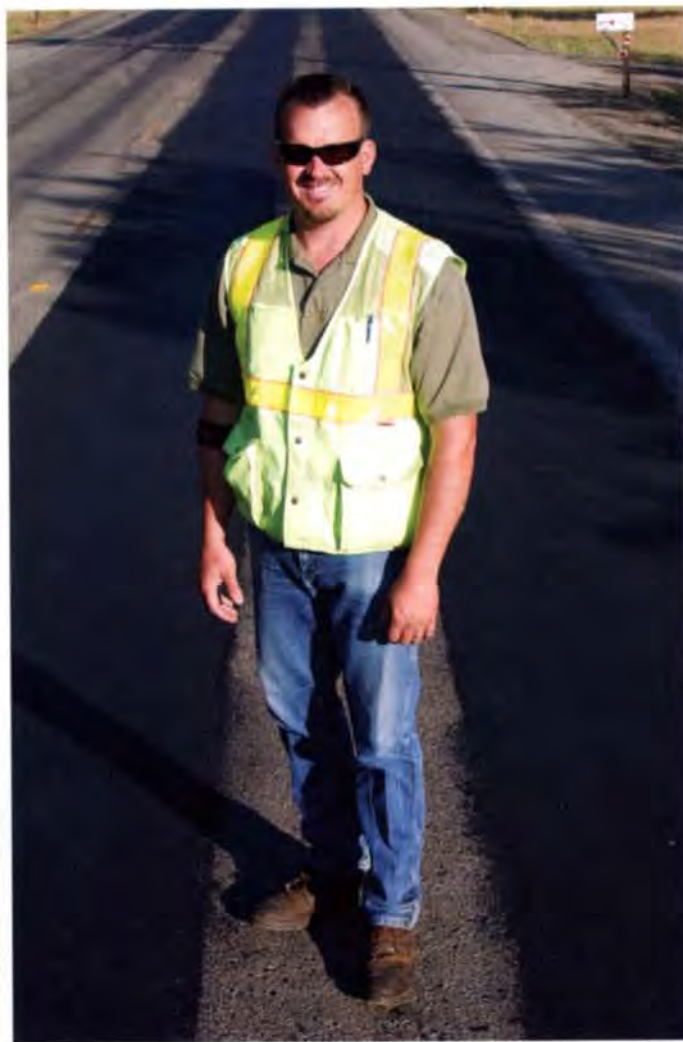


by Kirk Landers, Editorial Director

# Patching Roads with Full-Depth Reclamation

Two county road managers share their experiences with a new approach to asphalt pavement patching.



Above, Bryan Graves stands between two strips of recycled asphalt pavement in northern California's Butte County. Graves is the county engineer and one of the first in California to use full-depth reclamation for road patching.

County road managers in two California counties are pioneering the use of full-depth reclamation in patching asphalt roads.

While full-depth reclamation is widely used to rebuild entire roadways, using the technology for full-depth patching is a relatively new practice that has emerged with the marketing of the Asphalt Zipper, an attachment that equips a wheel loader to perform full-depth reclamation or soil stabilization.

The loader-based machine is relatively compact, easy to transport, and is very maneuverable.

For C. Bryan Graves, county engineer for Butte County, California, and Stephen Stangland, road superintendent for Lake County, California, those virtues added up to a system that could perform full-depth patches on hundreds of miles of farm-to-market roads in their respective counties. First Graves, then Stangland, acquired Asphalt Zippers, and both have worked with the company ever since to refine the product's features for their applications.

## Butte County

Graves' Butte County in northern California is a combination of rural and metropolitan areas. Its largest city is Chico, a college town of more than 100,000. In all, the county has 1,330 miles of roadways, about 1,000 of which are improved.

"Many of our older roads were never engineered," says Graves. "They started out as gravel roads and eventually had a chip seal added. Some of these roads are in areas that were once rural but are now seeing traffic volumes and weights similar to larger highways." Many of these roads need to be improved, notes Graves, but budget restraints make such upgrades difficult, so his crews focus much of their efforts on repairs.

Three years ago, Graves convinced the county to acquire a 480 model Asphalt Zipper in hopes that it would reduce the time and cost of the county's road





Lake County (California) uses its Asphalt Zipper unit both for road patching and, occasionally, to recycle an entire roadway (left). Below, Lake County Crews performing FDR for road reconstruction.

repairs. The gamble paid off.

"In the past, a typical project would require four separate processes, each with a separate traffic control," says Graves. "We'd first have to come out and saw-cut the area. Then we would come back and dig it out and haul the material away to a landfill. Next, we'd truck in new material, then bring it to grade and compact it.

"Now we're doing full-depth reclamation and we can do it in one process. A typical patch that would have taken us a couple of days (before) now takes us just a few hours. It has been a real benefit to residents, too, because we can get in and out and keep traffic delays to a minimum."

Graves says his crew has completed more than 100 patches with the loader-based attachment, ranging from 4-foot by 4-foot areas to lane-width patches that are several hundred feet long. Their most common patches are 4-feet wide and involve asphalt depths of 1 to 3.5 inches.

In many cases, the Butte County crew removes all material from the patch area so they can repair damage at the subgrade level due to poor soils. In these applications, they blend the recycled material with Permazyme, an enzyme that works well with local soils and hardens quickly.

Butte County has also done some full-width roadway applications with their Asphalt Zipper. Graves feels the county's model 480 has some capacity limitations when it comes to high production applications. The recently introduced model 550 has more potential, he says. In a local demonstration project, the 550 "blew through" a single-layer chip seal road. Graves hopes to rent a model 500 sometime this year.

Used primarily just for patching, the full-depth reclamation machine is more than paying for itself.

"We're saving 50 to 70 percent with FDR," says

Graves. We work the same amount of time but get two to three times more work done with the same dollars. Why bring in new material when you have the essence of what you need already there?

"There's a lot less wear and tear on equipment and crews, plus we're using substantially less fuel. Everyone is more productive; we're never waiting for anything. It's like an assembly line, and all the pieces are there."



## Lake County

Stephen Stangland, road superintendent for Lake County, California, is a colleague of Bryan Graves' and learned about full-depth reclamation patching from Graves. The two men co-chair an informal group of northern California road superintendents from 28 counties that meet quarterly to discuss challenges and solutions.

Soon after seeing Butte County's operation, Stangland procured an Asphalt Zipper for Lake County.

"We knew that to have any hope of keeping up with our 613 road miles with a crew of only 30, we'd need to look to newer methods and technology," says Stangland. His county has a total population of 68,000 and includes California's largest natural lake and its cleanest air. "We've found that by doing FDR we're stemming the onslaught of poorly engineered or non-engineered roads, and actually making some headway. We have found with rising asphalt and base rock prices, FDR is a cost effective alternative. With FDR and Permazyme, we have



the option of surfacing with either asphalt or chip seal. Our staff wants to do reclamation projects as much as they can.”

Stangland and his crew were sold on one of their first FDR projects.

“We were going to chip seal 10 miles of roadway and had a series of patches we were going to have to dig out, says Stangland.” Some patches were as small as 4 feet by 4 feet and they went all the way up to 4 feet by 300 feet.

“It would have taken at least 6 to 8 weeks to dig out all the areas that needed patching, not to mention all the material we would have had to haul away. We were able to Zip all the patches

With these modifications, Lake County not only patches with the machine, they also use it for full road reclamation and culvert replacements. One project planned for this year involves the reclamation of an entire subdivision street system — about a mile of roadway. And the reclaiming crew did a mile of 20-foot wide roadway last year at a 12-inch depth and averaged about 700 feet per day. Stangland says the crew learned a lot on that exercise and will be faster in similar applications now.

Lake County is largely rural and many of its roads were once wagon trails that have been chip sealed in recent decades. Like Butte County, Lake County makes frequent use of Permazyme in its repairs due to poor subgrade soils. “Our soils are mainly clay or volcanic rock,” says Stangland. “For areas with base failure, we’ll start by spreading 3 inches of base rock with lots of fines. The rock helps handle alligator cracking because it fills the seams and holds the chunks in place for better pulverizing. The Class 2 base rock helps counter the deficiencies of the soil.”

The crew then reclaims the new aggregate along with the existing asphalt or chip seal and several inches of base. The resulting patches are extremely durable, says Stangland, especially when the enzyme additive is used. “The patch material sets up harder than the surrounding materials,” he notes. “In fact, we’ve started going larger with our patches, all the way out to the ditch line, to avoid occasional problems with surrounding soils.”


Stangland estimates that the county is saving at least 50 percent in material costs by using full-depth reclamation patching techniques, and the crews are completing patches in one-third of the time it previously took. “The time savings is our biggest benefit,” he says. “When you can get the same or even better results in only 2 weeks compared to what would have taken us 6 to 8 weeks, everyone is better off.”

### Lessons learned

Both Stangland and Graves speak highly of the return on investment their counties have realized by adopting full-depth reclamation methods for patching their asphalt roads. Their crews are more productive, and their departments can maintain more miles of roadway with this technology.

Crews in both counties have found the technology of the Asphalt Zipper easy to master. Key crew members receive a few hours of training, then begin applying their knowledge and sharing it with other crew members. While the crews get more efficient and sophisticated in their use of the technology as they gain experience, Stangland and Graves both feel they were very productive right from the start.

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Lake County, California, crews prepare to begin work on a replacement bridge. The county frequently uses Permazyme in its repairs because of poor subgrade soils.

— approximately 153,000 square feet, 12 inches deep — in just two weeks. We did import some new material to give additional stability to some areas, but that was minimal compared to what it would have been.”

Lake County has worked with the manufacturer to modify their model 500 to handle larger quantities of material by adding raised pad feet to the unit (the standard pad feet were not tall enough to accommodate adding material). The modification reduces the work depth of the machine to about 10 inches, but it churns through thicker asphalt pavements and mixes material more efficiently. Stangland’s crew has also installed the larger diameter spray bar on their machine to meter in liquid additives — Permazyme — as the machine is pulverizing and blending material.