Full Depth Reclamation – Pros and Cons and Utility Coordination
UNC-Chapel Hill Skipper Bowles Drive Roadway Reconstruction

2016 FDR Symposium
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Questions:

- How many people are in the world?
- 7.3 billion
- How many traffic engineers are there in the world?
- 7.3 billion
AMT - Who We Are

Founded
1955

Employees
500

Services
• Transportation/Civil Engineering
• Construction Engineering Inspection
• Surveying
• Environmental Services
• Subsurface Utility Engineering (S.U.E.)
• Landscape Architecture

16 offices throughout the Mid-Atlantic

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Agenda

• Background/Introduction
• Using Full Depth Reclamation (FDR)
• Timing and University Coordination
• Utility Coordination, Stormwater Improvements, and Erosion Control
• Traffic Control and Pedestrian Movements
• How does FDR fit in? Pros and Cons
• Construction Process in Pictures
• Outcomes

Learning Outcome of Presentation

The pros and cons of using full depth reclamation for roadway reconstruction for smaller roadway projects (non-interstate). UNC – Chapel Hill recently used this technique to reconstruct Skipper Bowles Drive (the road near the Smith Center). Utility and stakeholder coordination were the major aspects to the project, as well as traffic control as every entrance and roadway needed to maintained during construction.
Background/Introduction
History: Used a Haul Road for Smith Center in 1985-86. Smith Center opened in January 1986.

Challenges:
- Constructed pavement thickness was not good enough for amount of traffic
- Replacing stormwater pipes
- Bus traffic: both normal and during special events
- Utilities
- Other neighbors: Family Medicine, Housing, Business School, Residence Halls, Athletic Facilities
- Timing
Using Full Depth Reclamation (FDR)

Why Use FDR? What is it? What are the benefits? Assistance from the PCA (Portland Cement Association)

**The Problem:**

Directional roads are a common problem for cities and counties. When trying to manage roads and parking lots with traditional methods, cities can often be faced with high costs and lengthy construction times. Using FDR, a smooth, smooth surface covering can be installed, resulting in a very cost-effective and time-efficient practice. FDR practices can offer a clay on pavement maintenance budget. Furthermore, cities and maintenance departments and commissions can consider using more innovative and cost-effective technologies for their roads.

Our pavement problems can be within a soft surface base, but even problems can be found beneath the surface. These problems can lead to a cracked or buckled road that can be hard to maintain, especially for a majority of the population. Being able to solve these problems can lead to safer and more efficient roads.

 excess material such as subgrade or high-water table void combined with the lack of good drainage causes cracks to become water material. This allows the asphalts mixed to erode and become detached from the pavements of everyday traffic, causing seizing, cracking, disjointing cracking, and punctures.

**The Process:**

FDR with cement makes the reconstruction of each a largely self-sustaining process. The complete recycling process can be divided into two stages, and both can be beneficial to the construction.

The old asphalt and base materials are removed, mixed with cement and water, and then compressed to produce a strong, durable base for either an asphalt or concrete surface. FDR uses the old asphalt and base material for the new roadbase layers.

The process starts by evaluating the condition of the existing pavement, including the thickness and type. Next, the base materials are removed and a new asphalt or concrete base material is placed, followed by the Portland cement. Finally, the new asphalt layer is completed, resulting in new road surfaces.

Equipment for the process includes reclamation, modeling, and grading machines, and asphalt mixers.
Using Full Depth Reclamation (FDR)

Why Use FDR? What is it? What are the benefits?
Assistance from the PCA (Portland Cement Association)

Overall Benefits of FDR Include:
- Money Saving Pavement Strategy
- Higher Load Carrying Capacity
- Creates Safer Roads
- Crown & Slope Corrections
- Stabilized Road Widening
- Corrects Drainage Problems
- Erases Reflective Cracking and Rutting
- Eliminates the Movement of Base Materials

The Solution:

The advantages of stabilization are many:
- Cement stabilization increases the stiffness and strength of the subgrade material, a little base reduces distress due to traffic loads, which results in lower stresses in the asphalt surface.
- A strong, uniform support provided by cement stabilization results in reduced stresses applied to the subgrade. A 3/4” cement stabilized section can replace subgrade support more than a 4-5” base of unconfined aggregate base. Subgrade failures, settlement, and road widening can be prevented.
- Maintenance interventions can destroy stabilized pavement bases. Cement stabilized base is a maintenance-free layer that keeps water out and minimizes higher levels of strength, even when unloaded.
- A cement stabilized base also reduces the potential for pumping of subgrade fines.

Injection of water
Deep recycled layer
Operating direction
Milling drum
Distressed pavement
Subbase and Subgrade
Timing and University Coordination

Very Short Time Frame: Late Spring to Late Summer (first football game was September 12)
Coordination with “Neighbors”:
- Parking
- Housing
- Business School
- Vehicular Access and Bus Routes
- Hospital
- Bike/Ped Access and ADA Compliance
Utility Coordination
Utility Coordination

One word: Wow
Stormwater Pipe Relocation

Replacement of Degraded Pipes Prior to FDR
Traffic Control

Skipper Bowles: Loop Road
Use One-Way Operation during construction
Traffic Control

PHASE 1:
CLOSE NE SIDE OF ROADWAY
PHASE 2: CLOSE NORTH END OF ROADWAY
Traffic Control

PHASE 3: CLOSE SW SIDE OF ROADWAY
How Does FDR Fit In? Pros and Cons

Why Use FDR?

Lets Review:
• Faster
• Reuse Materials
• Less Expensive

Order of Operations for Skipper Bowles Drive
1. Milling – first layer of asphalt
2. Pipe Replacement
3. Full Depth Pavement at Entrances
4. FDR Operations
5. Intermediate Course of Asphalt Pavement
6. Concrete Areas for Bus Stops (Did I mention all of the buses?)
7. Final Lift of Pavement
8. Pavement Markings
How Does FDR Fit In? Pros and Cons

Other Challenges:

- Summer Camps
- Move-In
- People in General – both Peds and Drivers
- Temporary Bus Stops and Crossings
- Sinkholes
- Electrical Distribution
- Sidewalk Repairs/ADA Compliance
- Pavement Marking and Signage Options
- Pipe Replacements
- Utility Issues and Coordination
- Signal Coordination
- Coordination with Other Agencies – Town of Chapel Hill and NCDOT
How Does FDR Fit In? Pros and Cons

Why Use FDR?

Pros:
• Faster
• Reuse some material
• Saved money
• Sets a great sub-base for future

Cons:
• Contractor milled initially too deep, needed to bring in some more material
• Hard to work around a lot of utilities – all need to be located (water main break, replace copper pipe in steam tunnel)
• Not good in tight spaces
• Takes 7 days to cure
• Need to Prepare Site
Construction Process in Pictures

Pictures were taken weekly.
Construction Process in Pictures
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Outcomes

• Finished on Time
• On Budget with Little to No Change Orders
• Much Better Finished Project
• Satisfaction of UNC Neighbors
• FDR was Successful
And Since.........
And Since........
Questions

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