

LIQUIDOW Liquid Calcium Chloride

Improved full-depth reclamation technique is both faster and less expensive

Full-depth reclamation (FDR) is a proven method for rebuilding deteriorated asphalt roads. It produces a strong road base, lowers material cost and eliminates the need for disposal of old pavement. The Asphalt Recycling & Reclaiming Association endorses FDR, stating, "The process has been proven on a wide range of flexible pavement structures to produce quality results at substantially lower costs and considerably shorter construction periods than conventional reconstruction practices."¹

Recently, Recon Construction Services, Inc. of York, Pennsylvania took a good FDR process and made it better. This article describes the improvements that have been made to the traditional FDR technique using liquid calcium chloride as the base stabilization agent.

The Traditional Method

Traditional full-depth reclamation with calcium chloride consists of six primary steps. First, a reclaimer is used to pulverize the surface and road base to a specified depth. Next, calcium chloride such as LIQUIDOW* Liquid Calcium Chloride is applied to the pulverized material using a truck with a spray bar—much like a dust control treatment. Then, a second pass of the reclaimer thoroughly mixes the calcium chloride with the road materials. The road is graded and shaped, followed by rolling and compaction with a vibratory roller. The last step is the application of a calcium chloride top dressing or fog seal.

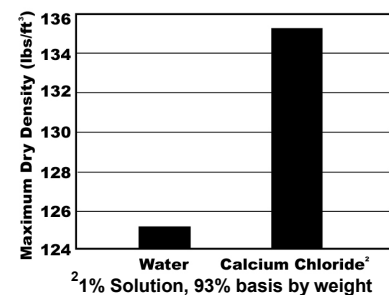
The Improved Method

Recon's improved FDR technique combines the first three steps of the traditional method (pulverization, liquid application and mixing) into one step. Using a specially modified reclaimer, the liquid calcium chloride is applied directly to the road material as it is reclaimed. Because the liquid is uniformly mixed during pulverization, the need for a second pass by the reclaimer is eliminated. Application rate is precisely controlled relative to ground speed and the reclaiming depth to assure consistent coverage of the stabilizing agent. After shaping and compaction, experience has shown that the fog seal may be considered optional, depending on job specifications. The end result is a densely compacted road base with consistent and uniform strength, achieved with less time and effort than was previously possible with the traditional procedure.

Proven Results

Recon has been using the improved FDR technique for three years, and they have been extremely satisfied with the results. "I'm convinced that injecting the calcium chloride into the material as it's being processed is the key to the results we've obtained with this modified process," stated Recon's Wayne Cleaver, VP of Business Development, "especially when you're talking about compaction. If all your material is coated with the product, you're going to achieve better compaction than you would if the coating was only applied to the surface area."

Figure 1: Density comparison



Mr. Cleaver's observations are consistent with the known physical properties of calcium chloride. Solutions of calcium chloride have a stronger moisture film than plain water. This enhances the lubrication effect produced by the liquid and allows the aggregate components to slide more easily against one another during compaction, resulting in a stronger, more compact base (Figure 1). Calcium chloride solutions also strongly resist evaporation. This works to maintain optimum moisture content in the road base. Dust problems are virtually eliminated. The potential for surface deterioration during staged construction is minimized or eliminated, so the stabilized road can be kept open for local traffic prior to final paving. "With calcium chloride, the longer a road bed lays, the stronger and more stable it becomes," Cleaver explained. "Prior to using FDR, a loss of surface moisture would often lead to raveling and deterioration of the road base before paving."

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How Full-Depth Reclamation Makes Roads Better

The FDR process combines the old asphalt surface materials with the underlying base to produce a rejuvenated road base that is stronger than new, virgin aggregate. The process is performed entirely on site, so the cost of removing, hauling away, and disposing of the old pavement is eliminated. Many roads require additional aggregate base material when they are rebuilt, but FDR utilizes less of this material since the old surface materials are combined with the existing aggregate.

The structural integrity of the road base is increased when liquid calcium chloride is used as a stabilization agent with FDR. Greater strength and density are achieved in the road base, thereby adding years to the expected pavement life. Frost heave damage is also reduced because calcium chloride lowers the freeze point of capillary water in road base materials.

FDR has been a technique primarily used on rural roads, but it's increasingly becoming the option of choice in urban reconstruction projects as well. In recent years, Recon has successfully utilized the modified FDR technique in a wide range of reconstruction projects in Maryland and Pennsylvania. Figures 2 through 4 show the modified FDR

Figure 2. The modified reclaimer in action



Figure 4. The reclaimed road after paving



process being performed in a Dover Township subdivision in York, PA. "Not all of our jobs are done using modified FDR, but it's definitely the way to go if the necessary funding is available," Cleaver stated. "The municipalities that have been willing to try the technique have continued to use it once they see the results."

Figure 3. Rolling and compaction



For more information, contact The Dow Chemical Company Customer Information Group at 1-800-447-4369 or visit www.dowcalciumchloride.com.

Acknowledgement

Adapted from an article in the December 2002 issue of *Public Works*.

References

¹Asphalt Recycling & Reclaiming Association. Full Depth Reclamation - A Century of Advancement for the New Millennium, Annapolis, Maryland: ARRA, January 2001.

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