

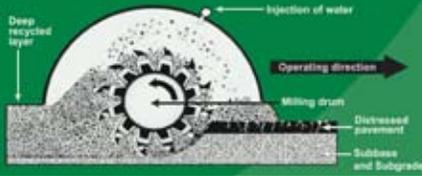


# WEST VIRGINIA DOH WELCOMES FULL DEPTH RECLAMATION INTO THEIR PAVEMENT REHABILITATION TOOLBOX

## ***FDR PROVIDES THE LONG TERM SOLUTION THIS ROAD NEEDS***

Marion County, WV; October, 2010

### **Case Study**



### **Full Depth Reclamation**

Mt. Carmel Stabilization Group is the leading soil stabilization company in North America with over 60 years of experience in providing expert soil stabilization services to our customers across the country. Our technical reports and case studies are an effort to educate our contractor partners, consultants and agencies on the merits of design, construction, and the environmental benefits of soil stabilization.

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### **The Problem – An Aging Logging Road Gives Way**

Poor subgrade soil conditions will eventually reveal themselves on a majority of pavements. This proved to be the case on Pricketts Creek Rd. (SR 80) in Marion Co., W VA, where a combination of heavy truck traffic from localized logging operations and poor subgrade, combined with the age of the road, all contributed to its severe distress and state of disrepair. The majority of the roadway consisted primarily of an accumulation of approximately 2 inches of “tar & chip” applications with very weak subgrade soil underneath. Typically, an owner agency might turn to an overlay option that not only does not address the issues below the existing pavement, but will ultimately reflect the underlying pavement flaws through the new overlay, shortening pavement life. In addition, WV DOH’s budget made total reconstruction of this low-volume road unfeasible. WV DOH had been researching the concept of Full-Depth Reclamation (FDR), and Prickett’s Creek Rd. seemed like a good fit to try FDR on a trial basis.



Photos from SR 80 (Prickett’s Creek Rd.) shows the full extent of the damage caused by a combination of poor subgrade, heavy loads and the age of the road.

### **Full Depth Reclamation – An Economical, Environmentally-Friendly Process**

Full Depth Reclamation (FDR) is an economical, environmentally-friendly process in which the full flexible pavement section and a pre-determined portion of the existing subgrade are uniformly pulverized, treated with an approved compatible chemical additive (such as Portland Cement), re-shaped and re-compacted to serve as the base course of a new roadway. FDR uses the entire existing roadway to build a new, high-performance base instead of removing and landfilling existing materials. FDR is an in-place recycling process that provides long-term road base performance at a low cost, with minimal environmental impact, when compared to other “traditional” pavement rehabilitation techniques.

### **Design Challenges**

With WV DOH new to FDR, pavement design utilizing the process offered some challenges. Following a series of meetings sponsored by the Builders Supply Association (BSA) of West Virginia involving representatives of the Portland Cement Association (PCA), Mt. Carmel Stabilization Group, Inc. (MTCSG), (North America’s largest and longest-tenured FDR/Soil Stabilization contractor and local to the area) and WV DOH Highway District

4 representatives, parameters (such as depth, additive and application rate) for the state's first FDR project took shape to ensure delivering WV DOH the best product possible.

WV DOH mix design requirements targeted 7-day, 300 psi unconfined compressive strength for the stabilized base. Project specifications ultimately called for the use of Portland Cement as the chemical reagent due to its ability to gain the required strength quickly at a relatively low application rate (4%). The project was subsequently advertised and bid successfully by the J.F. Allen Co. (Buckhannon, WV), who, in turn, subcontracted portions of the project to Mt. Carmel Stabilization Group, Inc. (MTCSG).

### **The FDR Construction Process**

At a pre-construction meeting for the project, it was determined that MTCSG would first completely pulverize the entire 3.76 mile stretch of Prickett's Creek Rd. to the specified 8-inch depth in order to allow WV DOH officials the opportunity to inspect the existing roadway materials for any areas of unsuitable materials (i.e. – clay deposits or areas in need of any additional aggregates). MTCSG pulverized the entire roadway in two days utilizing a CAT RS-350 B Road Reclaimer machine specifically built for FDR and Soil Stabilization operations. Working to the specified depth, the material was pulverized to project gradation specifications, ensuring sufficient fines content in the material to optimize the binding qualities of the Portland Cement additive. Following pulverization, the mixture was shaped and compacted to the desired 2% roadway cross slope and inspected by WV DOH representatives for any deficient areas of pavement, which there were none. The newly-shaped and compacted area was then ready for the application of cement and the final steps of the FDR process.

MTCSG utilized custom-built spreader trucks to apply the Portland Cement additive at the pre-determined 4% application rate. Cement was delivered to the project in bulk pneumatic tankers and transferred into these spreader trucks, equipped with dust collection systems designed to minimize fugitive dust during both the transfer and spreading process. Proper spread rate was critical to the performance of the end-product.

Following the application of cement, the roadway was then re-mixed with water added from a water truck hooked directly through the CAT RS-350's water system. Spray nozzles in the mixing drum of the Road Reclaimer ensured that the water needed to activate the chemical reaction of the Portland Cement was evenly and accurately distributed to fully hydrate the cement and allow the mixture to reach optimum moisture content for compaction.



A J.F. Allen Co. vibratory padfoot roller immediately compacted the mixture to the project density requirements and its motor grader then shaped the areas to project grades and cross slope for final grade. Final compaction was then accomplished with a double-drum steel-wheel roller to seal up the newly-reclaimed material and to maximize smoothness.

### **Finished Product**

The FDR portion of the operation was completed in an additional three days, for a total of five working days to successfully complete 3.76 miles. While accommodating local traffic, the treated area was allowed to "cure" (permitting excess moisture to evaporate) for a minimum of three days prior to an application of an asphalt overlay.



Mt. Carmel's custom built spreader trucks apply the cement on the subgrade at the prescribed application rate. These trucks are designed and built by Mt. Carmel personnel to meet precise standards for spreading accuracy, durability and dust control.



Mt. Carmel uses a Cat RS-350B Reclaimer to mix the pre-pulverized base with Portland Cement and water to a depth of 8".