Objectives

- Applications
- Performance
- Design
- Construction
- Cost
“Definition of Reclamation”

A rehabilitation process which utilizes the existing asphalt, base, and subgrade material to produce a new stabilized base course for an asphalt, chip seal, or surface treatment wearing surface.

GDOT
• Cement-Stabilized Reclaimed Base
• Lime-Stabilized Reclaimed Base
Georgia Public Roads

115,533 Centerline Miles

Urban (23.3%)
26,919 miles

Interstate (1.1%)
1,271 miles

Rural (75.6%)
87,343 miles
Georgia’s Geologic Provinces
Challenges Facing Georgia’s Roadways

- Continuing Growth
- Rising Expectations from Users
- A Heavily Used, Aging System
- Environmental Compatibility
- Changes in the Workforce
- Funding Limitations
Pavement Distress
Advantages of Reclamation

- Use of in-place materials
- Little or no material hauled off and dumped
- Maintains or improves existing grade
- Conserves virgin material
- Saves cost by using in-place “investment”
- Saves energy by reducing mining and hauls
- Environmentally friendly
Engineering Benefits

- Increased Rigidity
  Spreads Loads
- Eliminates Rutting
  Below Surface
- Reduced Moisture
  Susceptibility
- Reduced Fatigue
  Cracking
- Thinner Pavement
  Section
- Retards Reflective
  Cracking

**Thinner Pavement Section**

Unstabilized Granular Base

Cement-Stabilized Base
  - Soil-Cement Base
  - Cement-Treated Base
  - Full-Depth Reclamation

Accepted Rule-of-Thumb:
8 inches of a crushed stone base is equal to
6 inches of a cement-stabilized base material
Mix Design Proportioning

- Obtain representative samples of roadway material
- Typically up to 50% Asphalt, Aggregate Base, Soil-Cement
  - Meeting the gradation requirement is the key
- Pulverize to anticipated gradation
  - 100% passing 75 mm (3”)
  - 95% passing 50 mm (2”)
  - 55% passing 4.75 mm (#4)
- Estimate cement content
  - Usually 4 to 8%
  - By weight of dry material
- Run moisture/density curve
  - Standard Proctor
  - (ASTM D558)
Clearing
Pulverization

- Pulverize mat to appropriate gradation
- Typically 1 or 2 passes
Spreading (Dry)

- Cement is spread on top of roadway in measured amount
Blending of Materials

- Continuous blending of materials until a homogenous blend is achieved.
Compaction

- Material is compacted
- 98% minimum standard Proctor density
Moisture Addition

- Water is added to optimum moisture
Grading

- Material is graded to appropriate Plan line, grade, and cross-sections.
Surface Application

- Hot Mix Asphalt
- Chip Seal
- Surface Treatment
Quality Acceptance Testing

**Gradation**
- 95% Passing 2-inch sieve
- 55% Passing the No.4 sieve

**Compaction/Moisture**
- 98% of Max. Dry Density
- 100% to 120% of Optimum

**Depth**
- +/- ½-inch

**Strength**
- 300psi Min. Unconfined Compressive Strength
## Cost Analysis

### Conventional Reconstruction

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit Cost</th>
<th>Area (sq. yd)</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavating (Milling) the 2-inch paving course and disposal.</td>
<td>$1.00</td>
<td>14,000</td>
<td>$14,000</td>
</tr>
<tr>
<td>Mixing, Compacting, Grading the existing Sand-Clay Base for a Subgrade (not including the removal and replacement of unsuitable material)</td>
<td>$0.075</td>
<td>14,000</td>
<td>$10,500</td>
</tr>
<tr>
<td>3-inches of 25mm paving</td>
<td>$43.67</td>
<td>14,000</td>
<td>$100,877.70</td>
</tr>
<tr>
<td>2-inches of 19 mm paving</td>
<td>$43.71</td>
<td>14,000</td>
<td>$67,313.40</td>
</tr>
<tr>
<td>1.5-inches of 9.5 mm paving</td>
<td>$40.73</td>
<td>14,000</td>
<td>$47,043.15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>$239,734.25</strong></td>
</tr>
</tbody>
</table>
## Cost Analysis

### Cement Stabilized Reclaimed Base

<table>
<thead>
<tr>
<th>Description</th>
<th>Price</th>
<th>Quantity</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reclamation Process (including mixing, compacting, and grading)</td>
<td>$4.03 per sq. yd.</td>
<td>@ 14,000 sq. yd.</td>
<td>$56,420</td>
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<tr>
<td>Type 1 Portland Cement</td>
<td>$125.00 per ton</td>
<td>@ 259 tons</td>
<td>$32,375</td>
</tr>
<tr>
<td>2-inches of 19 mm paving</td>
<td>$43.71 per ton</td>
<td>@ 14,000 sq. yd.</td>
<td>$50,485.05</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>$139,280.05</strong></td>
</tr>
</tbody>
</table>
Cost Analysis

Conventional

$239,734.25

Cement Stabilized Reclaimed Base

$139,280.05

Cost Savings

$100,454.20

42%
The traveling public in Georgia are the big winners!

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