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**Symposium on Integrated Cement Based Pavement Solutions, Part 2: Roller Compacted Concrete Pavements**

March 19, 2012 • 11:00 A.M. – 1:00 P.M.

**Learning Objectives:**

By attending this session, attendees will be able to:

1. Apply principles learned to use roller-compacted concrete with confidence.
2. Recognize the most important factors to consider when constructing RCC.
3. Avoid the common problems associated with RCC design and construction.
4. Determine whether RCC is appropriate for a particular pavement application.

**Definition**

“Roller-Compacted Concrete (RCC) is a no-slump concrete that is compacted by vibratory rollers.”

- Zero slump (consistency of dense damp gravel)
- No forms or finishing
- No reinforcing steel
- High production
- Pavers or earth moving equipment
- Consolidated with vibratory rollers

Concrete placed in a different way!

**Benefits of RCC Pavements**

- Fast construction with minimum labor
- Economical
- Early load carrying capacity
- Durable
- Low maintenance
- Light surface reduces lighting requirements and Urban Heat Island effects
Applications
- Ports, intermodal yards and military hard stands
- Warehouse facilities & auto manufacturing plants
- Maintenance & storage yards
- Airport service areas
- Highway shoulders
- Rural roads
- Local streets & intersections

RCC – Experiencing a Revival
- Growth has accelerated in last seven years
- Used for more than just heavy-duty pavements
- Emergence of asphalt contractors placing RCC

Asphalt Prices Have Soared
Base Year: 2002 = 100
Source: Bureau of Labor Statistics

RCC Makes for Strange Bedfellows

Project Considerations
- Project size
- Site geometry
- Loading characteristics
- End use
- Client expectations

Surface Appearance
- Not as smooth as conventional concrete
- Important to recognize difference
- Similar appearance to HMA binder layer only light grey instead of black
- Surface can be diamond ground
Mixture Design

- Dry enough to support vibratory roller
- Wet enough to permit adequate distribution of paste

Modifications needed in no-slump conventional concrete mixture procedures (ACI 211.3R) because RCC is:
- Dryer than zero slump
- Not air-entrained
- Lower cement content
- Higher fines content (up to 6% of non-plastic fines)
- Nominal max. size aggregate 1/2 to 3/4 in.

Aggregate Blend Gradation

Soil Compaction Method

- Most common method used in the U.S. for RCC paving mixtures
- Testing equipment readily available at construction materials laboratories
- Three major steps
  1) Select aggregate blend with minimal voids
  2) Determine opt. m/c and max. density (ASTM D1557 Modified Proctor test)
  3) Determine cementitious content

Determine Cementitious Content

Construction
Construction Procedures
- Test section
- Subgrade preparation
- Mixing process
- Transporting
- Placing
- Compacting
- Jointing
- Curing

Continuous Pugmill
- Excellent mixing efficiency
- High-volume applications
- 125 to 250+ cy/hr
- Mobile, erected on site

Central Batch Plant
- Highly accurate proportioning
- Local availability
- Smaller output capacity
- Longer mix times than conventional concrete
- Possibly more cleaning
- Dedicated production

Transporting
- Rear dump trucks normally used
- Minimize transport time
- Covers required for long hauls, or hot/windy conditions

Transporting
- Load in multiple piles or continuous layers to avoid segregation
**Placing Equipment**

**Conventional asphalt pavers**

- Provide some initial density (80-85%)
- Relatively smooth surface
- May require modification
- Increased maintenance

**High density pavers**

- Vibrating tamping screed
- High initial density, 90-95%
- Less roll-down
- High-volume placement (1,000 to 1,500 cubic yards per day)

**Compaction**

- Proper compaction is critical for strength and durability
- Compact to 98% Modified Proctor (ASTM D1557)
- Vibratory steel drum roller
- Rubber coated steel drum, pneumatic tire or lighter steel drum roller to remove ridges and smooth surface

**Curing**

- EXTREMELY IMPORTANT
- Water or concrete curing compound
- Application rate depends on surface texture
RCC Guide
- Introduction
- Applications
- Properties
- Mixture Proportioning
- Structural Design
- Production
- Construction
- Troubleshooting

www.cement.org/pavements

RCC Training Modules
- Introduction & Uses
- Properties
- Mixture Proportioning
- Structural Design
- Production
- Construction

www.nhi.fhwa.dot.gov

Thank You
Discover how beautiful concrete can be