Full Depth Pavement Reclamation (FDR)

The Rehabilitation of the Cades Cove Loop in the Great Smokey Mountain National Park

W. Ros Kingery III, PE
Vice President
GEOServices, LLC

U.S. Department of Transportation
Federal Highway Administration
Eastern Federal Lands Highway Division
FDR is.....

- The pulverization of the existing asphalt, base stone and sometimes a portion of the underlying subgrade, the addition of cement and water, and the application of compactive effort to produce a high modulus sub base for replacement of pavement sections.
Advantages of FDR

- It recycles the existing pavement materials
- It produces a much improved subgrade
- Minimizes increases in pavement grades
- Significant cost savings compared to traditional undercut and replacement.
Enter Cades Cove (GSMNP)

- Cades Cove is a broad, verdant valley surrounded by mountains and is one of the most popular destinations in the park. It offers some of the best opportunities for wildlife viewing in the region.

- An 11-mile, one-way loop road circles the cove, offering motorists the opportunity to sightsee at a leisurely pace.
Enter Cades Cove (GSMNP)
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**Cades Cove Pavement**

- The existing pavement was nearing 30 years in age.
- In many areas, the pavement had completely failed.
- The FHWA EFL was commissioned to perform a pavement evaluation and make recommendations for rehabilitation.
Cades Cove Pavement
Cades Cove Pavement
Cades Cove Obstacles

- The Cove access is a one-way, 11 mile long, closed loop at the virtual end of an 8 mile road (Laurel Creek Road).
- Nearest Waste Area is 9 miles away.
- Nearest Asphalt Plant is 25 miles away.
- Traffic, Traffic, Traffic.
- Extreme Environmental Sensitivity..you are in the National Park!
Removal Option is not an Option

- Removal of existing pavement would result in nearly 1500 truck loads of material.

- Conversely, this would require the replacement of 1500 tandem axle dump trucks of stone.

- The existing clay subgrade is still an issue..especially during the selected repair period (late winter).

- Park didn’t want to close area during peak season.
FWHA and FDR

- FDR selected to minimize impacts to existing park Road.

- Minimize imports into the GSMNP.

- Insure a suitable subgrade condition.

- Minimize closure of the Cove.
FDR Results in...

0 waste trucks...85 Truck Trips of Cement (1700 tons).

Significantly Increase in CBR...Potential Reduction of 40 percent of Asphalt Thickness.

Improvement in soil sensitivity.
Initial Steps...

- Representative Samples were obtained
Initial Steps...

Laboratory Testing was performed to determine the cement percentage required.

Target Compressive Strength of 400 to 600 psi.

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<th>Station No</th>
<th>Sample No</th>
<th>Cement Content (%)</th>
<th>Unconfined Compressive Strength (psi)</th>
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</table>
Construction...

Plan on two way operation starting at mid-way point.
Construction...

Pulverizing, cement placement, mixing, compacting.....
Construction...
Construction...
Construction...
Construction...
Construction...
Construction...

Testing:

Compaction testing during placement.

“Pills” made during mixing.

Coring and verification post placement.
Construction ...

Potential Issues:

Low Compressive Strength...
- potential subgrade failure

High Compressive Strength...
- shrinkage cracking could reflect through new pavement section
Completed ....
Completed....
Completed....
QUESTIONS