



Rubblization Gives New Life to Dying Roads Nationwide

By Chuck MacDonald
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Industry outsiders might think that a man breaking up a concrete pavement with a sledgehammer is destroying public property; however, if industry insiders were to see this act or a machine rhythmically crashing huge hammers onto a roadway, they would instantly recognize this process as rubblization.

Departments of Transportation across the country are seeing that rubblization is a key tactic for bringing new life to aging concrete pavements. Instead of facing the expense of breaking up old concrete roads and hauling materials away, DOTs and contractors alike are finding it much more economical to break the roads into smaller pieces, usually 2 to 6 in. in size. These fragments create an interlocked and flexible base material for paving over.

Rubblizing breaks the bonds between any reinforcing steel and the concrete, eliminating slab movement and decreasing the chance of future reflective cracking. Contractors place an asphalt layer on top of this base, creating a new road with years of service for the driving public.

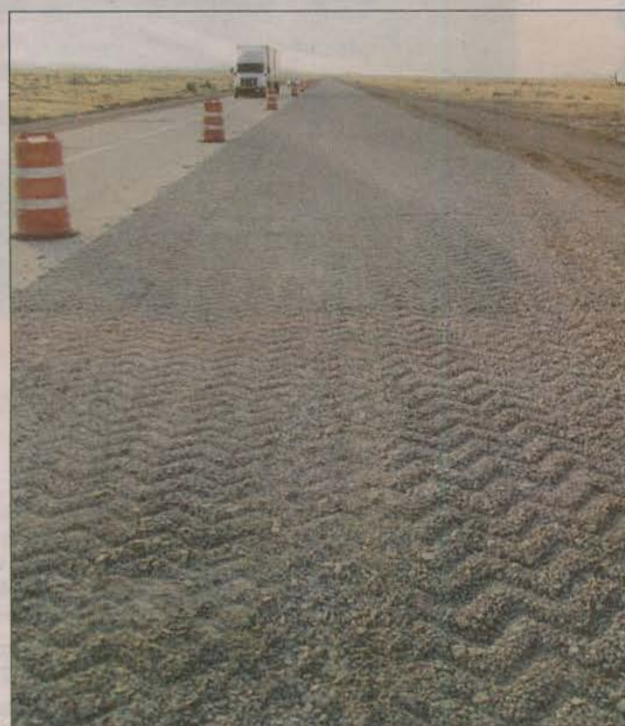
New Life for Illinois Highways

In the summer of 2019, the Illinois Department of Transportation deployed the rubblization process on three stretches of interstate. As expected, the \$152 million projects have resulted in a smoother road at a cheaper cost than building a new pavement entirely.

"Some stretches of concrete pavement have reached their end of life and can no longer be resurfaced or paved over," explained Tim Hemmen, a project implementation engineer for Illinois DOT. "From an economic point of view, it is much cheaper to rubblize the road than to break it up and haul it away. When done properly, rubblization creates a road that is much smoother to travel on. It also can be repaved in 15 to 20 years and have a long life of serving the public's driving needs."

I-70 Project

Travelers on Interstate 70, one of the nation's major east-west freeways, will see the results of rubblization as they travel west from Effingham, Ill., toward St. Louis. The 8-mi. paving job is a three-year project and will be approximately 50 percent complete by the end of this paving season. The rubblization and paving overlay for this job was handled by Howell Paving of Matton, Ill. The job requires Howell Paving to produce and lay down 11.25 in. of asphalt over the crushed surface. The cost of rubblization and new asphalt is roughly \$143,000 per mile, representing a savings of approximately 13 to 28 percent over traditional remove-and-replace paving.



A close-up view of the base material waiting to be paved over as part of the rubblization process that took place along Interstate 80 in Nevada.

The 11 mi. of pavement on I-74 in Bloomington, Ill., required about 300,000 tons of asphalt. After the rubblization, the contractor produced an 11.25-in. thick road over the crushed rock.

"One of our biggest problems was an unusual amount of rain which made it difficult to keep up with the aggressive scheduling requirements," said Pat Koester, vice president of production for Howell Paving. In addition to preventing work, the rain softened the ground, making rubblization more difficult.

Howell has had experience using the method in the past. According to Koester, the company has completed four similar jobs, including one in 2003 near Martinsville. "The 2003 project has performed well and is not showing any cracking or rutting," he stated. "Recent smoothness tests by the state showed it is in good shape."

The company estimates that the project will require about 218,000 tons of asphalt and will conclude with a topping of 2 in. of stone-matrix asphalt, a highly durable product which is the state standard for interstates.

All three of the interstate rubblization projects allowed the construction teams to reroute traffic to head-to-head on two lanes, leaving the contractors to operate with maximum safety and speed on the other two lanes. The projects required the asphalt to be deposited via material transfer devices. DOT engineers believed this process could contribute to less segregation and smoothness improvements.

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Rubblization Provides Cost-Effective Option With Long-Term Performance

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One problem the companies noted was that while two-way traffic on the interstate is quite safe, several rear-end collisions were reported. "People just pay too much attention to their devices while driving," one paving supervisor observed.

I-55 South of Chicago

Kankakee Valley Construction from Kankakee, Ill., handled the rubblization job on Interstate 55, one of the vital interstates headed out of Chicago. This 6-mi.-long project, in the second of three years under construction, is located near Pontiac. The rubblization process will cost between 53 to 72 percent less than the traditional road building process of remove and replace. The job will require nearly 100,000 tons of asphalt.

"The existing concrete pavement had severe cracking," said Dave Riordan, vice president of construction, Kankakee Valley Construction. "It had been patched and overlaid previously and was unreparable."

The rubblization process was well suited for this older piece of highway. "The concrete broke easily into smaller pieces as it should," Riordan said. "Paving on top of the shattered pieces was softer than I expected at first, but later lifts of asphalt proved easy enough resulting in smooth pavement."

The asphalt was produced at Kankakee plants just 10 mi. away, ensuring a quick delivery so that there was no delay required while producing an 11-in. thick road over the rubblized concrete.

Antigo Construction performed the rubblization with a multi-head pavement breaker on all three projects.

I-74 Near Bloomington

Rowe Construction, a division of United Contractors Midwest, handled the paving for a recent project on Interstate 74 between Bloomington and Peoria. The 11 mi. of pavement required about 300,000 tons of asphalt. After the rubblization, Rowe produced an 11.25-in. thick road over the crushed rock.



Antigo Construction's multi-head breakers were used in virtually all of the concrete breaking activities on the WVDOH projects.



What started out as an economic choice for contractors has now become a measure with long-term performance more in mind.

ILDOT requires the contractors on all of its projects to halt rubblization when passing under a bridge or over a major culvert to prevent damaging those important structures. In those instances, the paving companies removed the old concrete road before laying down new pavement.

"We did rubblization projects in 2015 and 2016, so we were familiar with the process," said Al Ruhup, area manager for UCM. "We will complete the eastbound section of the road this year and finish up westbound next year."

One challenge for UCM was that although the concrete roads were to be rubblized, the shoulders were asphalt and needed to be left intact. This meant that as the road was being pulverized, the equipment was producing a trench at least 8 in. deep. Because of this, the trucks needed to get into the trench to smoothly deposit the asphalt without damaging the shoulders. To solve the problem, UCM built wooden ramps for the heavily laden vehicles to roll into the trench and leave

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Rubblization Breaks Steel, Concrete Bond Decreasing Chances of Cracking

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the piles of asphalt for the pavers to easily gobble up to produce the new asphalt pavement.

Another DOT requirement for UCM was to provide a smooth tie-in from the newly paved road into existing on-off ramps located at Carlock and Goodfield. UCM manufactured the asphalt in plants located in Peoria and Normal, requiring a nearly ideal round trip time of just over an hour.

One "extra" item UCM added to the project was providing additional entrance points to the roadway so EMT vehicles could easily access the live traffic in case of accidents. UCM worked with the DOT to design and build these additional entry points that are available only to emergency vehicles. "We felt this was the responsible thing to do for the traveling public," Ruhup said.

ILDOT computed that rubblization was 35 to 37 percent cheaper for this job than remove-and-replace. "Without a doubt this is an economical process," Ruhup stated. "The interstate is at the end of its life in many places. Sections of highways have been repaired and overlaid so many times that they must be replaced completely. Rubblization allows those sections to be broken up and used as aggregate for the new road. It's an excellent process."

State-Approved Process

West Virginia Department of Highways (WVDOH) had experimented with rubblization to some success in the past, before deciding to employ the process extensively in 2018-2019, once state officials passed bonds to improve deteriorating roads. WVDOH leaders believed that rubblization would be a cost-effective means of bringing roads to life again promptly while showing voters they were getting value for their tax money.

During that construction season, West Virginia awarded 12 projects on the interstate system totaling 60 mi. of highway. The 12 contractors selected were free to use any rehabilitation method they liked. All of them chose rubblization.

Travis Walbeck, of the National Center for Asphalt Technology, was with the WVDOH at the time and saw that the contractors using rubblization were making an economical choice, but also one with long-term performance in mind. "Rubblization style projects help address pavements that are a maintenance burden," Walbeck explained. "These



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reconstruction projects, coupled with preserving good pavements, help us make progress in pavement conditions statewide."

WVDOH documented the performance of the rubblized road sections and have found them to be superior to even new construction. Engineers believe this is related to the firm foundation that the rubblized material provides for road-building activities.

Antigo Construction's multi-head breakers were used in virtually all of the concrete breaking activities on the WVDOH projects.

Nevada Relies on Rubblization

In 2015, the Nevada Department of Transportation spent \$30 million on two rubblization projects along Interstate 80 in Elko, Humboldt and Lander counties. Contractors rebuilt a total of 17 mi. of pavement for the two projects. The success of the jobs led to three more within the last two years, all on I-80 in the northern part of the state.

"Rubblization is a cost-effective method of highway maintenance in the state," said Darin Tedford, chief materials engineer for NDOT. "When concrete pavements are at the end of their life, it is much cheaper to rubblize than to dig out the concrete and haul it off to a landfill somewhere."

Tedford notes that NDOT research backs the effectiveness of the process as well. "Not only does it save money, but the rubblized road creates a strong base layer," he said. "The contractor compacts the base then paves with 6 to 7 inches of asphalt on top."

Contractors Q&D Construction and Road & Highway Builders did the paving for the NDOT projects in 2018-2019. Both companies are headquartered in Sparks, Nev., and had to set up mobile asphalt plants at the aggregate sites to access the somewhat remote paving zones on I-80.

The three most recent projects cost a total of \$37.5 million for the encompassing 17 mi. Contractors on the projects had advantages, but at the same time faced challenges too.

"In that part of the state, we don't have many bridges or utilities buried underneath the highway, so that creates steadier working conditions," Tedford said. "But they usually deal with weather there that can become severe quickly and create a much shorter paving season than in the southern part of the state." ■ CEG



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The cost of rubblization and new asphalt is roughly \$143,000 per mile, representing a savings of approximately 13 to 28 percent over traditional remove-and-replace paving.