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

So, why a modified, or treated base...?

A mechanical and chemically treated base means that we can build faster, smarter, more sustainable, stronger, with less resources, and incorporate greater value in our bases.

- We can modify soils to make them better
- We can make a rigid base that is not affected by water infiltration/exfiltration
- We can reduce construction resources
- Save money and time
- Offer a better product at a better value

What is RCC, or 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 (Maybe)
- Compacted with vibratory rollers
- High and Fast strength gain
- Resistant to freeze/thaw cycles and permeability
- Very dense
- Highly efficient installation methods

Innovative Roller-Compacted Concrete Pavement Technologies
Pavement Choice Considerations:
- What do we want our pavements to do?
- Perform as engineered
- Long service life
- Low maintenance
- Aesthetically satisfying
- Short construction schedules
- Ride quietly and smoothly
- Have the value that we intend it to have

The tougher question is:
How do we get there?
How do we design?
How do we implement?
Do we keep doing the same thing over and over, or do we look for a better answer?

Pavement Matrix

<table>
<thead>
<tr>
<th></th>
<th>Initial Cost</th>
<th>Structural Sound</th>
<th>Longevity</th>
<th>Speed of Construction</th>
<th>Aesthetics</th>
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</thead>
<tbody>
<tr>
<td>Asphalt and Stone Base</td>
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<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Conventional Reinforced Concrete</td>
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<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?
Advancements in RCC admixtures and curing compounds

Sustainability of CCP

Lower Heat Island Effect. It’s a cooler pavement.
Greater Solar Reflectivity, therefore, you need less nighttime lighting.
Ability to use recycled aggregates and more fly ash than conventional concrete.
Less initial cement than conventional concrete which lowers carbon footprint to construct and maintain. (No repetitive milling and repaving).
We can achieve up to 8 LEED points by using CCP.
RCC has been called and "ugly" pavement; What about CCP?

Innovative Roller-Compacted Concrete Pavement Technologies
1. GENERAL

1. Description: Compacted Concrete Pavement (CCP) consists of aggregate, Portland cement and possibly other supplementary cementitious materials (fly ash, slag), water and an admixture that allows for mechanical and physical finishing of the surface, edges, and joints. CCP is proportioned, mixed, placed, compacted, finished, and cured in accordance with these specifications. Ensure that the CCP conforms to the lines, grades, thickness, and typical cross section shown in the plans or otherwise established by the Engineer. When used as base course, it will be covered with one or more lifts of asphalt as shown on the Plans. Otherwise, the CCP will provide the final riding surface.

1. REFERENCED DOCUMENTS

1. ASTM C 31 – Practice for Making and Curing Concrete Test Specimens in the Field
2. ASTM C 33 – Specifications for Concrete Aggregates
3. ASTM C 39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
4. ASTM C 42 – Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
7. ASTM C 309 – Specification for Liquid Membrane-Forming Compounds for Curing Concrete
8. ASTM C 595 – Specification for Blended Hydraulic Cements
9. ASTM C 618 – Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
10. ASTM C 778 – Standard Specifications for Standard Sand
11. ASTM C 989 – Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
12. ASTM C 1040 – Density of Unhardened and Hardened Concrete In Place By Nuclear Methods
14. ASTM C 1240 – Specification for Use of Silica Fume as a Mineral Admixture in Hydraulic Cement Concrete, Mortar, and Grout
15. ASTM C 1435 – Standard Practice for Molding Roller Compacted Concrete in Cylinder Molds Using a Vibrating Hammer
16. ASTM D 994 – Standard Specifications for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
17. ASTM D 1557 – Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort

SPECIAL PROVISION FOR COMPACTED CONCRETE PAVEMENT

JULY 2015

<table>
<thead>
<tr>
<th>Flexural Strengths</th>
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ASTM C 944 Surface Durability and Abrasion Resistance Tests

- Conventional Concrete City of Wichita 650 Flex Mix
- Traditional RCC Mix, No Ash, No ACEiT Control
- Traditional RCC Mix, Ash, No ACEiT Control
- ACEiT, Ash, Rolled, Troweled

What could possibly go wrong?

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