Pavement Technologies
A New Perspective For A New Era
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
  - Cement-Treated Base
  - Full-Depth Reclamation
  - Cement-Modified Soil

- Soil-Cement

- Conventional Concrete
  - No Wearing Course Required
  - Wearing Course Required

- Flowable Fill

Cement Content vs. Water Content
Pavement Distress

Rutting
Pavement Distress

Base Failure
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
- Protect subgrade from permanent deformation

Pressure ~3 to 7 psi

+/- 20 ft
Compacted Concrete Paving
“The new RCC”
CCP is a Granular Solid

- Compressive strength ($f'_c$)
  - 4,000 to 10,000 psi
- Flexural strength (MR)
  - 500 to 1,000 psi
  - $MR = C(f'_c)^{1/2}$ where $C = 9$ (up to 11)
- Modulus of elasticity
  - 3,000,000 to 5,500,000 psi
  - $E = C_E(f'_c)^{1/2}$ where $C_E = 57,000$ (up to 67,000)
Sustainability of CCP

Lower Heat Island Effect. It's a cooler pavement.
Greater Solar Reflectivity, therefore you need less night time lighting.
Ability to use recycled aggregates and more fly ash than conventional concrete.
Less initial cement than conventional concrete which lowers carbon foot print to construct and maintain. (No repetitive milling and repaving).
We can achieve up to 8 LEED points by using CCP.
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 \textit{(Maybe)}
- High and Fast strength gain
- Resistant to freeze/thaw cycles and permeability (CCP now passes ASTM C666)
- Very dense
- Highly efficient installation methods
<table>
<thead>
<tr>
<th>Description</th>
<th>SY</th>
<th>Price 1</th>
<th>Price 2</th>
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<tbody>
<tr>
<td>12&quot; FDR One Mile</td>
<td>SY</td>
<td>14,080.00</td>
<td>$9.00</td>
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<td>12&quot; FDR with Double Treatment One Mile</td>
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<td>Pavement Type</td>
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<tr>
<td>Heavy Duty Concrete</td>
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<td>Heavy Duty RCC</td>
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<td>Concrete Parking</td>
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<td>Medium Duty RCC</td>
<td>5.05</td>
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<td>Medium Duty Asphalt</td>
<td>2.48</td>
<td>Light Duty RCC</td>
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<tr>
<td>Heavy Duty Asphalt</td>
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<td>Medium Duty RCC</td>
<td>5.05</td>
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RCC has been called an “ugly” pavement; What about CCP?

Imagine what we’ll know tomorrow
ASTM C 944 Surface Durability and Abrasion Resistance Tests

- Conventional Concrete City of Wichita 650 Flex Mix
- Conventional Concrete KDOT 4.0 AE
- Traditional RCC mix, No Ash, No ACEiT
- Traditional RCC mix with Ash, No ACEiT
- ACEiT No Ash, Rolled, Troweled
- ACEiT, Ash, Rolled, Troweled
**ASTM C 666/666M Method "A" Resistance to Concrete Rapid Freezing and Thawing**

<table>
<thead>
<tr>
<th>Mix Description</th>
<th>Durability Factor</th>
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<tr>
<td>Conventional Concrete City of Wichita 650 Flex Mix</td>
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<tr>
<td>Conventional Concrete KDOT 4.0 AE</td>
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<tr>
<td>Traditional RCC Mix, No Ash, No ACEiT Control 1</td>
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<tr>
<td>Traditional RCC Mix, Ash, No ACEiT Control 2</td>
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<tr>
<td>ACEiT, No Ash, Rolled, Troweled</td>
<td>80</td>
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<tr>
<td>ACEiT, Ash, Rolled, Troweled</td>
<td>90</td>
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What does ACEiT Blue Do?

- Evaporation Retardant
- Viscosity Modifier
- Finishing agent
- Reduces plastic shrinkage
- Stops crust from forming
- Prevents Crazing
- Prevents Blistering
- Non film forming
- Wont affect any other sealers, paints, or color
- Works with any cementitious products
- Easy to use and apply
- Reduces labor
- Extends pan and trowel life
- Bonding agent
Patches and fill in areas will blend in, be compacted, and bond where traditional RCC mixes have marginal rates of success. When done properly, the ACEiT™ admix will help achieve greater success 100% of the time.
What could possibly go wrong?

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