implemented. At the rate implementation is proceeding in the North Central region, that will happen here before we know it.

The NCSC will again offer hands-on laboratory training in binder testing and mix design at the NCSC. In addition this year, we are offering a four-day mix design course intended for laboratory technicians with limited mix design experience. This new class will include such procedures as determining Rice and bulk specific gravities, batching aggregates and mixing samples. The three-day mix design course assumes participants are already familiar with these procedures.

Superpave Binder

February 14-16-2000 Indianapolis

Superpave Volumetric Mix Design - Experienced

December 13-15, 1999 Indianapolis

January 26-28, 2000 West Lafayette

Superpave Volumetric Mix Design - Beginner

Four-Day Intensive Course for Beginners

February 29-March 3, 2000 Indianapolis

Additional customized training is available at the NCSC or on location. For more information please call the North Central Superpave Center, Rebecca McDaniel, Technical Director.

Summary of Implementation

State	Number of Projects	Approximate Tonnage	Type of Projects	Date of Full Implementation
Illinois	54	1.1 million	Selected projects	2001
Indiana	93	2.3 million	All	Fully implemented
Iowa	21	1.15 million	50% state, interstate and primary plus 6-10 local projects	2000 for State routes, 2002 for all routes
Kansas	16	1.5 million	Selected - major modifications and new construction	October 2000
Michigan	68	1.8 million	Mainline roadway	Fully implemented
Minnesota	22	0.99 million +	High volume trunk highways Design ESALs > 3 million Projects with long-term fixes	Construction Year 2001±
Missouri	20	0.85 million	100% of all heavy and medium duty pavements	2000
Nebraska	30	1.0 million	100% of interstate	2000
Ohio	11	90 thousand	Selected (primarily heavy traffic)	2001 (Heavy volume only)
Wisconsin	25	0.85 million	Selected projects	2001*

*Wisconsin will fully implement on roadways with design traffic volumes greater than 2 million ESALs in 2000 and less than 2 million ESALs in 2001.

North Central States Investigate Superpave Issues

States in the North Central region are among the leaders in implementing the Superpave system. As they lead the movement to Superpave, they have uncovered a number of issues that need further evaluation on a regional or local level. The states in the region, therefore, have initiated extensive research efforts individually or as pooled fund projects to address these issues.

Regional pooled fund projects being coordinated through the NCSC include work on fine aggregate angularity and the use of RAP in Superpave mixtures. Many states in the region are also participating in a national pooled fund project being conducted by Indiana and Purdue that is using accelerated pavement testing to evaluate the performance effects of VMA, the restricted zone and fine aggregate angularity.

Aggregate related issues are of major interest throughout the region. The Iowa DOT is investigating the effect of crusher type on mixture properties in an in-house project. Mike Heitzman, of the DOT, is also working with Dr. Brian Coree at Iowa State University on developing a test to measure specific gravity, specifically looking for an objective way to measure the saturated surface dry (SSD) condition. Coree is also investigating the aggregate properties that affect VMA for Iowa. All of these projects are scheduled for completion next year.

Dr. Sam Carpenter at the University of Illinois is investigating the influence of flat and elongated particles in HMA mixtures through a project sponsored by the Illinois DOT. Illinois is also sponsoring an evaluation of techniques for video analysis of aggregate as a replacement for the flat and elongated test; Dr. Erol Tutumluer at U of I is conducting the project.

The Indiana DOT has funded research by Dr. Tom White of Purdue on fine aggregate angularity; this project is nearing completion. Nebraska is requiring the contractor to measure fine and coarse aggregate angularities and gradation on both the cold feed and plant produced mix (after the ignition oven) for comparison purposes.

Iowa and Missouri are both conducting in-house projects on the effects of the ignition

oven on their aggregates. John Hinrichsen is attempting to identify Iowa aggregate types or sources that are significantly degraded when processed through the oven. Missouri's study, recently completed by Dale Williams, determined that the ignition oven is accurate in determining asphalt content, but the aggregate is degraded to the point where it cannot be used for gradation specification compliance. Nebraska is comparing the binder content determined in the ignition oven to tank stabs.

Compaction and related issues are also of major concern to states in the region. Indiana and Illinois are investigating field density measurements. Illinois' study, being conducted by Dr. Bill Buttlar at U of I, is evaluating the Trans Tech density gauge. Dave Andrewski, of the Indiana DOT, is working on developing an improved field measurement technique and improving construction procedures to achieve higher in-place densities. Ohio is evaluating permeability equipment developed for the Florida DOT in a laboratory study prior to evaluating the equipment in the field. Nebraska is also looking at the permeability of Superpave mixtures placed last year.

Other states are investigating the gyratory compactor. Iowa and Missouri have both conducted comparisons of different types of Superpave gyratories. Both projects were described in the last issue of this newsletter. Missouri's round robin experiment was completed by Joe Schroer in March 1999 and revealed that brand of compactor had the greatest influence on bulk specific gravity; they are continuing to investigate the reasons. Iowa's comparison results are nearly ready for distribution. Wisconsin DOT is attempting to establish the compactive effort in the Superpave gyratory needed to simulate Marshall compaction for their MV and LV mixtures.

Mixture performance and ways to predict performance are being evaluated by many states. Tom Zehr, of the Illinois DOT, and Ronald Netemeyer, of the Missouri DOT, have been looking at use of the Georgia Loaded Wheel Tester (GLWT) or Asphalt Pavement Analyzer (APA) to investigate the potential performance of their

mixtures. Netemeyer has concluded that the GLWT can be used as a laboratory proof tester. Illinois' project is ongoing.

Ohio is comparing different tests for the prediction of rutting through a project by Osama Abdulshafi at Ohio State University. As part of that project, the NCSC is conducting mixture tests in the Superpave Shear tester. Drs. Sargand and Kim at Ohio University are conducting a study for ODOT on pavement performance testing that will determine the correlation of laboratory and accelerated load testing results with field data, among other objectives. The durability and performance of polymer modified mixtures is under investigation at the University of Akron (Dr. Liang).

Iowa State is working on a test to measure rutting susceptibility under Iowa DOT sponsorship. The method proposed by Dr. Coree utilizes a gyratory compactor with fairly simple modification.

Illinois, Ohio and Minnesota have formal studies monitoring the performance and cost effectiveness of their Superpave projects.

Other issues under investigation include the following. Wisconsin and Indiana are both investigating the best layer/pavement thicknesses for Superpave mixtures in terms of ease of compaction and performance. Minnesota is sponsoring two projects conducted by Dr. David Newcomb at the University of Minnesota. Newcomb is investigating the feasibility of using Superpave mix design to produce high-performance, affordable low volume pavements. He is also characterizing typical Minnesota RAP materials and developing a methodology for designing Superpave mixtures with RAP. Kansas DOT has been conducting a project looking at the use of the microwave oven to age asphalt binders in lieu of RTFO plus PAV aging.

The NCSC is currently collecting more detailed information on these ongoing and recently completed projects. This information will be posted on the NCSC web site (ce.ecn.purdue.edu/~spave/) this summer.

North Central Superpave Center
1205 Montgomery Street
P.O. Box 2382
West Lafayette, IN 47996-2382

Jan Olek (765) 494-5015
Director
olek@ecn.purdue.edu

Rebecca McDaniel (765) 463-2317
Technical Director ext 226
rsmcdani@purdue.edu

Stephen Bowman (765) 463-2317
Lab Technician ext 225

Lynn Warble (765) 463-2317
Communications Specialist, and ext 224
Coordinating Editor
warble@ecn.purdue.edu

FAX (765) 497-2402

WebSite: <http://ce.ecn.purdue.edu/~spave/>

The National and Regional Superpave Newsletters are published three times a year and are coordinated by the North Central Superpave Center.

NCSC Vision and Mission:

To be an industry-recognized source of Superpave expertise and to lead further development and implementation of Superpave technology by providing services to its customers, through excellence in research, training, and communication.

Calendar of Events

- July 16, 1999 North Central Steering Committee Meeting
Wisconsin Dells, WI
Contact: NCSC, (765) 463-2317
- August 24-26 FHWA Regional Training and Certification Workshop
Indianapolis, IN
Contact: Ron Walker (317) 232-5280, ext. 202 or
Lee Gallivan (317) 226-7493
- October 27-29, 1999 7th Annual U.S. Hot Mix Asphalt Conference
Orlando, FL
Contact: NAPA @ 1 - 888 - HOT - MIXX
- November 8, 1999 Missouri Asphalt Paving Conference
University of Missouri - Rolla
- November 18, 1999 39th Annual Bituminous Paving Conference
University of Illinois
Contact: Sam Carpenter, scarpent@uiuc.edu
- January 9-13, 2000 79th Annual Transportation Research Board Meeting
Washington, DC
Contact: TRB (202) 334-3214 www.nas.edu/trb
- January 18-20, 2000 North Central Asphalt User/Producer Group Meeting
Kansas City, KS
Contact: Ken Archuleta, FHWA, (816) 276-2732
- March 12-15, 2000 Association of Asphalt Paving Technologists
Reno, NV
Contact: AAPT, (651) 293-9188
- April 10-12, 2000 Superpave: Building Roads for the 21st Century
Denver Marriott Tech Center
4900 S. Syracuse Street
Denver, CO 80237
Phone: (303) 740-2531



1205 Montgomery Street
P.O. Box 2382
West Lafayette, Indiana 47996-2382

Non-Profit Organization
U.S. Postage
PAID
Purdue University