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CDOT PRESERVES US 36 PAVEMENT NEAR NATIONAL PARK

American Recovery and Reinvestment Act funds chip sealing of eastern gateway route to Rocky Mountain National Park between Estes Park and Lyons

By Paul Fournier

The Colorado Department of Transportation (CDOT) recently completed the pavement preservation of US 36 near Rocky Mountain National Park using funds provided by the American Recovery and Reinvestment Act (ARRA).

CDOT awarded the \$1.7 million contract for the chip sealing of 19 miles of the highway between Lyons and Estes Park to United Companies of Grand Junction, Colo. The state is slated to receive more than \$400 million in ARRA funds for transportation projects and \$103 million for transit projects. Pavement preservation projects such as the US 36 job meet ARRA requirements that they be "shovel-ready" (create jobs and put people to work quickly) and can be under contract and under construction within 12 months of the date that President Obama signed the bill on February 17, 2009.

Preserving "Good" Pavement

Chip seal is one of a number of thin, non-structural maintenance applications that fall under the mantle of "pavement preservation." A growing awareness of these techniques, which protect and extend the service life of engineered road pavements, has led to their increased use by state DOTs and municipal agencies across the country. This awareness is being furthered by educational efforts of the Federal Highway Administration (FHWA); the American Association of State Highway and Transportation Officials (AASHTO); National



Contractor United Companies broadcasts aggregate during the chip sealing of 19 miles of US 36 between Estes Park and Lyons for the Colorado Department of Transportation.

Center for Pavement Preservation (NCPP); and regional partnerships of government, academia and industry representatives supported by NCPP.

Proactive in nature, pavement preservation techniques such as chip seal, slurry seal and micro surfacing are employed while a pavement is still in good condition. Transportation officials recognize that this will preclude having to spend up to nine times as much to rehabilitate or reconstruct the pavement when it is in poor condition or has failed.

CDOT is investing heavily in pavement preservation in these days of restricted government budgets to protect and preserve its 9,200-mile highway system, including about 915 miles of Interstate highways.

This effort was indicated in the agency's news release announcing the US 36 project in which James Flohr, CDOT resident engineer, stated, "This stretch of US 36 was last paved about four years ago and while it doesn't look like it is in need of improvement, it is important for CDOT to conduct pavement preservation activities in order to maintain the components of our infrastructure that are in good condition.

"With the pavement only a few years old, we will reap the most benefits by treating the roadway now, so we focus our resources on other highways in the future," he added.

**Owner: Colorado Department of
Transportation
General Contractor: United Companies
Asphalt Emulsion Supplier: COBITCO Inc.**



Emulsions Versus Destructive Forces

Chip seal treatment consists of spraying a pavement surface with asphalt emulsion, covering this with a layer of stone, and compacting with rollers. This treatment is usually applied to roads carrying up to 10,000 vehicles per day. US 36 is in this category, according to Rick Jensen, a CDOT transportation maintenance (TM3) foreman and inspector on the US 36 job.

"We have an average daily vehicle count of about 8,200, with about 500 of those vehicles being trucks." He pointed out that the majority of this stretch of highway has two lanes with just two-foot shoulders, but there are several miles of passing lanes on the steepest portions of the road. The difference in elevations between the endpoints of the job is roughly 3,000 feet.

Traffic counts climb steeply in summer when thousands of tourists use US 36 as the primary road to the national park's eastern entrance at Estes Park. Since the highway has significant grades and many curves, vehicle braking imposes considerable stress on the pavement. Temperature extremes due to high elevation – approximately 7,500 feet at Estes Park – can exacerbate this. In late fall and winter there's substantial snowfall driven by high winds. This creates tall drifts requiring frequent snow plowing, which in turn results in repeated, severe blade down-pressure on the chip seal surface.

Asphalt emulsions utilized in chip seal must resist these forces attempting to pluck aggregate from the surface. In recent years, polymer modifiers have been added to boost the effectiveness of emulsions in retaining aggregate. Transportation officials are learning that asphalt emulsions modified with polymers form a thicker film of asphalt residue on the aggregate than asphalt emulsions not modified with polymer, and are thus better able to reduce rutting, stripping and thermal cracking while improving resistance to traffic-induced stress.

CDOT Checks Out Latex

Until the recent pavement preservation of US 36, CDOT had been calling for CRS-2P, a rapid-setting cationic asphalt emulsion modified with SBS polymer (styrene-butadiene-styrene) in its chip seal specifications. For this project, however, the agency agreed to allow the use of CRS-2R (also known as CRS-2L), a rapid-setting cationic asphalt emulsion modified with SBR (styrene-butadiene-rubber) latex polymer. This was done at the request of the emulsion supplier, COBITCO Inc.

Denver-based COBITCO manufactures conventional asphalt emulsions and polymer-modified asphalt emulsions. It has supplied emulsions modified by SBS and SBR polymers for municipal projects in Colorado, but historically only supplied SBS-modified asphalt emulsions for CDOT projects due to specifications.

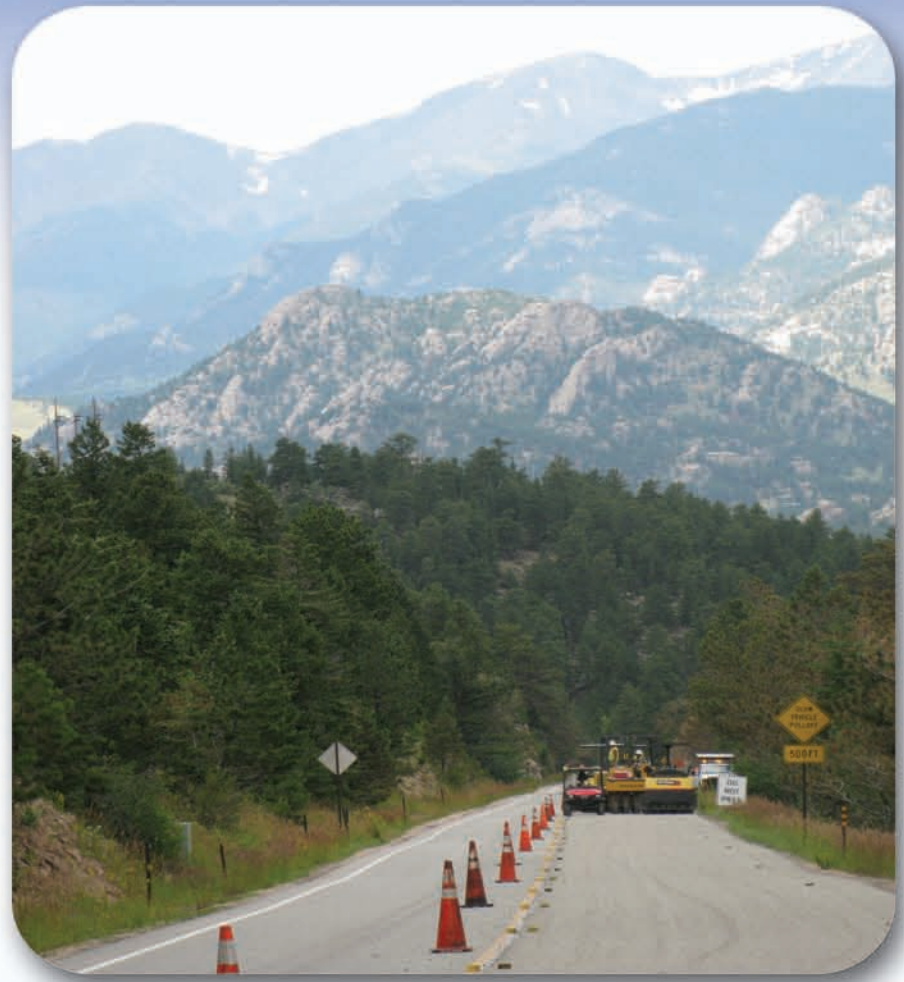
"Our purpose is to prove that latex-modified CRS-2R can perform successfully under heavy traffic on steep and winding roads, with frequent braking and repeated snow plowing," explained Douglas Martin, COBITCO sales manager.

In preparation for the CRS-2R chip seal application, the manufacturer enlisted the help of the Charlotte, N.C., technical laboratory of BASF Corporation, which supplies SBR latex and other chemical products. Arlis Kadrmas, technical development leader for the BASF group that produces asphalt polymer dispersions for construction, said the lab evaluated COBITCO's CRS-2R emulsion.

"We used the latest asphalt residue recovery techniques to ensure that the CRS-2R would work well under chip seal application conditions," Kadrmas said. Technicians also compared COBITCO's properties with other emulsions on the market. Kadrmas noted the lab wanted to make sure the emulsion would adhere properly to aggregate and resist snow plow blade pressure and other road conditions.

A Half-Century Making Emulsions

A family-owned and operated company, COBITCO and its predecessor have been making asphalt emulsions since the late Edward Morgan established Colorado Bitumuls Co. Inc. in Denver in 1960. At the time, the company was a licensee of Chevron Asphalt to produce emulsions, but in 1982 Chevron stopped its licensing program and Morgan established his independent company, changing the name. His sons – Lee Morgan, president, and Robert Morgan, vice president – have expanded its territory to include portions of Wyoming, Kansas and Nebraska, and broadened its product line to include conventional emulsions, polymer-modified emulsions containing SBS or SBR modifiers, and other pavement preservation products. As a member of the Asphalt Emulsion Manufacturers Association and an associate member of the Colorado Asphalt Paving Association, COBITCO supports pavement preservation techniques like chip seal, micro surfacing and slurry seal as cost-effective ways to protect and extend the service life of the nation's pavements.



With towering mountains in the background, United Companies' chip seal crew heads down a steep section of US 36.

Getting The Job Done

Contractor United Companies started chip sealing at Estes Park and worked downhill towards Lyons. Under the direction of Mark Painter, project superintendent, the crew employed an Etnyre asphalt distributor to spray CRS-2R asphalt emulsion on the roadway at the rate of .4 gallons per square yard. They followed this immediately with an Etnyre ChipSpreader, broadcasting aggregate at the rate of 26 pounds per sq. yd. Specifications called for 100 percent of the aggregate to pass a 3/8-inch sieve, 0 to 8 percent to pass a No. 4 sieve and 0 to 1.5 percent to pass a No. 200 sieve.

Rolling was performed right after the ChipSpreader broadcast aggregate. The contractor used five 10-ton pneumatic rollers – three HYPACs and two Volvos – staggered to cover the 15-foot travel lane in each pass per CDOT specs. Three passes were called for. Traffic was placed on the chip seal 20 minutes after rolling.

For two-lane sections of the project, motorists followed a pilot car through the work zone in single-lane alternating traffic at a maximum speed of 40 mph. The contractor switched lanes approximately every two miles. Crews swept loose aggregate from the road surface within two to three hours of chip seal placement.





Discussing progress of the job are (left to right): Rick Jensen, CDOT TM3 foreman; Doug Martin, COBITCO sales manager; and Mark Painter, United Companies project superintendent.



The Etnyre ChipSpreader follows immediately after the asphalt distributor, broadcasting 3/8-inch aggregate at the rate of 26 pounds per square yard.

The Proof Of The Pavement

According to CDOT's Jensen, placement of the chip seal offered no problems. He said the emulsion and stone reacted well together, and he approved of how the emulsion cured, noting there was no flushing even with heavy traffic.

However, the proof of the pavement is in the spring viewing after a typical punishing Colorado winter, when CDOT will take a very close look at how the chip seal has stood up to the snow plows.

COBITCO's Martin said he is confident that not only will the chip seal pass state evaluation in spring, it will continue to protect the US 36 pavement for another seven to eight years as well. ■



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