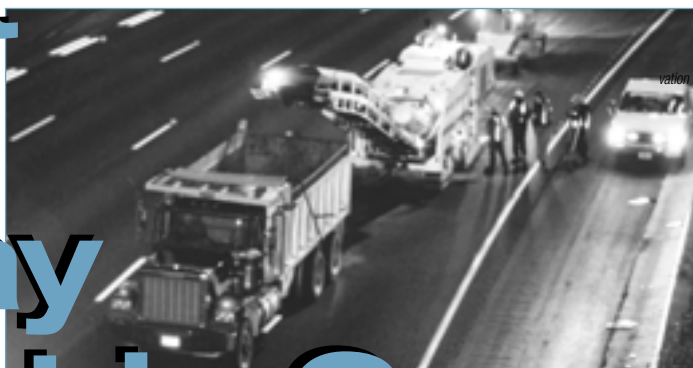


Asphalt Spells Highway Comfort in Georgia



Preservation and Maintenance Program

Georgia's Highway System, the Best in the Nation, is 95 Percent Asphalt

Prepared for the Asphalt Pavement Alliance

In the mid-1970s the Georgia Department of Transportation (GDOT) implemented a pavement preservation program to improve the overall condition and serviceability of its highways. The success of this program is evident in the smoothness and high quality of Georgia's pavement network.

The network includes 4,403 center-line miles in the National Highway System. It consists of 95 percent asphalt pavements and 5 percent concrete pavements.

Traffic counts on the roads in Georgia's urban Interstate System range from 45,000 to 415,000 average daily traffic (ADT) with 5 to 10 percent heavy trucks. Traffic on the roads in the rural Interstate System range from 20,000 to 45,000 ADT with 25 to 40 percent heavy trucks.

A recent Federal Highway Administration (FHWA) Southern Resources Center report* explains how Georgia has maintained the best roads in the nation for the last 7 years. Perhaps the biggest reason that Georgia has good roads is that the motorist's comfort and convenience are a prime concern of GDOT. "Over the last decade, GDOT's policy has been to promote a quiet ride, a smooth

ride, a good surface appearance and good durability," says Don Watson, GDOT Assistant State Materials and Research Engineer.

"Asphalt lends itself to our program because it is easy to work with, and it's quiet and smooth," says Watson. "We don't have to block off projects for long. Often times, we can fix the roads during the night and get them open in time for rush hour the next morning."

If It's Broke, Fix It Quick

A timely maintenance program keeps Georgia's roads in excellent condition. GDOT has found that fixing a pavement as soon as distress begins to show will make repairs easier and cheaper. Because pavement continues to deteriorate until the repair project is actually underway, quick delivery is a critical factor in the success of GDOT's preservation program.

"Maintaining a state system the size of Georgia's with concrete would be difficult," states Ron Collins, President of Pavement Technology, Inc. and former 30-year GDOT Materials and Research Engineer for Bituminous Construction. "That's why 95 percent of the road system is asphalt."

In some states, several years may pass from the time a pavement is identified as needing repair until the pavement is actually rehabilitated. "You must have a good maintenance program and recognize when the roads need maintenance," says Collins. "If a

road gets too low on the performance curve, you have to put it in the schedule and fix it. Timing is important." Collins thinks that using asphalt improves GDOT's response time to do repairs.

GDOT's goal is to perform preservation on 10 percent of its network every year. Figure 1 shows that from 1989 to 1999, the actual percent of the network being preserved has varied from 5.8 to 13.8 percent.

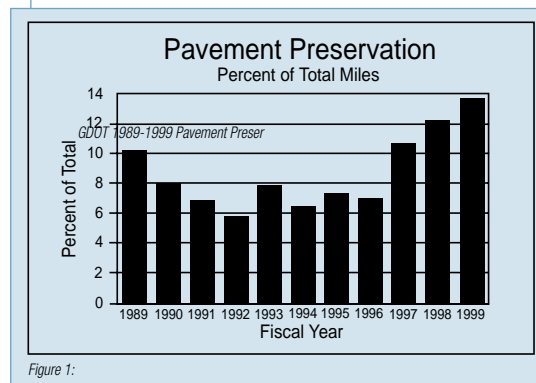


Figure 1:

Smoothness

To meet its smoothness requirements, GDOT uses the latest technology. It uses the newest modified asphalt binders, Stone Matrix Asphalt (SMA) intermediate courses, and open-graded friction courses (OGFC) to ensure smoothness.

"We build them smooth and keep them smooth," says Watson. "GDOT excels with smoothness on its urban Interstates. It also does well with smoothness on its rural Interstates."

GDOT began measuring smoothness in 1968 and in 1980 acquired trailer-mounted Mays Meters. The Department developed new smoothness specifications based on their use. In 1995, GDOT acquired laser-based South Dakota profilers, developed correlations with the data generated by the Mays Meters, then created new testing procedures and smoothness specifications for the South Dakota profilers.

Smoothness Report

GDOT sends out a quarterly *Summary of Smoothness Results* report on each active or completed construction project. It also shows smoothness index values before construction and after construction, including percent of improvement. Figures 2 and 3 show that GDOT's approach to pavement preservation has significantly improved average

Annual

Highway Users Study

In 1998, GDOT did a study of 800 Georgia highway users. The purpose of the study was to examine user satisfaction with state highways and to compare data with a similar survey conducted in 1996. The survey was patterned after the 1996 Georgia Quality Initiative Highway User Survey and conducted as part of the Federal Highway Administration's National Quality Initiative (NQI).

The survey revealed that highway users' satisfaction with ride smoothness was 78.1 percent, which is 21.1 percent higher than in 1996. The number of highway users satisfied with the surface appearance was 76.8 percent, 19.8 percent higher than in 1996. Users satisfied with a quiet ride were 78.5 percent, 19.5 percent higher than in 1996. Users satisfied with pavement durability were 74 percent, 13 percent higher than in 1996.

These user satisfaction levels far exceeded the national levels shown in the 1995 NQI survey. Figure 4 shows the comparison between the 1995 NQI Survey, the 1996 GDOT survey and the 1998 GDOT survey.

Pavement Preservation Program

GDOT's pavement preservation program is the foundation for the high level of satisfaction experienced by Georgia highway users. Ten years ago, the Georgia DOT began a pavement preservation system. Its purpose was to:

- ▲ Apply the Pavement Condition Evaluation System (PACES) to all state routes
- ▲ Use PACES to determine rutting and cracking
- ▲ Fix projects before they are broken
- ▲ Use a rating value of less than 70 percent to trigger rehabilitation
- ▲ Spend rehabilitation money primarily on milling and overlaying
- ▲ Rehabilitate distressed pavements with 1.5-inch overlays

GDOT uses PACES for annual evaluations of its asphalt pavement network. PACES rates the overall project by assigning a pavement in perfect condition a maximum value of 100 and deducting points for each distress extent and severity. Following the statewide evaluation, GDOT further evaluates all projects rated 70 and

below to determine if they are good candidates for a preservation action and what that action will be.

GDOT then evaluates the overall project rating and individual distresses to determine the most appropriate rehabilitation treatments. For flexible pavements, the treatments vary from "do nothing" to "mill and fill" with asphalt. The pavement rating, severity levels, and traffic volumes define the decision points.

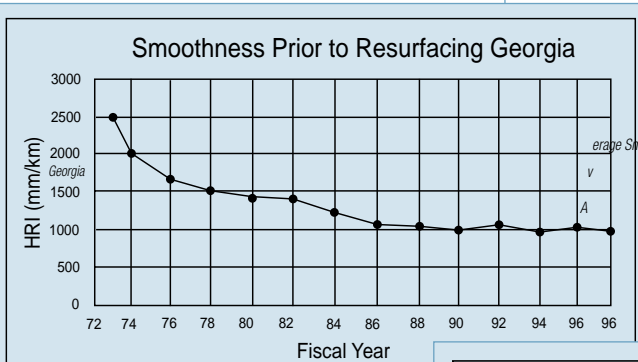


Figure 2:

smoothness over the last 25 years. (See Figures 2 and 3.)

Some concrete highway builders contend that they can construct concrete pavements that are as smooth as asphalt. "But that has not been my experience," says Collins. "When you construct or reconstruct with concrete, you almost always have to deal with joints. Joints make bumps in the road. It is difficult to construct a really smooth road with joints in it."

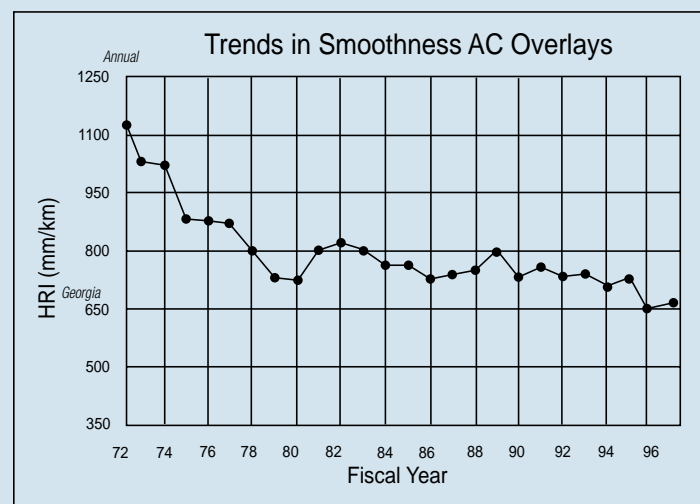


Figure 3:

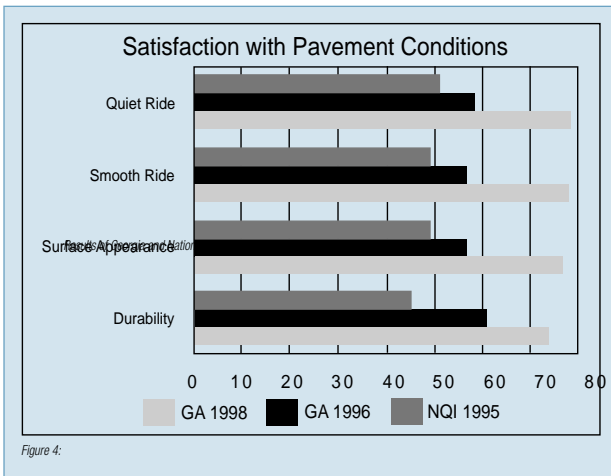


Figure 4:

Collins says that asphalt blends well with Georgia's quick-delivery maintenance program. He cites the example of asphalt's speed of construction in overlaying 330 lane-miles of Interstate in the Atlanta area just prior to the 1996 Summer Olympics. "Asphalt contractors worked at night and maintained traffic flow the whole time," says Collins. "We couldn't have done such work successfully and that quickly under heavy traffic using concrete. Some sections we worked on had more than a 400,000 average daily traffic count. We could do it with asphalt but not with concrete."

Life-Cycle Costs

In the life-cycle cost category, Collins says that asphalt is well able to compete with concrete if DOTs will use premium mixes. "A life-cycle cost comparison of 20 years or less really doesn't show much, says Collins. But one of 40 or 50 or 60 years will reveal a lot.

"The longer the pavement is down—whether asphalt or concrete—the better asphalt will look. If a life-cycle cost analysis includes one PCC rehabilitation over a 25-, 30- or 40-year period, asphalt will nearly always have a lower life-cycle cost," says Collins. He points out that premium asphalt mixes, such as SMA, will add a significant measure of durability to the asphalt pavement.

"It's true," says Watson. "More durable mixes make more durable roads. We use more durable mixes

than we did in the past." Watson says SMA mixes can last 20 to 40 percent longer than conventional asphalt mixes. "The public wants roads that look good, ride good and last longer," he concludes. "Durable SMA mixes provide those ingredients."

Maintenance and Rehabilitation Strategies

To construct and rehabilitate Georgia's durable, smooth pavements, GDOT uses state-of-the-art asphalt technology. GDOT uses Superpave for base courses, SMA for intermediate courses, and OGFC for surface courses. The OGFC or porous mixes provide:

- ▲ Excellent skid resistance
- ▲ Good driver visibility at night and in the rain
- ▲ Noise reduction and
- ▲ Stripping control.

An OGFC will reduce noise by up to 6 decibels, says Watson. "It will reduce noise on Interstates and primary roads by an average of 3 decibels." A 3-decibel reduction is the equivalent of cutting traffic noise in half or a 20 percent reduction in vehicle speed.

Stone Matrix Asphalt (SMA)

GDOT uses SMA on the intermediate layers above the base course and below the surface course. It is a gap-graded mix with a high asphalt and filler content. GDOT has concluded that SMA provides good stone-on-stone contact and will support heavy truck-loads better than dense-graded mixes.

SMA mixes have about 25 percent more asphalt coating on the aggregate and they are expected to last approximately 20 percent longer than conventional mixes. Experience to date has

shown that rutting rarely occurs on pavements using SMA design.

Superpave Uses

GDOT began using Superpave binders and mixes in 1997 and 1998. They use Superpave on primary routes and for base courses on Interstates. GDOT placed 7.9 million tons of Superpave on Georgia roads in the year 2000. Although Superpave provides an excellent base course, GDOT continues to use SMA for intermediate courses on roads with high-stress, high-traffic volume.

Although GDOT puts a heavy emphasis on the use of premium asphalt mixes, it is not the primary reason that Georgia has good roads. "Quality consciousness makes the difference," says Collins. "You really have to have quality consciousness. And you need to recognize that the cheapest is not always the best. You have to consciously look at the life-cycle cost and be willing to pay more for a better pavement.

"SMA is not a cheap mix. But if you look at the life-cycle cost, it's worth it. You'll get your money back after eleven more months of service life than conventional mixes give. Think for a minute: if you could make every job last one year longer, you would have a free budget every 10 years."

Collins cautions that quality consciousness alone is not enough. "You also need to measure quality. If you don't, you won't know whether your road program is getting better or worse. When you measure quality, you provide your contractors incentive to build the best road they can. That's what makes a good road system." ▲

**Georgia's Pavement Preservation Program and Smoothness Requirement—Smooth Pavements Don't Have to Cost More than Rough Pavements is a recent report available from FHWA's Southern Resources Center website at www.fhwa.dot.gov/resource_centers/southern/reports/btm.*

The APA is a cooperative effort of the Asphalt Institute, the National Asphalt Pavement Association and State Asphalt Pavement Associations.

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