

The stretch of Utah SR 36 that runs through Tooele between 3 O'Clock Drive and CR 2000 North, had actually been reconstructed with HMA in 2015-2016. The road was completely torn out and replaced; new utilities and curb and gutter were also constructed as part of the project. But the HMA placed on the roadway allowed water to permeate between two separate layers of asphalt. Heavy snow or rain storms would drain into the first layer of asphalt, then into utilities, such as manhole concrete pipe, causing the manholes to flood. Within less than two years, the road needed to be sealed against water. UDOT and Tooele's elected officials considered several preservation methods, including slurry seal and chip seal, but ultimately, because of the large numbers of vehicles traveling SR 36, the group chose to micro surface the pavement in the summer/fall of 2017 before winter could set in.

Contractor required to allow cross traffic within 5 minutes of laying the micro surface on the pavement

restores pavement and seals out water that penetrated two year old HMA reconstruction

Meets the International Roughness Index (IRI) Specification

#### BACKSTORY:

When the Utah Department of Transportation (UDOT) opened bids for the micro surfacing of SR 36 in the City of Tooele in July 2017, it was only after the agency had worked for a year with an experienced pavement preservation contractor to create a special provision specification for the material mix and equipment. In fact, prior to writing the special provision for this project, UDOT had considered taking a total departure from the use of micro surfacing because the agency wasn't satisfied with the longevity or performance of the projects it had completed with this pavement preservation method. "Utah experiences extreme climate fluctuations," explains Rusty Price, area manager for Intermountain Slurry Seal, a wholly owned subsidiary of Granite Construction Inc. "Between the hot summers and cold winters, UDOT's biggest complaint with its past micro surfacing projects was that the resulting pavement was too brittle, and it cracked. They needed an asphalt emulsion with a softer base asphalt, requiring a penetration range of 80-120. The specification previously was 40-90. Another contributing factor was requiring more residual asphalt in the micro surfacing. So the minimum asphalt content was raised to 8%."

**“ UDOT is really happy with this project. It's a move in the right direction. ”**

— Rusty Price, Area Manager for Intermountain Slurry Seal

#### SOLUTION:

##### Micro Surfacing: Best Solution

"Chip seal and slurry seal are both good, economical pavement preservation treatments," says Price. "But neither of those methods would have performed well along SR 36. They are better suited for residential areas and low-traffic conditions."

In looking at the lifecycle cost, he explains, a chip seal would likely have protected the pavement for two to three years at most, requiring additional work at that point. In addition, chip seal and two-phase chip/fog seal projects also tend to frustrate drivers, as both traffic control and pavement setup times can become lengthy — another reason why the methods are ideal for more lightly traveled roads.

"Micro surfacing, however, is a high-performance product for heavy traffic. You lay it down once, it sets quickly, and it provides a good, black, smooth surface for travelers. It was the best solution for sealing this section of roadway," Price says.

##### Special Provision Specification

According to Price, when micro surfacing was introduced in the United States in 1980 by German engineer Dr. Frederick Raschig, it incorporated natural latex in the mix. By 2008 and over the past decade, however, micro surfacing has changed to include many different versions, 99% of which do not include natural latex.

For the SR 36 project, UDOT's special provision mix specification required 26 lbs. of dry aggregate per square yard and 13% emulsified asphalt. Further, the provision required 8% minimum asphalt content and 3% natural latex polymer base in the emulsion. This would be a cold mix that when combined with water and applied to the road, would allow the water and chemicals to evaporate, and the asphalt and emulsion to set quickly. "Following industry meetings with UDOT over the prior year, the first micro surfacing spec to come out of our meetings is the one for this project — and it includes natural latex for better flexibility and stability when a heavy application of aggregate is applied to a roadway environment, such as SR 36. Heavy traffic and several stop lights require a micro surfacing that will remain stable when aggregate is 'stacked' (rock on rock)," Price says.

Additional requirements for the project included the fact that the job must be performed with a continuous-run paver and a variable-width spreader box (VSB). The paver was required to have a computerized monitor to validate the percentage of materials in the mix and keep a log of the paving rate for the project engineer to print out at any given time. "For this project, we used our 2013 Bergkamp M1E continuous-run paver with a Bergkamp VSB, which together helped us to meet all of the requirements for the job," says Price.

##### A Month of Sundays

The challenges faced with the micro surfacing of SR 36 included more than a special provision specification. The project parameters incorporated 3.5 miles of micro surface paving (200,000 square yards) over four lanes, plus shoulders, as well as 35 approaches that called for 50 to 75 feet of micro surfacing into the State Right of Way. All of these approaches included traffic signals, and the contractor was required to allow cross traffic within 5 minutes of laying the micro surface pavement. "The time component was in place because of the effect on the public," notes Price. "Tooele is a large community of 40,000 people, and SR 36 is a highly traveled road."

The bid was awarded to Intermountain on August 16, 2017, and the contractor then had 40 calendar days in which to complete the project — with the clock starting just three days after the award. If Intermountain went over the 40 calendar days, a disincentive of \$1,570 per day would be levied against the contractor. Weather and other restrictions shortened the timing to just nine actual working days.

Price says that for a 3-mile section of the roadway, stretching from the north side of CR 520 South to CR 2000 North, work on outside lanes and shoulders could occur only on Sundays from dawn to dusk.

"This section comprised almost half of the entire job, and we could only work on Sundays. Because of the Labor Day weekend, we started work on this section on September 10, and we had just three Sundays to finish the project by October 1," says Price. "But because two of those Sundays were cold, with snow and wet conditions, we really only had one Sunday to work from dawn to dusk and complete half of the job," he adds.

##### Critical Factors

According to Price, Intermountain's 2013 Bergkamp M1E Continuous Paver played a large role in the success of the project. He explains that the M1E's automated calibration capability was utilized prior to the start of work each day, and was key to ensuring accurate numbers in the spec.

Bergkamp's EMCAD (Electronic Mix Control And Diagnostic) System is designed to manage power inputs and electronically control material outputs to maintain the desired mix design for the paver. EMCAD simplifies maintenance and allows operators to easily calibrate the machine and monitor production rates. As it displays current and average material ratios, total material used and material application rates, EMCAD eliminates manual calculations, greatly simplifying calibration. In addition, it electronically self-diagnoses and displays easy-to-read indication lights and diagnostics, reducing troubleshooting and repair time. With its onboard printer, EMCAD can produce on-demand and end-of-day reports to track production for individual sections of the job, or the entire job.

Ultimately, the system allows the operator to control the production with simple adjustments, while the driver progresses at an optimized rate of speed — ensuring faster project completion. Supervisors can evaluate report printouts, simplifying record keeping and enhancing management oversight by allowing managers and owners to monitor mixes.

One example of the way EMCAD simplifies calibration is in adjusting for moisture content in the aggregate. Because micro surfacing and slurry seal mix designs are performed with completely dry aggregate, knowing the moisture content of the aggregate is critical in creating the entire mix, and it should be tested every day prior to startup. "If the aggregate should have just 3% to 4% moisture, say because of rain, then the rest of the mix needs to be adjusted for percentage of emulsion, water, etc.," Price says. "With old-style pavers, you have to manually adjust the aggregate output setting, and there is room for error. With the M1E, you just set the aggregate moisture percentage into the computer, and it automatically deducts the moisture content in the aggregate, therefore, you are always working with data that is based on dry weight of the micro surfacing aggregate. It allows you to be 100% accurate."

Intermountain's crew members also were integral to the SR 36 project's success. According to Price, approximately 22 crew members were required on regular days, and Sunday crew numbers grew exponentially, just to handle traffic control at all of the approaches. "We had to have all of our eggs in one basket on Sundays, so we had to make sure the crews were there," he says.

### Smooth Ride

Price says as an additional provision for the SR 36 job, UDOT included a smoothness specification with the contract that measured the International Roughness Index (IRI) before and after the project. Along with 3.5 miles of four lanes, the agency evaluated the smoothness of the pavement in 140 sections using laser technology. Only four sections out of 140 did not precisely meet smoothness spec.

"Meeting the IRI is not the same as warranty work," Price says. "But it is a cut-and-dried performance measurement that leaves no questions about the quality of the work. The smoothness spec puts a lot of responsibility on the contractor."

### PHOTOS:



Micro Surfacing Application Intermountain Slurry Seal



Close up of micro surfacing application



Micro Surfacing Application by Intermountain Slurry Seal with Bergkamp M1E Continuous Paver