Intersect

Strategy 4

by Dwight Walker, Associate Director of Research and Technical Services, Asphalt Institute

This article is the fourth in a series on obtaining better performance from asphalt pavement intersections.

The first article, published in the Winter 1999 issue of *Asphalt* Magazine described the overall process. It discussed why intersections require special attention and what the key steps are to establishing an "intersection strategy." Those steps include:

- ensuring structural adequacy,
- selecting and controlling materials,
- following proper construction practices, and
- implementing the plan.

The second article, published in the Summer 1999 *Asphalt* Magazine, covered the first of the steps—ensuring structural adequacy. The third article, also in the Summer 1999 issue of *Asphalt*, covers the materials and construction steps.

This article details projects that have followed the intersection strategy and evaluates three examples of implementing the plan.

U.S. 40 and Maryland 213

The first major trial project was located at the intersection of U.S. 40 and Maryland 213 in Cecil County, Maryland. This location had a history of severe rutting that needed milling and repaving on an almost yearly basis. In early 1994, the Maryland State Highway Administration (MSHA) asked both the asphalt and concrete industries to use their best technology to rehabilitate the intersection. MSHA asked each industry to develop their proposed solutions without being constrained by existing specifications.

The Maryland Asphalt Association formed a task force comprised of the Asphalt Institute (AI), the National Asphalt Pavement Association, Koch Materials Company, and Paving Materials Supply Co. This group determined that it was necessary to remove the existing 8 inches of asphalt to ensure performance. AI conducted Superpave mix designs for the base and surface courses. Both mixtures met all Superpave criteria. Rutting-prediction tests were performed using AI's Superpave Shear Tester (SST). The resulting aggregate blends were 90 percent limestone and 10 percent natural sand. PG 76-22 was used in both the base and surface mixes.

In August 1994, asphalt construction began. Two 3-inch courses of 25-mm base were placed followed by 2.25 inches of 19-mm wearing surface mix. The crews did the work in 8 nights—3 nights of milling and 5 nights of paving. The contractor's quality control efforts included asphalt content determinations, gradations, Marshall air voids and VMA, and in-place density testing.

Three Examples of Imp

After two years of service, the HMA intersection was described as "looking as good as the day it was put down. There are no signs of rutting." After five years of service, the asphalt intersection pavement is described as having practically no rutting. The PCC portion of the pavement is exhibiting fairly severe cracking.

U.S. 27 and KY 80

Another major test site was installed at Somerset, Kentucky, at the intersection of U.S. 27 and KY 80 in May and June of 1998. Again, the two industries were invited to use the latest technology and were not restricted to existing state specifications. The HMA team consisted of representatives from the Plantmix Asphalt Industry of Kentucky, Asphalt Institute, Hinkle Contracting, the Kentucky Department of Highways, and the Kentucky Transportation Center.

This group exemplified the "partnering" approach in their efforts to plan the work. Site evaluations were performed to evaluate the in-place thickness and integrity of the existing layers. It was determined that 5 inches of asphalt needed to be milled and replaced. The group elected to use the Superpave process for materials characterization and mix design.

The gradation of the base and wearing courses were both essentially Superpave gradations but were slightly coarser than the bottom control points. The aggregate structures were somewhere between coarse Superpave and SMA. One hundred percent crushed aggregate was specified, and PG 76-22 was selected. Shear testing, performed by AI following the mix design, indicated that the laboratory mixtures had comparable rutting resistance to that of the Maryland designs.

The two northbound lanes of U.S. 27 received 2 inches (50mm) of 12.5-mm HMA wearing course over 3 inches (75mm) of 19.5-mm base mix. This work was completed in 7 nights at a cost of $25.25 per square yard. The southbound lanes received a 4-inch (100-mm) "white-topping" inlay of portland cement concrete (pcc). The concrete work took 28 days to complete. The unit cost for the PCC effort (milling, replacing pavement, etc.) was $50 per square yard.

The HMA quality control operation consisted of evaluating the plant-produced mix for air voids and VMA from Superpave gyratory-compacted specimens, asphalt binder content and gradation, and density. Extra care was taken with joint construction and avoiding segregation.

After one year of service, both the pcc and HMA pavements are performing satisfactorily. Neither side is perfect; the pcc has a few minor cracks, and some portions of the HMA mat experienced slight (2-5-mm) consolidation or rutting in the first month of service. After that initial deformation, the rut depths have not increased.

Sante Fe Boulevard and KS 7

A third trial site was recently constructed in Olathe (near Kansas City), Kansas, at the intersection of Sante Fe Boulevard and Kansas State Route 7. After milling and repaving twice in a very short period of time, there was strong sentiment to white-top the intersection. However, after learning that the cost for white-topping was an estimated $600,000, and a Superpave HMA pavement could be constructed for about $200,000, the city engineer decided to use HMA. About 3500 tons of 19-mm Superpave mix with a PG 82-22 will be used. The three listed projects are examples of the many successful HMA intersections being built. The technology exists to design and construct HMA intersections that perform well. The challenge now is getting the word out and delivering the product.▲

lementing the Plan