Asphalt

The Magazine
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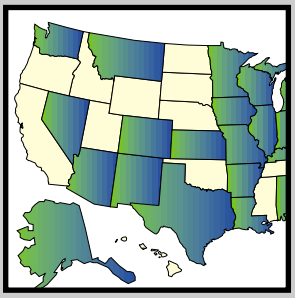
Winter 1997 Vol. 11, No. 1

Minnesota Counties

Turn to Superpave

ASPHALT INSTITUTE

Features



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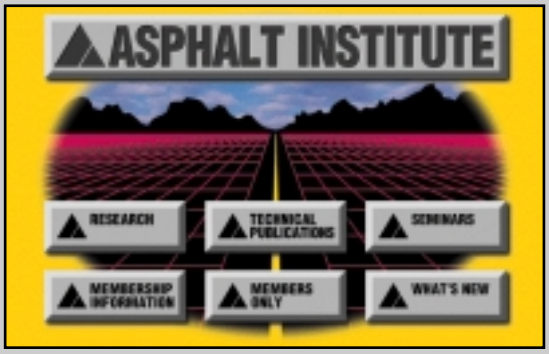

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John Davis, Editor
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Just Four More Years

Just four more years until the turn of the century. Not much time left to do all those things you planned on doing that would benefit your business, industry, nation, family, community and you. I'm speaking of those changes you intended to make to launch a new direction into the 21st century. For some, it might be simply getting ready for retirement or balancing family commitments with the requirements of the job.

For others, it might be a new image and marketing strategy for your company or starting grassroots programs to inform the public of the many needs of our highway infrastructure. Hopefully, many of you have Superpave implementation in your plans over the next four years. You can read about what some are doing along this line in this magazine.

Regardless of whether your plans include changes in your personal or professional life, obstacles will surely surface to block the way and test your commitment to your goals. It will take courage, persistence and perseverance to reach the success you seek. It might help along the way to keep the following story in mind, which is taken from "Bits & Pieces."

A young man at the age of 22 attempted and failed at business. At 23, he ran for legislature and was defeated. At 24, he again attempted and failed at business. At 25, he was elected to the legislature. At 26, his sweetheart died. At 27, he had a nervous breakdown. He ran and was defeated for Speaker at 29. He ran and was defeated for Elector at 31. He was defeated for Congress at 34 but finally was elected at 37. He then was defeated for Congress at 39, defeated for Senate at 46, and defeated for Vice President at 47. After one final defeat for Senate at 49, he was elected President of the United States at the age of 51. That man's name was Abraham Lincoln.

So go out there and start making those changes. Don't let the obstacles and nay-sayers block your path, and especially don't let the fear of mistakes stop you. Remember these words from Peter Drucker: "The better a man is, the more mistakes he will make, for the more new things he will try. I would never promote into a top-level job a man who was not making mistakes.....otherwise he is sure to be mediocre."

With that thought, I want to wish everyone a great new year and the best in your personal and professional plans.

Edward L. Miller

Edward L. Miller, President

Industry-Wide

The 105th Congress will be working toward a balanced budget package that could reduce discretionary spending and therefore reduce federal highway spending. The effort to take transportation trust funds off-budget lost 55 supporters in the House in the recent election. Education of the newly elected Representatives plus reaffirmation of current supporters are needed. On the House Transportation and Infrastructure Committee, 55 out of 63 will return for the 105th Congress.

A special panel to study transportation taxes will seek industry's opinions beginning this January or February. The panel began receiving briefings from federal agencies in December. Aviation will be the panel's first topic, then highways. Panel chairman Mac Collins (R-CA) says only policy items directly affecting transportation issues will be covered. He says the panel's work will be guided by fairness, equity and efficiency of administration.

AASHTO is promoting the "lead states" concept to advance Superpave technology. A lead team consisting of representatives from Florida, Indiana, Maryland, New York, Texas and Utah, plus industry reps from those states and a representative of the North Central Superpave Center, will provide a pool of technical experts to assist other states with Superpave implementation.

The American public supports higher spending on highways and bridges and believes the fuel tax is the fairest way of raising funds for that work, according to a survey commissioned by National Quality Initiative Steering Committee and paid for by FHWA. Nearly two-thirds of the highway users surveyed said they wanted improvement in pavement conditions, traffic flow and safety. FHWA sponsored the project to identify priorities for highway improvement.

Asphalt pavement performance has increased approximately 20 percent over the last ten years, according to data assembled by DOT agencies. They credit the improvement to the implementation of QC/QA requirements in the mid-to-late 1980s and the implementation of smoothness specifications in the late 1980s and early 1990s.

The Asphalt Industry Environmental Oversight Committee has presented a report on the entire spectrum of asphalt fume research to the Threshold Limit Value (TLV) Committee of the American Conference of Governmental Hygienists. The TLV Committee will consider the presentation and determine whether to reevaluate asphalt fume, considering the scientific uncertainties and inconclusive evidence of any potential harmful effects. A decision by the Committee is expected in March or April 1997.

The FHWA Binder Expert Task Group has recognized a 0.01 difference in m-value measurements, depending on the brand of bending beam rheometer (BBR) used. Until differences can be resolved, the ETG recommends that agencies using the ATS BBR allow an m-value of 0.29 to be acceptable. This recommendation was based on a testing program performed at the Asphalt Institute's laboratory.

The Transportation Center at the University of California at Berkeley estimates that automobiles, on the average, use less fuel per passenger mile than mass transit. In 1980 the BTU per passenger mile for autos was 4,782 and 3,008 for mass transit. In 1993, the BTU per passenger mile for autos was 3,593 and 3,687 for mass transit. Extra equipment on mass transit vehicles has increased fuel consumption at the same time ridership has been falling.

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Around the Nation

Arkansas has placed 4.3 million tons of hot-mix asphalt using PG binders since May 1995. The state has scheduled over 25 Superpave projects for bids in 1997. Many of the projects will involve rehabilitation on interstate highways.

The Railroad Transportation Research Center at Pueblo, Colorado, plans to place a railroad track bed using asphalt as underlayment and overlayment. They have the Asphalt Institute to assist them with specifications and construction procedures.

A new Northeast Superpave binder, mix training and research center has been established at the University of Connecticut in conjunction with **CONNDOT**. The Connecticut Advanced Pavement Laboratory (CAPLAB) director is Jack Stephens, Professor Emeritus, UCONN.

Construction is in progress on the 29-mile eastern section of E-470, the Denver Beltway. Colorado DOT chose 9-inch-thick Full-Depth asphalt for the initial pavement, with a 1.5-inch "staged" overlay to be added in a few years. Mix design for the project will follow Superpave criteria. The total project will require approximately 50,000 tons of asphalt cement.

news

Indiana DOT has approved the use of asphalt roofing shingles in hot-mix asphalt. The InDOT specification says the shingles cannot exceed 5 percent of the total mix weight and must be waste material from a shingle manufacturer. Tear-off material from roofs is not permitted. If used with RAP, the maximum amount of total recycled material can't exceed 20 percent, with RAP to shingles at a 4:1 ratio.

North Carolina voters approved a $950 million highway bond issue in the November election to provide for increased construction of secondary roads, intrastate highways and urban loops over a six-year period.

Minnesota, Wisconsin and Iowa are working together through the North Central Asphalt User/Producer Group to standardize PG asphalt binders across state lines. The DOTs in all three states intend to specify equal grades of binder where geographic conditions warrant common materials. This will relieve local asphalt suppliers of the burden of supplying a wide variety of PG asphalts in areas where common materials can be specified. Nebraska and Michigan also expressed an interest in joining the three-state group to further standardize material specifications in the region.

Minnesota DOT has contracted with the Asphalt Institute to provide Superpave training in the state this winter. The Institute will provide three one-day introductory courses and two 4-day Superpave volumetric mix design courses, with assistance from local Asphalt Institute member companies.

A review of the cost of concrete versus Full-Depth asphalt on seven rehabilitation contracts on the Ohio Turnpike last summer shows that the square yard cost for the concrete project was $38.89, while the average square yard cost for the six Full-Depth projects was $20.46, or a 47.6 percent savings.

Tulsa Public Works Department officials are discussing the alternate use of asphalt design for city street construction and reconstruction with the Oklahoma Asphalt Pavement Association and the Asphalt Institute. Most of the recent street work in Tulsa has been concrete.

The Utah Department of Transportation is planning a 6-mile, 4-lane, crack and seat project with a 6-inch asphalt overlay on I-15 near Ogden for 1997. It is the first time UDOT has used crack and seat. The Asphalt Institute worked with UDOT staff to provide crack and seat specifications.

People

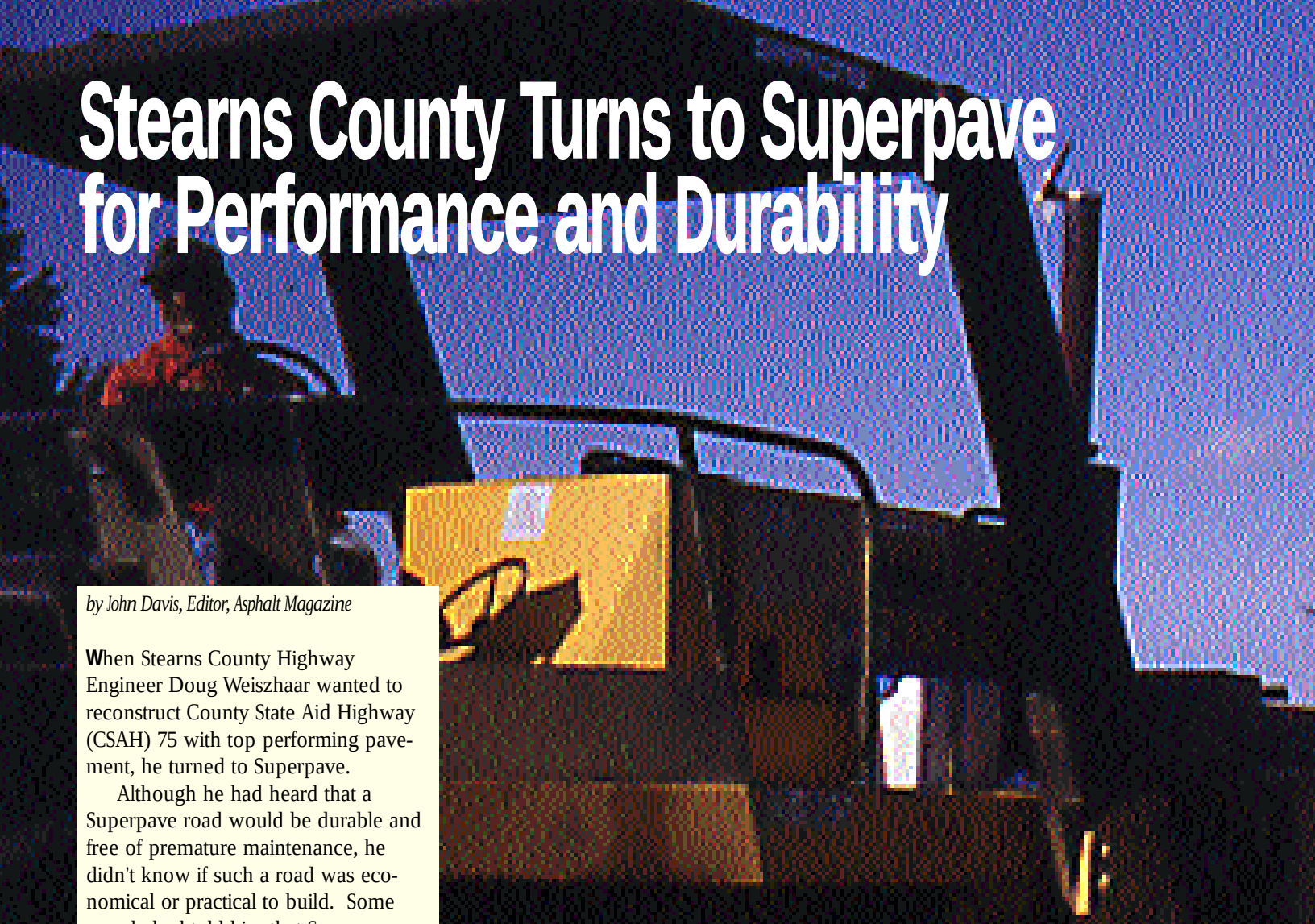
William C. Carey, Executive Vice President of Southern States Asphalt Co., Ashland Petroleum Company, is the Asphalt Institute's **1997 Chairman of the Board of Directors. Gene Chew**, Managing Director, Sales and Supply, Neste Trifinery Petroleum Services, is the Institute's **1997 Vice Chairman of the Board.**

Dwight Walker, previously Asphalt Branch Manager for the Kentucky Department of Highways, is the Asphalt Institute's **new Associate Director of Research.** With more than 25 years of experience in asphalt design and materials, he will be directing various Institute laboratory projects, including a project on the testing and inspection of asphalt overlays.

W. L. Hindermann, former managing engineer for the Asphalt Institute's Northern Division, recently passed away. Recognized by many as the "Father of Full-Depth Asphalt," *Hindy* was the author of a number of the Institute's publications and promotions on Full-Depth asphalt. He was president of the Association of Asphalt Paving Technologists, president of the Minnesota Society of Professional Engineers, listed in the Asphalt Institute's *Award of Merit*, and was inducted into NAPA's *Hall of Fame* in 1990. He was esteemed by asphalt researchers, technologists and contractors. "Hindy was a top engineer and a good administrator," says former Asphalt Institute president Gene Johnson. "We will truly miss him."

Carmela Chapelle, Engineering Research Technologist for the Asphalt Institute, supervises Research Technician Heidi Hope (left) of Conoco, Inc., at the recent Superpave Binder Course held at the National Asphalt Training Center II (Asphalt Institute) in Lexington, Kentucky. Bruce Cline of CITGO Asphalt Refining Co., Keith Friley of Ashland Petroleum Co., and Tom Hogan of Koch Materials also participated in the training.

Stearns County Turns to Superpave for Performance and Durability



by John Davis, Editor, Asphalt Magazine

When Stearns County Highway Engineer Doug Weiszhaar wanted to reconstruct County State Aid Highway (CSAH) 75 with top performing pavement, he turned to Superpave.

Although he had heard that a Superpave road would be durable and free of premature maintenance, he didn't know if such a road was economical or practical to build. Some people had told him that Superpave technology was too hi-tech and expensive for counties.

Undaunted, Weiszhaar invited Asphalt Institute District Engineer Al Palmer to discuss the possible use of Superpave on CSAH 75 with him, Assistant County Engineer Mitch Anderson and Senior Asphalt Design Technician Gene Thyen.

Palmer confirmed that Superpave technology would answer their concerns about the aging, cracking and rutting problems that recently appeared on some of the Stearns County roads. He recommended that at least one Superpave test section be included in the CSAH 75 project, and that the section be build in a heavy traffic area.

Pre-Project Partnering

Surprisingly, the Stearns County engineers not only agreed with his recommendation but suggested doing the entire project with Superpave. They had considered doing the project with portland cement concrete (pcc) but the higher costs of pcc prohibited that option.

The county and the Asphalt Institute met again in February 1996 to further discuss the project. This time, the group invited a number of additional asphalt industry representatives. Since Superpave had not been used locally, and the county was operating under a fairly tight federal-aid budget, the group asked Koch Materials and Meridian Aggregates to supply materials for a preliminary mix design to give Stearns County engineers an idea of Superpave material requirements and associated costs.

New Technology

Although the county like the idea of constructing CSAH 75 with Superpave, they were concerned about the possible higher cost of the new technology. Would the higher cost of Superpave materials--aggregate, PG binder and testing procedures--be prohibitive? If the cost of using Superpave was too high, the county would have to choose conventional materials and standard design.

Surprisingly, Stearns County engineers found that Superpave costs were comparable to conventional paving materials. In neighboring states, the use of modified asphalt binders had increased costs substantially--as much as $100 per ton. Although the PG binder grade for CSAH 75 was still undetermined, the PG could range

(from left) Asphalt Institute District Engineer Al Palmer, Stearns County Highway Engineer Doug Weiszhaar, Senior Asphalt Design Technician Gene Thyen, and Assistant County Highway Engineer Mitch Anderson gather in front of an antique grader at Stearns County Highway Department.

from 52-28 to a 58-40, depending on the binder selection criteria used for design.

Even though very high quality aggregates were used for the preliminary mix design work, aggregate costs were competitive. Weiszhaar and Palmer asked the MnDOT research office if any funding was available for constructing Superpave research projects at the local level. They said that research money was available from FHWA to investigate the use of polymer modified asphalt materials in Minnesota. Thus, a PG 58-34 asphalt grade was selected for use on the project. Based on the locally available asphalt materials, it was understood that this would result in a polymer-modified asphalt binder being used on the project. The cost of the polymer-modified was offset by the research money contributed by MnDOT and FHWA.

Superpave Design

Palmer and Stearns County considered the project a real breakthrough for Superpave in Minnesota. The new technology had not been widely used in the state and CSAH 75 provided the ideal forum to promote its use. The County, MnDOT and FHWA decided that Superpave criteria would be used for the entire project.

Materials selection and mix design criteria were strictly followed. Palmer worked with the county, materials suppliers, MnDOT research and the MnDOT central lab to provide preliminary mix designs, and to develop plans and specifications for the Superpave sections. MnDOT did most of the mix design work and the University of Minnesota helped with the aggregate testing.

Specific Aggregate Source

The county decided to designate a specific aggregate source for the Superpave mixes and provide the mix design to all prospective bidders. This was done due to a relatively short time span for completing the project. Also, this would allow for an objective evaluation of the Superpave sections.

Through a cooperative agreement between the county and Meridian Aggregates, the county was assured that all Superpave bids would be based on the same aggregate selection and the same aggregate price. Meridian and Palmer worked on the aggregate blends to achieve proper Superpave criteria. No special aggregate processing was required for the formulation of the Superpave aggregate. All of the aggregates proposed for the blends were currently available at the quarry. MnDOT validated these in the mix design phase.

MnDOT completed the mix design in July and sent materials to the Asphalt Institute in Lexington, Kentucky, for mix design verification. The mix design verification testing showed a very close correlation between the MnDOT laboratory and the Institute lab. A single mixture was used for all Superpave sections on the project.

Typical Section

The primary Superpave sections were designed to be in the westbound lanes of CSAH 75. The typical section for these lanes included a base course layer followed by an intermediate course and a wearing surface layer. The entire base course layer was designed for a conventional MnDOT mix. The binder layer in the eastern half of the project included Superpave

mix, while the other half was paved with a conventional mix. The entire surface layer in the westbound lanes was then designed for Superpave mix.

A typical section included approximately 5 inches of existing aggregate base, 2.5 inches of 3/4-inch maximum size, recycled hot-mix base course, 2 inches of 3/4-inch maximum size intermediate course mix, and 2 inches of surface course mix. The Superpave mix used for the intermediate and surface layers was 19mm nominal size; the conventional intermediate course mix consisted of 3/4-inch maximum size aggregate.

The surface course in the eastbound lanes consisted of 1/2-inch maximum size aggregate meeting an MnDOT Type-47 specification, which is a minimum 70 percent plus #4 crushed with 25 percent manufactured sand. The 10-foot-wide outside shoulders were milled and paved with an overlay that matched the thickness of the newly constructed course.

Construction

Construction of the project began July 30, 1996 and was completed September 15, 1996. Construction on the westbound and eastbound lanes each took three weeks. Actual construction of the three Superpave sections in the westbound lanes took only 4 1/2 days--August 26 to August 30. Duininck Brothers, Inc. of Prinsburg, Minnesota, was the contractor and Jebro, Inc. of Sioux City, Iowa, supplied the PG 58-34 asphalt binder for the Superpave sections.

Eastbound lanes have conventional MnDOT mixes except for a 1-mile section that contains Superpave aggregate materials and 120/150 conventional penetration grade asphalt. The purpose of this section is to compare performance between the conventional sections and the Superpave sections containing PG binders in the westbound lanes.

The contract specified milling out about 6.5 inches of existing pavement in the westbound and eastbound traffic lanes of the 5.78-mile project. MnDOT specifications allowed the contractor to use recycled asphalt pavement (RAP) in all pavement layers unless the special provisions exclude its use. Stearns County prohibited the use of RAP in the surface layers on this project. The contractor chose to use 50 percent RAP in the conventional base and intermediate layers. Approximately 16,000 tons of the 76,000-ton project was constructed using the SBR polymer-modified binder and Superpave mix design.

Quality Control Testing

Superpave did not specifically address the mix production control aspects of construction, although Minnesota has

been working under a quality control system for several years. "So we devised a testing procedure for the Superpave production portion of the project," says Palmer.

"Stearns County was one of the first to adopt the QC/QA concept for asphalt mix production, and they wanted to continue the practice on the Superpave sections. We inserted the Superpave testing equipment and procedural requirements directly into the standard MnDOT QC/QA specifications. This answered concerns expressed by some that Superpave did not include adequate QC/QA procedures."

The biggest hurdle to overcome was the lack of available equipment in the state to perform the testing. The contractor and the Asphalt Institute worked together to leap the hurdle. Asphalt Institute Mix Technologist Gary Irvine transported a Superpave Gyratory Compactor from Institute headquarters in Lexington, Kentucky, to conduct daily gyratory compaction tests on the Superpave mixes. The contractor performed maximum specific gravity (Rice), sieve analysis, asphalt content and pavement density testing, and collected samples for gyratory compaction.

One of the unique aspects of the project was that plant production was based solely on the results of the gyratory samples. During the entire Superpave mix production, no adjustments were required in asphalt content or aggregate proportions to meet the specified mix volumetric criteria. MnDOT conducted the gyratory compaction for the Quality Assurance testing. The FHWA Superpave mobile lab, which was in Minnesota at the time, also conducted tests on the plant-produced mix.

No Segregation

Before construction started, there was some concern that segregation would occur in the Superpave mix. A standard MnDOT mix is typically 65-75 percent passing the No. 4 sieve. The Superpave mix design called for 40 percent passing. But segregation did not occur. Adequate asphalt content and film thickness, along with the highly crushed aggregate resulted in little, if any, segregation during construction.

The project density specifications required the use of a pneumatic tired roller for intermediate rolling passes. After a few passes, however, the contractor requested the use of steel-wheeled rollers because "pickup" on the pneumatic tired-roller was an obvious problem. Once the proper mix temperature was determined for adequate compaction, the contractor was able to achieve consistent density.

The county specified 40-foot-interval sawcut and sealing to relieve thermal cracking on each of the different design sections throughout the project. This was done to compare the low temperature properties of the PG binder materials to sections of pavement with conventional asphalt binder and the stress relief cuts.

Comparing Asphalt and Concrete

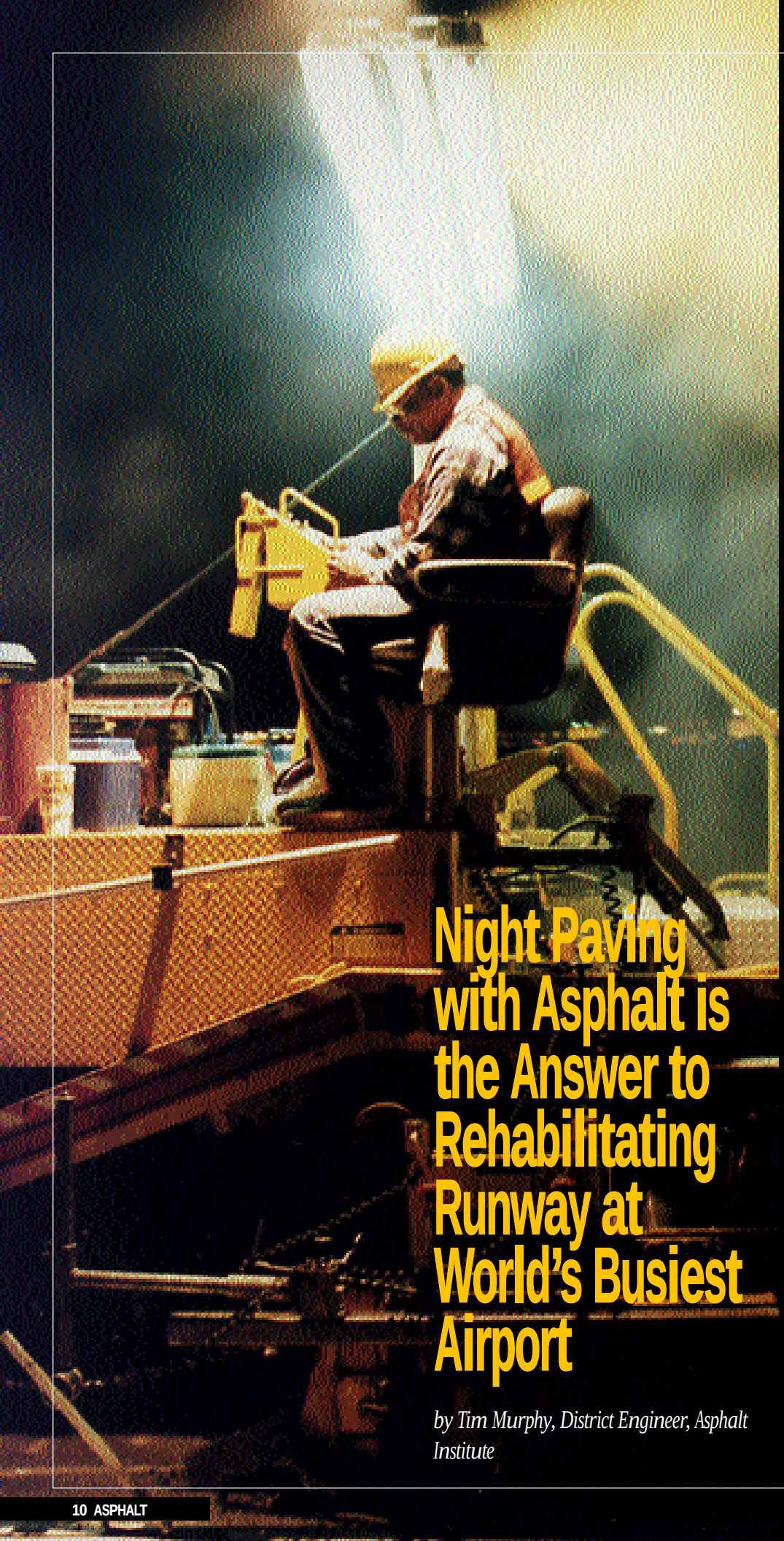
Abutting the 5.78-mile Superpave project on the east end is a 1.6-mile stretch of new four-lane concrete. The two pavements have approximately the same traffic volume and percentage of heavy trucks. Stearns County and MnDOT researchers will have an ideal opportunity to compare construction costs and material performance on the two projects.

Stearns County officials, MnDOT, FHWA, the contractor, the aggregate producer and the Asphalt Institute all believe the project went smoothly and successfully because of the cooperation in forming a plan, then working together to bring it to fruition. Stearns County engineers are particularly enthusiastic about the smooth execution of the project and are anticipating good results. Still, they have questions. They want to know if:

- ▲ Superpave will last longer and perform better than conventional asphalt pavements.
- ▲ Superpave will reduce thermal cracking.
- ▲ Superpave will prevent the loss of fine aggregates and avert the need for an early sealcoat.
- ▲ Superpave will prevent rutting under heavy traffic.
- ▲ Superpave will prevent disintegration in the wheel paths.

County engineers also want to know how long a Superpave pavement can last without an overlay, and how long it can last until it requires some form of routine maintenance.

Regardless of the unanswered questions, Weiszhaar and Stearns County sees a bright future for Superpave. "If it performs well, we'll use it throughout the county," he says. "We want to build roads that our customers appreciate. Our customers, the motorists, have been complaining lately because of less than excellent road quality. If Superpave gives us better quality, we'll use it again and again." ▲



Night Paving with Asphalt is the Answer to Rehabilitating Runway at World's Busiest Airport

by Tim Murphy, District Engineer, Asphalt Institute

How do you rehabilitate a runway at the world's busiest airport? The answer is carefully, quickly, with asphalt and at night.

There are some obvious reasons for that. There's no time during the day to schedule laydowns on a runway at the world's busiest airport. Consequently, the contractor must do the work at night. And even when working at night, the contractor doesn't have many hours to pave. Probably six at most. Usually, they can't start paving until midnight. Then, if they don't get their equipment completely off the runway by precisely 6 am the next morning, they'll pay a heavy penalty--$10,000 or more.

Bob Hart, Senior Project Engineer with the Chicago office of HNTB Corp., put it this way: "Because of the tight time frame at O'Hare and the huge penalties involved in keeping the runway closed too long, there was no other way to rehabilitate the runway than to do it at night and with asphalt." HNTB has designed several rehabilitation projects for some of the busiest runways in the world. The structural overlay of the runway at O'Hare is one of their recent projects.

Experienced Paver

The overlay, which incorporates Superpave criteria, was done in conjunction with a substantial reworking of the lighting system for Runway 9R-27L. "There was so much electrical work that the prime contractor was an electrician," says Hart. Allied Asphalt of Chicago was the paving contractor.

Allied has many years of experience in placing asphalt in the Chicagoland area and handled the O'Hare project with little difficulty,

according to Allied Paving Superintendent Bob Housholder. "We know what we're doing out on the runway because we've been involved with similar airport projects at O'Hare for many years," said Housholder.

Stringent Specification

Runway 9R-27L was a bit different, however. It was designed to carry aircraft weights well in excess of 60,000 pounds with tire pressures greater than 100 psi. Because of the tight time constraints, and in order to meet the stringent asphalt mixture P-401 specification (modified), HNTB:

1. required a larger maximum aggregate size than usual;
2. demanded a 30 percent higher stability requirement than ever before, and;
3. specified an asphalt cement "which, as written, dictated supplying a binder with a grading equivalent to PG 76-22," according to Asphalt Testing Lab's Manager, Kevin Nelson.

The tough mixture requirements were part of the challenge; getting the job done within specification and on time was the other. "The availability of materials coupled with our past experiences at O'Hare led us to develop a special type of mixture," stated Glenn Anderson, Quality Control Manager for Allied Asphalt. The special mix allowed Allied to place up to 2,500 tons of mix per night during the paving operation, although many times the runway demand allowed only six hours of paving per night.

Paving in Echelon

In order to ensure the maximum tonnage placement, especially while paving with the mainline mix, the contractor operated with two pavers in echelon, each placing 25-foot-wide mats. "The exceptionally wide placement of the asphalt mix meant using the big Barber-Greene pavers' hard-tail extensions," said Housholder. "The hard-tail extensions allowed each paver to place asphalt mix in 25-foot widths." Allied met every longitudinal joint requirement set by the P-401 specification. Six vibratory rollers coming right behind the pavers compacted the 50-foot-wide mats.

Again, the many years of runway experience helped Allied ensure the proper placement of over 48,600 tons of hot-mix asphalt on this project. Housholder said his company achieved the best production and placement when producing the mix near 340°F. Placing and compacting was done at 310°F whenever possible. "You just don't let it cool much before you roll it," he added. "The rollers come right behind the pavers."

Mix Design

The mix itself was designed using Marshall 75-blow design. The air voids level, Voids in Mineral Aggregate (VMA) and the Voids Filled Aggregate (VFA) criteria all met or exceeded Superpave recommendations. The aggregate structure consisted of 3/4-inch top-size material and a very high level of manufactured sand. Approximately 75 percent of all material passing the No. 8 sieve was manufactured.

This aggregate structure design, coupled with the aggregate materials supplied by Vulcan Materials, and the binder supplied by Seneca Petroleum, enabled Allied to compact the 310°F mat right behind the paver. This allowed the airport to land flights almost immediately after paving. Both project and inspection personnel said there were little or no pavement indentations, even on the nights when planes landed just minutes after opening the runway to traffic--proof that the mix performed better than most mixes specified under the current P-401.

Although the binder is costing around 10 percent higher than the type specified for conventional mixtures, the Department of Aviation and HNTB anticipate using the mix in the future. Production on the project was not compromised even with several new specification requirements. Given the challenges involved, project team members felt the project went smoothly. "There is plenty of experience out there to indicate that the new binder products work," says HNTB's Hart, "so, collectively, we decided to just do it!"

Always On Time

Although paving contractor Allied Asphalt had to push to begin paving operations on time every night and push to end them on time the next morning, they did not pay costly penalties. Paving equipment was completely off the runway by 6 am every morning. If not, the Aviation Administration would have charged Allied $10,000 for the first 15 minute delay, then $5,000 more for any part of an additional 15 minute delay.

The big planes are rolling again on one of the world's busiest runways--all night long and all day long. And both HNTB and Allied are ready to do it again on some other runway. "We always enjoy the challenge," says Housholder, "especially if it's different or hasn't been done before. We learn something new on every project. On this one, we're glad we didn't hold up traffic. We did a good job, but if we do it again, we'll probably do it even better." ▲

Implementation of Superpave

by Dr. Richard W. May, Director of Technical Services, Asphalt Institute

The Superpave system is the culmination of five years and $50 million of research effort in asphalt materials by the Strategic Highway Research Program (SHRP). The fast-track research conducted under SHRP was unprecedented in its scope and depth, and it has brought to the highway industry many products that will improve the performance and durability of United States roads and to make those roads safer for both motorists and highway workers.

However, as with any massive research effort, completing the research means that only half the work is done. Research products must be brought out of the laboratory and used in the field, and Superpave is no different. And as experience is gained during product implementation, new concerns and issues arise that were either not the scope of the original research or have come up as the new product is used. This is no different with Superpave.

The Federal Highway Administration (FHWA) has been tasked by Congress to direct the implementation of all of the SHRP research results. There are many entities involved in this vast implementation effort and this article has been written to highlight the status some of the programs pertaining to Superpave, as well as the various sources of information.

TWG and ETGs

The FHWA has formed two groups to manage and assist in the ongoing evaluation of the various products developed by the SHRP research. A Technical Working Group (TWG) oversees many aspects of a specific subject area of the SHRP research. The Asphalt TWG manages the Superpave evaluation and implementation. A TWG is supported technically by various Expert Task Groups (ETGs); the Binder ETG and Mixtures ETG are two that work with the Asphalt TWG.

There are two primary sources of funding now being used to investigate specific ways to improve Superpave. The National Cooperative Highway Research Program (NCHRP) is funded by the state transportation departments to conduct research of a national scope, and it funds research in all aspects of highway needs, including Superpave. The FHWA has included funding in its second National Asphalt Training Center contract (NATC II) with the Asphalt Institute to use national expertise in investigating Superpave concerns.

PG Asphalt Binder

Superpave represents a good direction for the asphalt industry. The Superpave system includes a new Performance Graded (PG) asphalt binder specification that incorporates a number of new and adopted test procedures to measure the physical properties over the complete range of the binder service life. The condition of the asphalt binder is simulated at various stages of its service life. The test procedures evaluate the ability of the binder to do its part in preventing the three critical distresses of asphalt pavements: rutting, fatigue cracking and low temperature cracking.

The binder specification was the most complete part of Superpave when the SHRP research was completed, and most states will be using the PG grading by January 1, 1997. Arkansas, Utah, and Texas have already implemented the PG grading spec. The FHWA initiated and has completed a pooled-fund purchase providing the first set of the PG test equipment for all the states, and much of the industry is comfortable with the PG system. As with any new test or piece of equipment, there are things that are being refined and reevaluated; everyone has definitely learned as they used them.

Superpave Binder Studies

The Binder ETG is investigating issues related to the PG specification. Topics that the Binder ETG is exploring include various equipment concerns, such as those related to different manufacturers using different design approaches for "new" equipment. They are recommending more research to establish a method of calculating low pavement temperature. Currently it is assumed to be equal to the air temperature, which is very conservative. Through the FHWA Long-Term Pavement Performance (LTPP) program, data is being collected and new calculation methods are being explored.

One study has been initiated to further explore how various types of modified asphalts fit into this system and how to establish mixing and compaction temperatures. The NCHRP has awarded Project 9-10 to the Institute and the National Center for Asphalt Technology (NCAT) to investigate these materials. In addition, under the NATC II contract, the Institute is comparing the behavior of various types of modified PG 76-22 binders. Also, everyone wants to know the repeatability and variability of the PG test results to understand how to interpret differences in measurements. Several round-robin test programs are underway to resolve this issue.

Even with all of the questions, the PG binder specification represents a significant improvement for the asphalt industry over penetration, ductility, and viscosity measurements. The questions

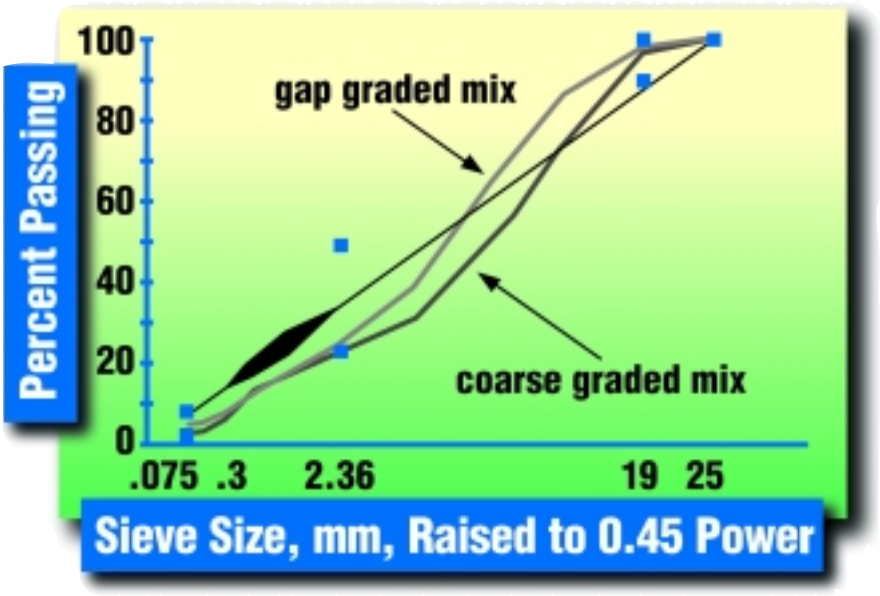


Figure 1. Aggregate Gradation Controls in Superpave

will eventually be resolved.

AI has been working with the American Association of State Highway and Transportation Officials (AASHTO) to develop a Standard Practice for an Approved Supplier Certification System for Suppliers of Performance Graded Asphalt Binders, PP 26, which will facilitate the overall implementation process for both suppliers and agencies. The procedures included in PP 26 will help ensure that the binder used on a project meets the specified PG grade.

Superpave Asphalt Mixture Design

Superpave also includes a completely-revised asphalt mixture design and analysis practice. To obtain specimens that represent the actual pavement, SHRP developed the Superpave Gyratory Compactor (SGC), adopting the most reasonable parameters from the French and Texas gyratory compaction devices. The SGC slowly kneads the mix together into a mass that has similar composition and aggregate orientation as found in the roadway. In mix design, the SGC specimen is used to evaluate the proper volumetric proportioning of the asphalt, aggregate and air that make up the mix.

Existing aggregate criteria and test procedures have been adopted, by consensus, to provide a uniform method for all agencies to select aggregate materials for different traffic levels and the depth of the layer in the pavement structure. In the only new step that is different from current practice, the desired blend of aggregate stockpiles is selected from a number of trial blends based on several factors, such as aggregate gradation control points and a restricted zone. These gradation controls (see Figure 1) are intended to build an aggregate structure or skeleton that achieves a compromise that will produce both a durable and a stable asphalt mixture.

In trying to achieve consistency on a national level, SHRP adopted the 0.45 power chart, the ASTM D 3515 standard set of sieve sizes and control points to evaluate these trial blends. The restricted zone was adopted to avoid mixes that have too much fine sand material. These types of mixes have experienced problems many times in the past, exhibiting plastic flow behavior under traffic.

Superpave Gyratory Compactor

One of the nicest features of the SGC is that it provides additional data to evaluate the compactability of the laboratory mixture. By monitoring how the mix compacts (see Figure 2) initially (N_i), as well as after a maximum number of gyrations (N_m), an indication of mixture behavior is provided. The Institute and other organizations are investigating if the slope of the compaction curve will provide some useful information.

As one might expect, there are varying opinions over parts of this mix design framework. There is considerable debate over the Fine Aggregate Angularity (FAA) test and criteria and its intent to reduce the amount of rounded sands in the mix. Several organizations are investigating this issue.

Many people have questioned the use of the restricted zone; as a guideline, this zone is intended to help engineers

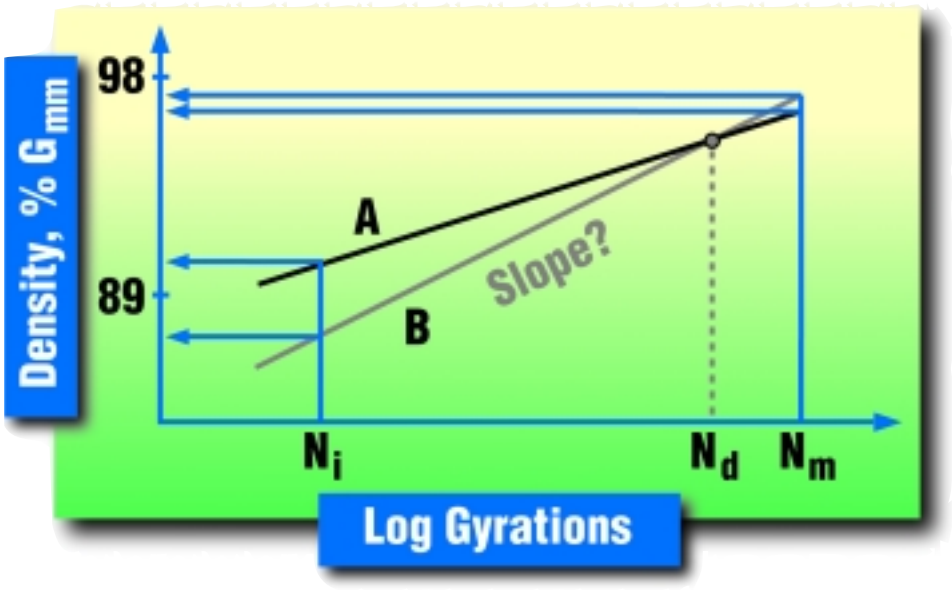


Figure 2. The SGC allows the compactability of the mix to be evaluated

when working with unfamiliar aggregates. Much of the controversy would disappear if everyone would use practical engineering judgment and remember that experience should always dictate. Good performing mixes that violate the restricted zone should not be abandoned. However, if the engineer has had bad experience or no experience with a blend of materials, the zone should be avoided. The Institute strongly recommends not only avoiding the restricted zone but also using gradations that fall below the restricted zone, especially for heavy traffic.

In addition, there are a few questions that need to be answered concerning the procedure used for measuring moisture sensitivity -- AASHTO T-283. The questions include the size of the specimen (100 mm vs. 150 mm diameter) as well as the aging process to be used (T-283 vs. Superpave short-term aging). Regardless of these issues, AASHTO T-283 has been shown in several studies to be the most consistently reasonable method for evaluating moisture susceptibility or detecting mixes in which the binder will strip off the aggregate. Further study will be done under a contract soon to be awarded by NCHRP.

Non-Conventional Mixes

More work needs to be done for mixes other than conventional dense-graded mixtures, such as open-graded mixes, stone matrix asphalt (SMA), and mixes that contain a significant amount of reclaimed asphalt pavement (RAP). NCHRP awarded Project 9-9 to NCAT and the Institute to explore some of the questions with non-conventional mixes. To answer some of the questions pertaining to RAP (e.g. blending binders, extractions, material variability, mix criteria), the FHWA has authorized some testing at the Institute under the NATC II and NCHRP is soon to award a new contract in this area.

In addition, under NATC II, the Institute and the Heritage Research Group are testing specimens cored from in-place pavements to further investigate the design number of gyrations (N_d) needed in the SGC to achieve 96 percent density or 4 percent air voids. Some believe that SHRP established too many design compaction levels (28) and it is known that these levels were based on limited data. Even though the current N_d concept appears to be working well based on hundreds of already-constructed projects, the FHWA Mix ETG has directed that more work be done to reevaluate this issue.

FHWA has completed the initial pooled-fund purchase of the SGC, providing the first device for all of the states. According to FOCUS, the FHWA newsletter that reports on the implementation of SHRP technology, a majority of states constructed Superpave Mix Design projects in 1996 (see Figure 3). Many of these states had previously constructed projects and are close to using Superpave mix design on a routine basis. The original goal established by FHWA for mix design implementation was the year 2000.

Beyond volumetric mix design, Superpave Mix Analysis involves sophisticated testing of SGC-prepared specimens and computer software analysis to process the test results. The Superpave Shear Tester (SST) and Indirect Tensile tester (IDT) are used to subject these specimens to various stress conditions to measure fundamental structural material properties that can then be used in various computer models to predict future

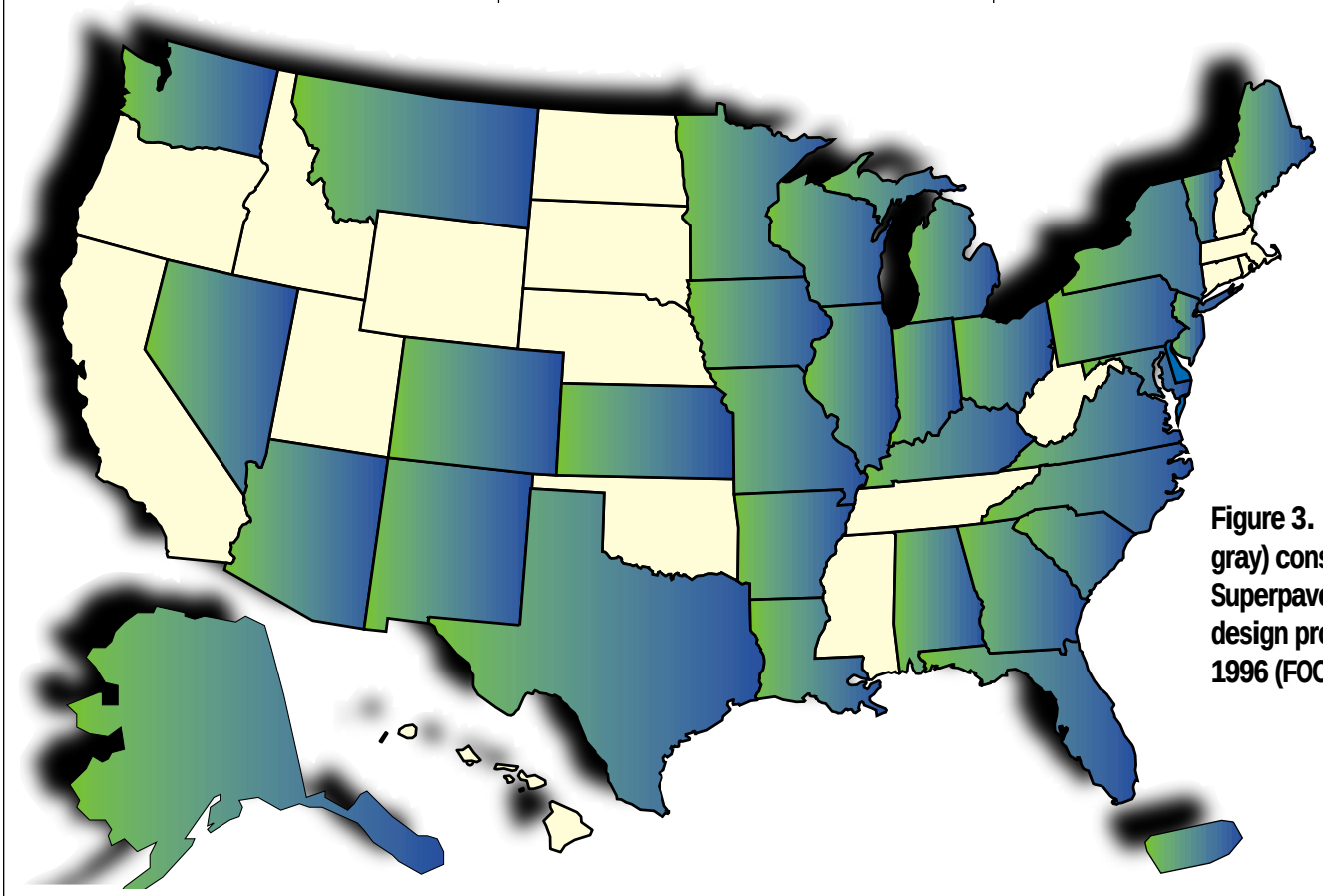


Figure 3. States (in gray) constructing Superpave mix design projects in 1996 (FOCUS).

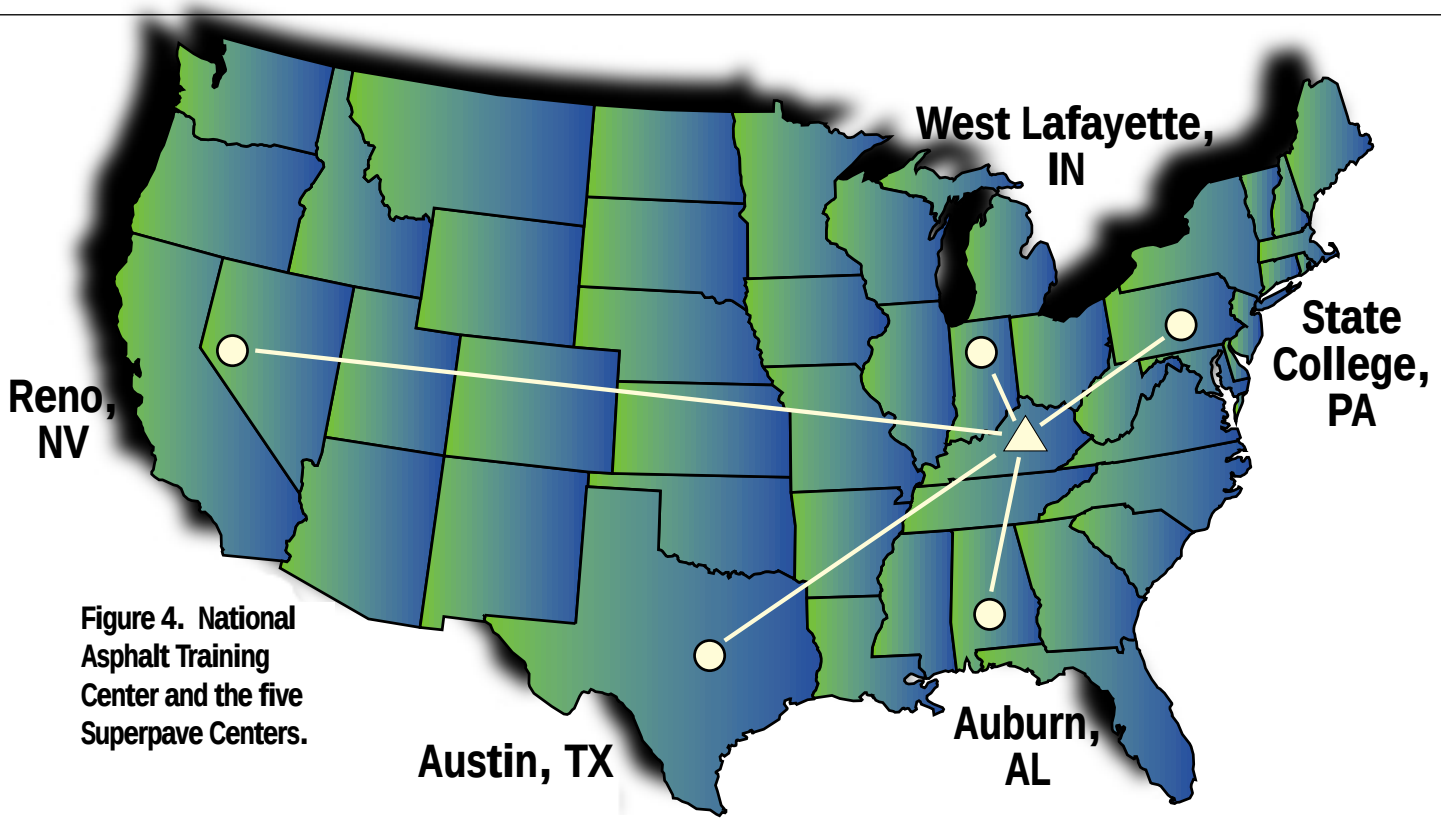


Figure 4. National Asphalt Training Center and the five Superpave Centers.

performance. This is the ultimate goal of Superpave. If the modeling and test procedures were verified and available, we would have a tool to explore various compromises and truly optimize the mix design for the specific traffic, climate, and structure of the specific project.

Because this goal is so important to the asphalt industry, the Asphalt Institute has done a lot of work in this area. We performed the first evaluation of the final SHRP testing, modeling, and software framework, and provided the initial feedback to FHWA. There are many questions that need to be resolved before Superpave Mix Analysis can be used confidently. However, two states (Arizona and Indiana) have partially implemented mix analysis on an experimental basis. The Superpave Mix Analysis system is now being evaluated under an FHWA contract by the University of Maryland. Basic changes in the software have been identified and recommendations for model improvement and change have been submitted.

To implement Superpave in the field, there is a great need for a process of field verification and quality control and assurance. NCHRP Project 9-7 was awarded to Brent Rauhut Engineering, Inc. soon after SHRP concluded to address these issues. The final report for this work is due at the end of the year.

Superpave Centers

Fortunately, unlike in the past, there are many forums available for both raising issues and obtaining information. An interesting and innovative concept of cooperation developed around SHRP. Based on the original Pacific Coast organization, five Asphalt User-Producer Groups, representing various parts of this country and Canada, have been formed to work on and resolve these kinds of problems. Their goal is for agencies, asphalt producers, and asphalt contractors to reach practical solutions for all. FHWA has reestablished the NATC to provide training and on-site field assistance. Between the two NATC contracts at the Institute, one-week hands-on laboratory courses on both Superpave Binder Testing and Superpave Mix Design have been provided to about 700 people.

In addition, FHWA has established five Superpave Regional Centers (see Figure 4), through initial seed funding and loaned laboratory equipment. These Centers are available to assist states in their geographical regions with training, laboratory needs, or other questions pertaining to Superpave.

Publications on Superpave are currently available from many of these sources. FHWA has printed publications on binder testing and mix design. The Institute has developed Superpave manuals, written in practical simplified format, on Binder Testing (SP-1) and Mix Design (SP-2). The Institute is also developing detailed operation manuals on specific testings hints and troubleshooting ideas. In addition, through the NATC II contract, AI and the Superpave Regional Center at Austin are developing National Highway Institute (NHI) course materials for the individuals less interested in hands-on training. These courses will be taught at the Superpave Regional Centers, beginning next year.

The Superpave system does represent a good direction for the asphalt industry. We encourage everyone to stay in touch as the technology and asphalt pavement performance advance further in the future. ▲

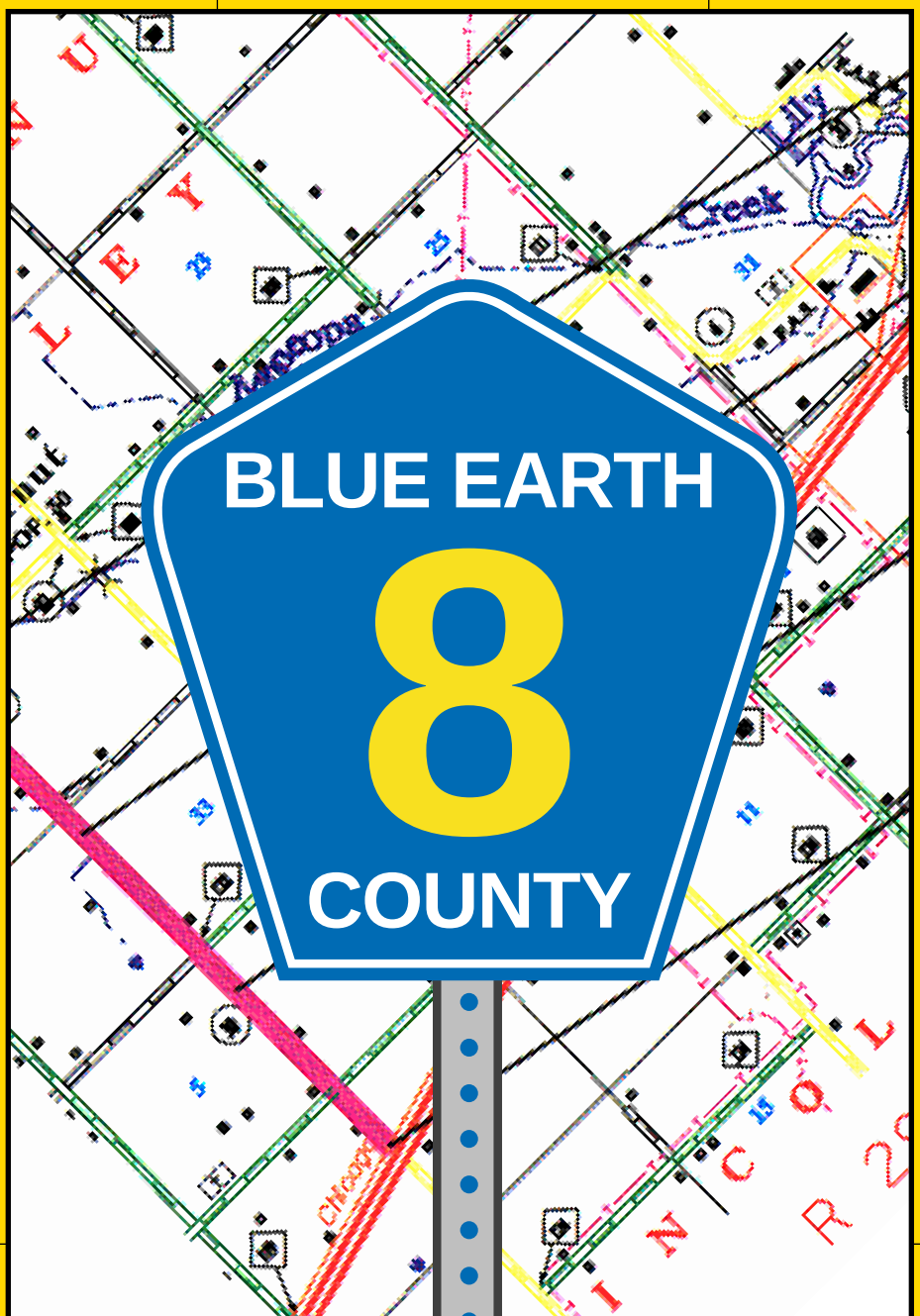
Practical Principles fo

by Alan Forsberg, Public Works Director and County Engineer, Blue Earth County, Minnesota

After many years of planning, designing and constructing roads and streets in Blue Earth County, Minnesota, county engineers have developed reliable, practical principles for building and maintaining low volume roads in cold climates.

Blue Earth is located in south central Minnesota and gets extremely cold in the winter. Temperatures of minus 20 to 30°F are common. The County has 720 miles of roadway consisting of minor and major collectors and minor arterials. Traffic ranges from as low as 100 vehicles per day to several thousand per day. About 400 miles are paved. The rest are surfaced with aggregate. Traffic in rural parts of the county is stable, but around the City of Mankato, it is steadily growing.

Decisions to pave roads in Blue Earth County are generally based on potential for economic development, maintenance cost, safety and environmental considerations such as dust and erosion. Limited resources balanced with demands for road improvements also influence decisions.



Pavement Drainage

The County recognizes the critical need for good drainage in designing and constructing pavements. Slotted, corrugated drain tile and open-graded drainage layers are economical and effective. The 4-inch thick clean rock drainage layer under the aggregate base provides drainage through the drain tile system. But the drainage layer under the shoulder is not necessary for proper drainage.

Base design that extends the aggregate base through and beyond the shoulder costs more and is unnecessary because the shoulders get little or no traffic. Its additional cost for drainage or load-carrying capacity is not warranted on many low volume roads.

Design Decisions

Because the climate is extremely cold in winter in central Minnesota and because traffic volume is low in parts of the County, Blue Earth pavement engineers have established that our road designs must consider the following factors:

or Low Volume Roads

▲ roads fail because of age, or oxidation and stripping of asphalt binder;

▲ additional asphalt provides increased durability and a reservoir to compensate for oxidation and stripping;

▲ infrequent but heavy loads may cause failures;

▲ emphasis solely on ESALs may result in short pavement life;

▲ design is often a compromise between the current most economic design and future needs;

▲ road designs should focus on a 15- to 20-year design life.

Because of these factors, Blue Earth County engineers have found that a relatively high asphalt content coupled with low air voids provides the elasticity needed for long pavement life with low traffic volumes and extreme weather conditions. The County requires an integrated design-construct method for asphalt pavements that controls air voids appropriate for the particular mix by varying gradation of aggregates and asphalt cement.

Studies, coupled with our own experience, show that high air voids promote pavement deterioration due to oxidation and stripping. Problems associated with low voids such as rutting and bleeding are not common on low volume roads.

Consequently, low volume roads, especially those with light traffic and light loads, should be designed toward the low end of the air voids spectrum.

Durable Aggregates

Hard, durable aggregates, which will resist the affects of loading and severe weather, are also essential. Critical aggregate qualities include gradation of material by size and hardness, shape and affinity for asphalt binder. They effectively transfer loads and reduce spalling. Crushed materials substantially increase stability and reduce rutting. The best gradations are developed by requiring two or more stockpiles graded by size. Coarser materials with increased crushed content are best. Limiting the use of soft, deleterious materials will prevent surface spalling and increase long-term stability.

When larger rock is not locally available, imported material is an alternative. The County requires an integrated design-construct method for asphalt pavements that controls air voids appropriate for the particular mix by varying gradation of aggregates and asphalt binder.

Maximum Density Line

A Colorado DOT study examined 101 mix designs for relationships between air voids and several alternative maximum density plots. The study found the maximum density line was a useful rule of thumb to determine how to adjust gradation to optimize the mixture's air voids. If a local agency wants higher air voids, they will adjust the gradation away from the maximum density line. If they want lower air voids, they will adjust the gradation toward the maximum density line.

Blue Earth specifications allow the local agency to adjust asphalt content and aggregate gradation upon request. This ability requires that the aggregate producer have multiple stockpiles, and also separate pay items for asphalt binder and aggregate.

Adjusting Binder and Gradation

Laboratory design is an essential but limited model of the field environment. The real need is to control air voids, aggregate and asphalt binder in the hot-mix asphalt produced at the plant. The following is an example.

Blue Earth County was paving a road in the summer of 1993. Loveall Construction was the contractor. Gradation and asphalt content tests showed the contractor was operating within the specifications, but samples showed that air voids at 5 percent were above the optimum 3 to 4 percent for the low volume road.

An asphalt content of 6.5 percent was appropriate based on past experience with the aggregate source. Production gradation was extremely close to trial mix gradation. The County elected to adjust the mix gradation since the asphalt content was appropriate.

After studying the maximum density curve, the County instructed the contractor to decrease the sand by 2 percent increments. This would move production gradation toward the maximum density line and reduce the air voids. A voids update was done after each increment until the contractor reached voids of 3.5 percent. Production then continued at 3.5 per-

cent air voids and asphalt content at 6.5 percent.

Compaction

Behind the paver, the mat has 15 to 20 percent air voids. The rollers will reduce that void content to 8 percent or less of maximum theoretical specific gravity.

The County currently requires the contractor to construct a control strip to determine the best rolling pattern to reach maximum density. The contractor determines densities by means of a portable nuclear gauge. Compaction specifications require breakdown by steel-wheeled roller, intermediate rolling by rubber-tired roller, and finish rolling by a steel-wheeled roller.

Owner Responsibility

Planning, design, construction and maintenance of low volume asphalt roads is still an art, but is slowly advancing to a science. We have learned a lot since we began paving and maintaining roads in the county. We have made mistakes, and we have corrected them. We are trying to follow and improve upon the practical guidelines that we have developed over the years.

The owner, the County, must be willing to take responsibility for the quality of the work performed. We, myself and the Blue Earth engineering staff, represent the people in Blue Earth County, and we willingly take the responsibility for doing the job right. ▲

Blue Earth Goes Superpave

"Higher asphalt content and lower air voids generally provides the most durable low volume mix. We've been working on that premise for many years. Then, we began getting information from Focus, the Asphalt Institute, TRB and the Local Road Research Board (LRRB) about Superpave. The LRRB is a local advocacy group composed of State and local agencies dedicated to improving pavement throughout our State.

"After studying the information about Superpave and asking a lot of questions, I was ready to try a Superpave project on a low volume road. We did a 3.5-mile, 2-inch-thick overlay on County State Aid Highway (CSAH) 30 at Crystal Lake using Superpave mix design. The average daily traffic on the road is about 130.

"Minnesota DOT brought in its mobile pavement laboratory and designed the mix right at the aggregate pit. Because the Superpave mix used a higher quality aggregate, and coarser than local aggregates, we had to import aggregate. It cost a bit more, but only $1,000 to $2,000 more per mile than our conventional mix. LLRB paid the cost overrun.

"Another Superpave project, CSAH 8, included a 5-mile new road, composed of 12 inches of aggregate base and 3.5 inches of Superpave mix placed in two courses, one 2-inch course and one 1.5-inch course. We used a PG 52-34 binder. It cost just a little more than the standard MnDOT binder.

"On all these projects, we are building a base of knowledge. As we gain confidence, we'll shift completely to Superpave. We are convinced it has the potential for dramatically improved pavement performance at a reasonable cost."

Comments by Alan Forsberg, Public Works Director, County Engineer for Blue Earth County, Minnesota

Spring Seminars

Quality Construction of Hot Mix Asphalt Pavement

This seminar is devoted to teaching the recommended practices for constructing a high quality hot mix asphalt pavement. Participants will be provided with an understanding of the materials used in hot mix asphalt; hot mix asphalt production procedures; preparing surfaces for paving; placement and compaction operations; and pavement acceptance criteria. Interactive participation and example problems will help in providing a good learning environment.

Detroit, MI	**February 24-26, 1997**
Seattle, WA	**March 3-5, 1997**
Burbank, CA	**March 10-12, 1997**
St. Louis, MO	**March 17-19**
San Francisco, CA	**March 24-26, 1997**
Atlanta, GA	**March 24-26, 1997**
Woodbridge, NJ	**March 31- April 2, 1997**
Cleveland, OH	**April 7-9, 1997**
Houston, TX	**April 7-9, 1997**
Fort Lauderdale, FL	**April 7-9, 1997**
Marlboro, MA	**April 21-23, 1997**
Las Vegas, NV	**May 12-14, 1997**

The Superpave Asphalt Mix Design System

This workshop is designed to provide participants with a working knowledge of the Superpave asphalt mix design system. Comparisons are made between Superpave and the older systems used for specifying asphalt binders and mixtures. The proper use of the Superpave system is presented, and a discussion will be held on the Superpave implementation activities in each workshop locale.

Detroit, MI	**February 27, 1997**
Seattle, WA	**March 6, 1997**
Burbank, CA	**March 13, 1997**
St. Louis, MO	**March 20, 1997**
San Francisco, CA	**March 27, 1997**
Atlanta, GA	**March 27, 1997**
Woodbridge, NJ	**April 3, 1997**
Cleveland, OH	**April 10, 1997**
Houston, TX	**April 10, 1997**
Fort Lauderdale, FL	**April 10, 1997**
Marlboro, MA	**April 24, 1997**
Las Vegas, NV	**May 15, 1997**

Quality Construction of Hot Mix Asphalt Pavement
Registration Fee: $360 per person
Agency Discount for 3 or more-$299 per person

The Superpave Asphalt Mix Design System
Registration Fee: $150 per person

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P.O. Box 14052, Lexington, KY 40512-4052
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SAPAE NEWS

Louisiana Asphalt Pavement Association's president, Steve Strickland, believes that Louisiana's asphalt industry is headed in the right direction with the new hot-mix specifications now being implemented. They were developed by a specifications committee that included asphalt industry people, academia, FHWA, Louisiana Transportation Research Center and the Louisiana Department of Transportation and Development. "In my opinion," says Strickland, "the new hot-mix specifications should be used in lieu of the Stone Mastic Asphalt mixes. The new specifications are far more economical and will extend the life of the pavements as expected."

The Rocky Mountain Region Asphalt Pavement Education Center is a partnership between the Colorado DOT, FHWA and the Colorado Asphalt Pavement Association (CAPA). It offers programs that provide everything from basic information about asphalt pavement construction to detailed training in QC/QA laboratory tests and asphalt mix design. Part 2 of the Mix Design program includes instruction in fabricating and evaluating properties of test specimens using equipment specific to both the Marshall and the Superpave methods.

Dodge County, Wisconsin, Highway Commission; the Wisconsin Asphalt Pavement Association; Northeast Asphalt, Inc.; Payne and Dolan, Inc.; Koch Materials Company; CMI Corporation; and Marquette University all combined to stage an In-Place Asphalt Rehabilitation Techniques demonstration this past fall. Over 250 people watched four techniques--1. Milling and Relay of asphalt pavement; 2. Pulverizing and Relay of asphalt pavement; 3. Cold in-place reclamation, Emulsion Injection; and 4. European Technology/Foamed Asphalt Injection--demonstrated on a 5-mile project.

NAPA conditionally endorsed the National Occupational Safety and Health (NIOSH) draft guidelines on engineering controls for highway pavers. The NIOSH proposal includes requirements for the installation of engineering controls on all self-propelled asphalt pavers weighting 16,000 pounds or more built after July 1, 1997. The engineering controls must vent at least 80 percent of the asphalt fumes away from workers on or near the equipment. The NIOSH proposal would require all older pavers weighing the same to be retrofitted with engineering controls by July 1, 1999.

Michigan Asphalt Pavement Association reports that fine aggregate angularity requirements for Superpave may have a significant impact on material selection, especially on higher traffic volume projects. MAPA urges their contractors to obtain the required testing equipment and begin testing their fine aggregates to determine if they meet Superpave fine angularity requirements. MAPA also suggests that contractors work with aggregate suppliers and alert them about any necessary changes.

Flexible Pavements Inc. of Ohio reports that Ohio DOT has adopted a policy for 1997 hot-mix asphalt projects that require the addition of SBR or SBS polymers to heavy duty surface courses. FPI recommended the policy to ODOT to increase durability and longevity of its heavy-duty surface mix. ODOT has put together a team to implement the policy. The team includes representatives from liquid asphalt suppliers and the hot-mix industry, as well as representatives of polymer-modified asphalt suppliers. The implementation team will recommend how to merge the policy with the adoption of performance graded asphalt binders, which will occur about the same time.

Wayne Muri, Miissouri Asphalt Pavement Association executive director, was awarded the George S. Bartlett award at the AASHTO annual meeting in Buffalo, New York. Muri earned the award in recognition of his contribution to highway progress. The award is co-sponsored by the ARTBA, TRB and AASHTO.

Maryland Asphalt Association, Inc.'s partnering team, composed of contractors and MAA executive director Brian Dolan, regularly meets with the Maryland State Highway Administration to educate front line employees of both the SHA and the asphalt industry about new developments and new ways of doing business in the asphalt industry. Recent meetings have included a presentation by the Plant Rating Team to ensure that all employees understand the new plant rating system.

Carroll Lance, long-time executive director of the Asphalt Contractors Association of Florida, passed away in the fall of 1996. Carroll is rememberd by both local and national contractors as a "warrior for the asphalt industry" and a strong supporter of NAPA. **Jim Warren**, formerly director of education for ACAF, was recently named its executive director. ▲

SUPERPAVE CENTER NEWS

The Federal Highway Administration helped establish five Superpave Centers around the U.S. to serve as regional sources of expertise to promote the successful implementation of Superpave. The five Superpave Centers were established at Pennsylvania State University at State College, Pennsylvania; the National Center for Asphalt Technology at Auburn University in Alabama; Purdue University in West Lafayette, Indiana; University of Texas at Austin; and University of Nevada at Reno.

The centers are involved in such things as ruggedness testing of the Superpave Shear Tester (SST) and the Indirect Tensile Tester (IDT), SPS-9 testing, mix designs and analysis for experimental or pilot projects, forensic analysis, referee testing and proficiency testing. The centers are also an important source of hands-on training for engineers and technicians at the local level.

The Southeast Superpave Center at NCAT serves eight states, Alabama, Georgia, North Carolina, South Carolina, Mississippi, Florida, Virginia and Tennessee. The primary function of the center is to support implementation of SHRP research results by state DOTs and the asphalt industry in the Southeast.

During the next fiscal year, the center will conduct seminars on mixture analysis procedures. It will provide problem-solving expertise on Superpave technology to the DOTs and the asphalt industry within the region, as well as conduct a series of round robin studies on modified binders, unmodified binders and on the Superpave Gyratory Compactor. The primary tools used by the center will the Superpave Shear Tester (SST) and the Indirect Tensile Tester (IDT).

The North Central Superpave Center is working with states in its region to establish key concepts that asphalt industry personnel need to learn.
One of its primary functions, as established by its steering committee, is communication. To that end, NCSC publishes a quarterly newsletter and has established a www site. Its home page can be found at http://ce.een.purdue.edu/~spave/.

At the request of the North Central Asphalt User Producers Group, the NCSC has coordinated a binder round robin testing program to investigate the amount of variation in binder testing from different labs under normal testing conditions. This identified lab results and allowed comparison of one lab with another. Test results were returned by 25 labs that tested 26 sets of samples. Four asphalt cements, including one polymer-modified binder, were tested for compliance with known grades in the rotational viscomter, bending beam rheometer (BBR) and dynamic shear rheometer (DSR).

The results revealed relatively high amounts of variation in some tests, which emphasized the need to follow the standardized procedures closely to eliminate sources of error.

The Superpave Center at Austin represents a unique partnership among TxDOT, FHWA, and the University of Texas at Austin, Center for Transportation Research. Its mission is to: 1. evaluate and improve Superpave products through applied research, 2. assist and promote uniform Superpave technology, 3. be an information resource for management level personnel, 4. provide training in Superpave technology, and 5. provide testing and technical assistance to Superpave Center partners.

At its new location, the center's laboratory contains virtually every laboratory apparatus needed to conduct Superpave mix design and analysis and Superpave binder analysis. Because training is a key function of the center, the new site also contains a meeting room that will accommodate thirty people in classroom style. The center also is located across the corridor from the Asphalt and Bituminous Sections of the TxDOT Materials & Tests Division. TxDOT not only supports the center financially, but makes its equipment and personnel available for applied research aimed at implementing Superpave in Texas and in its partnering states.

Current activities at the **Western Regional Superpave Center** include equipment shakedown on SST, IDT, and additional binder equipment; setting up an additional laboratory for training purposes only with volumetric mix design and binder equipment; Superpave volumetric mix design and binder training; developing training courses for the specific needs of neighboring states; forensic work for neighboring states using Superpave technology; materials characterization of WesTrack binder and mixes; and preliminary work on SST ruggedness testing. ▲

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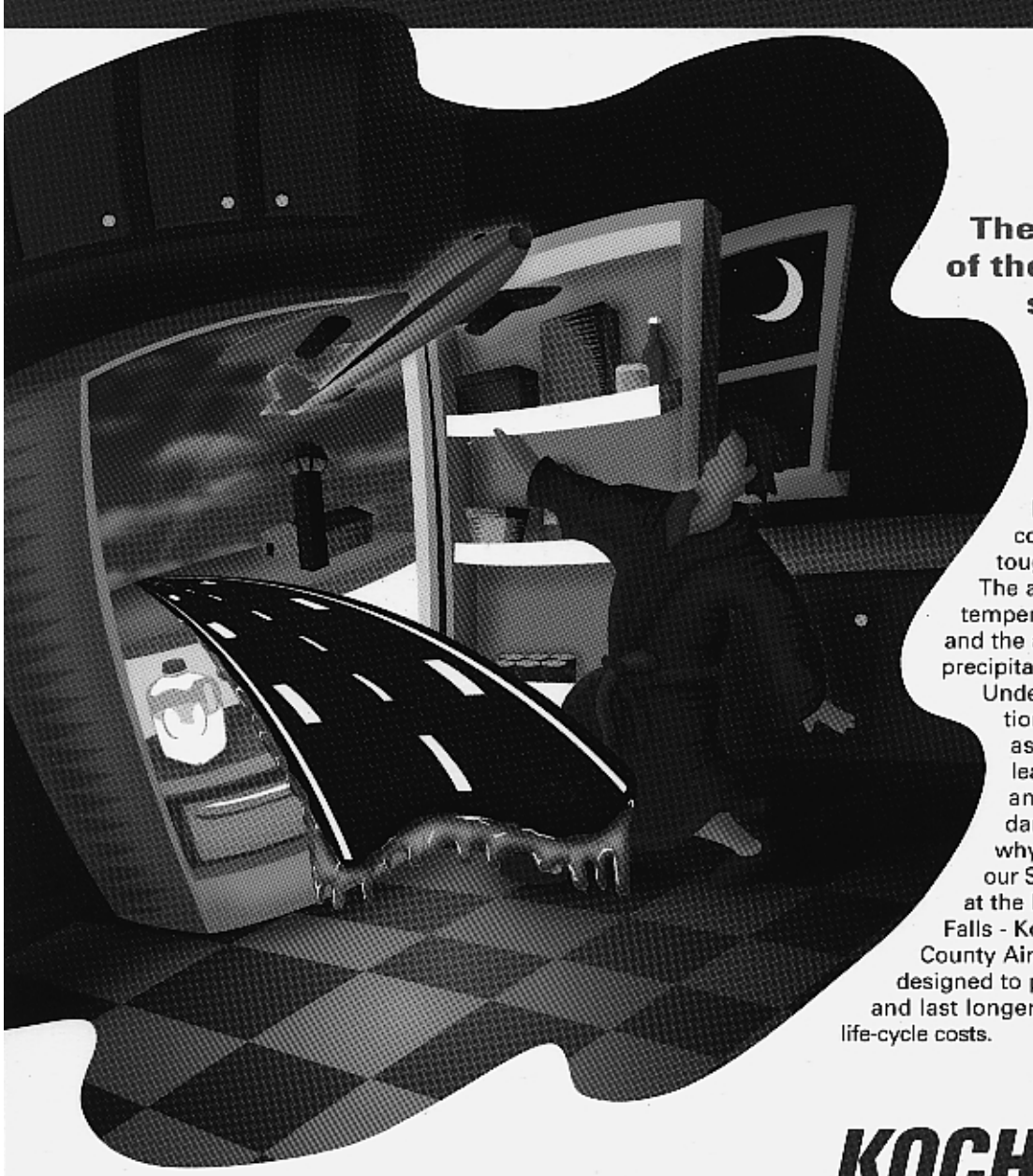

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