Andale Construction, Inc
Innovative Construction and Pavement Solutions
How many people are on the earth?
7.4 Billion

How many Pavement/Traffic engineers are there in the world?
7.4 Billion
Five hundred years ago, everybody knew the earth was flat.

“If you don't know where you're going, you might not get there.” - Yogi Berra
Cement-Based Pavement Materials

- Roller-Compacted Concrete
- Conventional Concrete
- Soil-Cement
- Flowable Fill
- Full-Depth Reclamation
- Cement-Treated Base
- Cement-Modified Soil

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Water Content

Cement Content
What is a pavement supposed to do?

• Functional aspects:
  • Noise
  • Ride
  • Friction
  • Rutting

• Structural aspects:
  • Protect the subgrade from permanent deformation
  • Have sufficient fatigue resistance to withstand repeated loading
History of RCC

- First RCC road in 1924

- RCC became well-known in Canadian log sorting yards in the early 1970’s.

- RCC was recognized as the “go-to” pavement of choice in intermodal and port facilities, as well as in military installations for its speed of installation, reliability, consistent mass production, resilience to a wide variety of weather conditions, heavy repetitive loading without premature failure, and lower cost.
Where is RCC used?

- Industrial/Manufacturing Plants
- Military Facilities
- Intermodal Facilities
- Port Terminals
- Distribution Centers
- Large Laydown or staging areas

- Local Streets and roads and new subdivisions
- Reconstruction of old deteriorated roads
- Commercial Developments
- Highway Shoulders
Quality RCC Pavement Requirements

Based On:

- Twin Shaft Mixer or Pug Mill Plant
- High Density Screed Paver
- Appropriate Mix Design
- Smoothness (IRI)
- Concrete Density (for durability, frost, permeability) Density is directly proportional to strength
- Concrete Strength (for fatigue)
- Uniformity of Product (Density, Strength)
- Surface Texture (for smoothness, appearance, friction):
Why Choose RCC?

- Fast installation
- Initial cost and long term costs are relatively low
- Low maintenance
- Extremely durable
- Can take heavy repetitive loadings
- Less labor, equipment, and materials
- Open to traffic/service quickly
<table>
<thead>
<tr>
<th>Pavement Type</th>
<th>Original Design SN</th>
<th>Alternate Pavement</th>
<th>Alternate Design SN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy Duty Concrete</td>
<td>6.72</td>
<td>Heavy Duty RCC</td>
<td>6.80</td>
</tr>
<tr>
<td>Concrete Parking</td>
<td>4.22</td>
<td>Medium Duty RCC</td>
<td>5.05 20%</td>
</tr>
<tr>
<td>Medium Duty Asphalt</td>
<td>2.48</td>
<td>Light Duty RCC</td>
<td>4.30 73%</td>
</tr>
<tr>
<td>Heavy Duty Asphalt</td>
<td>2.94</td>
<td>Medium Duty RCC</td>
<td>5.05 72%</td>
</tr>
</tbody>
</table>

Organizations that have realized the value of RCC Pavements

- BMW
- Caterpillar
- Honda
- Toyota
- Mercedes
- Norfolk Southern
- CSX
- Burlington Northern
- Duke Energy
- Southern Company
- Dominon Power
- General Motors
- Charlotte Douglas International Airport
- Denver International Airport
- Port of Houston
- South Carolina Ports Authority
- Georgia Ports Authority
- CB&I
- Waste Management
- Republic Industries
- Port of Longbeach
- Norfolk Virginia Port Authority
- USACE
What is needed for a successful project?

- Choose the correct materials
- Use the right equipment
- People
- Quality control (Design, Mixing, Placing, curing)

<table>
<thead>
<tr>
<th>% Cement</th>
<th>Cement (lbs/yd³)</th>
<th>Water (lbs/yd³)</th>
<th>Aggregate* (lbs/yd³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.0</td>
<td>394</td>
<td>235</td>
<td>3586</td>
</tr>
<tr>
<td>13.0</td>
<td>459</td>
<td>235</td>
<td>3521</td>
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<tr>
<td>15.0</td>
<td>519</td>
<td>235</td>
<td>3462</td>
</tr>
</tbody>
</table>
Particle Size Distribution Report

Material Description
50:50 Blend of No. 67: Dry Screenings

Atterberg Limits

PL = LL = PI =

Coefficients
\[ D_{90} = 16.5327 \]
\[ D_{50} = 4.4219 \]
\[ C_L = 0.2317 \]

Classification
USCS = AASHTO =

Remarks
COMPACTATION TEST REPORT

Test specification: ASTM D 1557-07 Method C Modified

<table>
<thead>
<tr>
<th>Elev/Depth</th>
<th>Classification</th>
<th>Nat. Moist.</th>
<th>Sp.G.</th>
<th>LL</th>
<th>PI</th>
<th>% &gt; 3/4 in.</th>
<th>% &lt; No.200</th>
</tr>
</thead>
<tbody>
<tr>
<td>USCS</td>
<td>AASHTO</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**TEST RESULTS**

Maximum dry density = 147.4pcf

Optimum moisture = 5.9%

**PROJECT NO.**  340-15  **CLIENT:** Andale Ready Mix

**Project:** Bricklawn

Monroe, North Carolina

**SUMMIT ENGINEERING**

 Ft. Mill, South Carolina

**MATERIAL DESCRIPTION**

50:50 Blend of #67 and Dry Screenings @ 13.0% Cement

**Remarks:**

*Figure*
## Pavement Matrix

<table>
<thead>
<tr>
<th></th>
<th>Lower Initial Cost</th>
<th>Structurally Sound</th>
<th>Longevity</th>
<th>Speed of Construction</th>
<th>Aesthetics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt and Stone Base</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Conventional Reinforced Concrete</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>CCP Compacted Concrete Pavement</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

What is the difference, now?

ACEiT Plus and ACEiT Blue admixture and finishing aid and curing compound
What could possibly go wrong?
What to watch for

Is it a warning, or a watch?

- Moisture
- Weather/Environment
- Gradation
- Moisture
- Is it the right pavement at the right place at the right time?
- Water
- Is the equipment up to par?
- Density
- Moisture
Now...The future is here
Compacted Concrete Paving

“The next Generation of RCC”
What is RCC CCP?

CCP is a no-slump concrete that is compacted by vibratory rollers.

- Zero slump (very dry... less paste)
- Little to no forming—depends on application
- No reinforcing steel
- Limited finishing required
- Compacted with vibratory rollers (Maybe)
- High and Fast strength gain
- Resistant to freeze/thaw cycles and permeability
- Very dense
- Highly efficient installation methods
RCC has been called an “ugly” pavement; What about CCP?
Southwest regional airport Benton Harbor, Mi
Southwest regional airport Benton Harbor, MI
Questions:

“You can observe a lot by just watching.” - Yogi Berra
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