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Rubblizing U.S. Highway 12

Rubblization was the answer to a tough pavement rehabilitation problem last year in the Wisconsin DOT (WisDOT) Waukesha District.

The project was successful in terms of cost to deliver, time to design and construct, and overall quality of the constructed project. WisDOT was able to minimize delays to the heavy amount of tourist traffic that uses U.S. Highway 12. The key to the success of the project was a design team effort by WisDOT that included input from contractors, maintenance personnel, and other DOT offices.

Our involvement with the project began in 1997 when the WisDOT staff managed a half-mile of cracking and seating with hot mix asphalt (HMA) overlay on one of the worst sections of Highway 12. The biggest concern was knowing where to stop. The county had been doing concrete joint repairs for the last several years and seemed to be fighting a losing battle. Both longitudinal and transverse joints showed severe deterioration all the way from the Illinois State Line to Lake Geneva, an 8.6-mile stretch of 4-lane divided highway.

Safety Concerns

Along with breakup of the joints, the surface was "shattering," indicating that much of the reinforcing mesh in the concrete was too near the surface. The shattering was not only causing problems but was creating safety concerns as chunks of concrete were being dislodged from the pavement.

The cross section of the existing road consisted of 9 inches of mesh-reinforced concrete pavement with 60-foot joint spacing over the top of 6 inches of crushed stone aggregate over a 6-inch granular subbase. The pavement was constructed in 1965 and had an average daily traffic (ADT) in 1997 of 6,800 vehicles. Due to the low traffic volume and competition for funding with other projects, the Highway 12 project was planned and stopped on several occasions. Maintenance, which had been increasing during the last several years, consisted primarily of concrete joint repair.

We planned to crack and seat the pavement, then overlay it with HMA. But, as cracking and seating proceeded, we encountered some problems. The combination of high paving temperatures and hot weather reacted with the pavement and caused some of the joints to "tent up" shortly after placing the first HMA course. The contractor on the job, B.A. Amon, decided to do some asphalt base patching to remedy the problem. That worked, and we were able to finish the job with no more problems.

Rubblize It!

After some discussion with the WisDOT staff, we concluded that the mesh in the deteriorated concrete pavement was contributing to pavement stress. We needed to somehow eliminate the residual stress. We needed a method to totally disintegrate the existing pavement.

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We had heard about rubblizing, but we were not entirely convinced it was the solution. We needed to find out more about it and whether it was suitable for Highway 12. At this point we hit the Internet, talked with several contractors, the Wisconsin Asphalt Pavement Association (WAPA) and several WisDOT offices. We were fortunate to find a lot of usable information and folks willing to meet with us and discuss what they knew about rubblizing.

The more we learned about the method, the more optimistic we became. We talked with George Meter from WisDOT, District 1 in Madison, and he explained his experiences and what he thought were some keys to making the rubblizing work. He emphasized the importance of having a good subgrade.

On the Fast Track

After some intense discussion, we decided to put the job on the fast track. It was November 1997 and we had found an opening in our construction funding program for May 1998. If we could get the 8.6-mile stretch of road designed by March 1998, we could resolve our pavement problems on Highway 12. We formed the design team and went to work immediately.

The first order of business was to put together a constructable plan that would minimize delays to the traveling public. We obtained help from WAPA's Gerald Waelti, who facilitated putting together meetings where we could discuss issues like traffic control, production rates, and the constructability of preliminary plan concepts. Payne and Dolan, B.R.Amon & Sons, and Antigo Construction provided valuable recommendations on milling and rubblizing.

Total Plan

After gathering all the information, we put together a plan involving underdrains, rubblization and asphalt overlay that would address our pavement concerns on Highway 12. The project was let on time at a cost of $7.5 million. During construction, we opened the road to four lanes of traffic on weekends, minimizing delays to tourist traffic.

The prime contractor, B. R.Amon & Sons, started construction in July 1998. The entire 8.6-mile roadway was open to traffic in September 1998, three months later. Antigo Construction performed the rubblizing with a multi-head breaker and put in extra effort to keep the job on schedule. Profilograph specifications were used on this job and a ride quality index of 2 inches per mile was obtained by Amon. To date, there has been no reflective cracking and the new 5.5-inch-thick HMA overlay is performing well.▲

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