ROLLER COMPACTED CONCRETE PAVEMENT

RCCP

Road Pavements Forum

Port Elizabeth

June 2018

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What is RCC

- Gets its name from the steel drum and rubber-tyred rollers used to compact it
- Similar strength properties and basic ingredients as conventional concrete but different mix proportions
- Stiffer than zero-slump conventional concrete
- Placed with asphalt-type paver preferably with HD screed
- No forms, dowels or reinforcing
- Not to be confused with RCC for dams

Benefits

- Speed
- Cost effectiveness (reduced cement, no forms, construction times)
- Reduced shrinkage
- High compressive, flexural and shear strength
- Low permeability – better durability
- Reduced joint maintenance
- Lifts up to 250 mm

Common uses

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History

- 1970s Use for log sorting yards in Canada
- 1940s Airport in Washington
- Late 1980s Port and intermodal facilities
- 2000s low to moderate traffic streets and secondary highways




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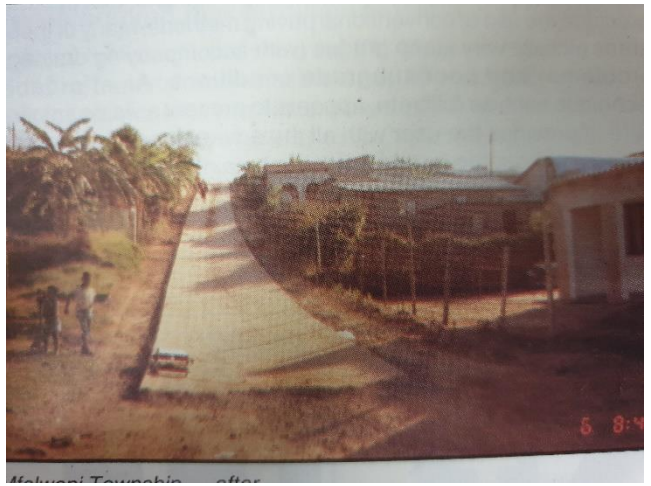
History in South Africa

- Late 1980s
  - Test Section in Silverton (CSIR) HVS tested
  - Road in Pinetown
  - Road in Durban
  - Road in Mfolweni
  - Road in Honeydew
  - Road base near Umdloti HVS tested
- Early 1990s
  - Lethabo road
  - Vulamehlo Road
- 2013
  - Rayton Road HVS tested



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History in South Africa

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Structural design

- Based on limiting flexural stress and fatigue damage
- Methods
  - RCC-PAVE
  - USACE
  - ACI
  - ACPA StreetPave
  - Pavement designer.org

Document

https://pavementdesigner.org/projectTypes

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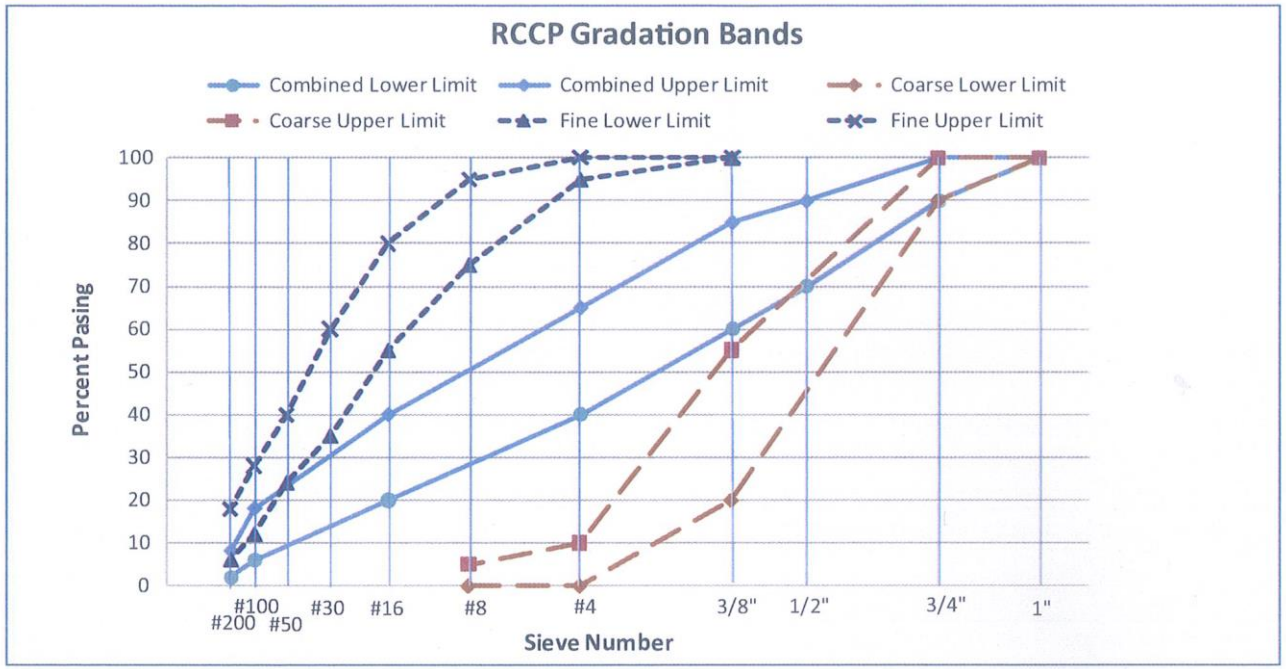
Mix design

- Aggregates
  - Good quality, dense, well-graded
- Binder
  - Up to 25 to 30% extender
- Admixtures
  - Water reducers
  - Retarders



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Mix design

- Use Soil compaction method
    1. Choose well graded Aggregate
    2. Select mid-range binder content
    3. Develop moisture-density plots
    4. Cast samples to measure strength
    5. Test and select required binder content
    6. Calculate mix proportions

Production

- Batch plants for smaller projects. Mixer VIP
- Pugmills
- Horizontal shaft mixers

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Construction (Placing)

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Construction (Compaction)

- 10 ton dual drum vibratory rollers
- Rubber tyred rollers
- Combination steel drum and rubber tyres
- Complete within 15 mins of spreading
- Four to six passes for 150 to 250 mm lift

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Sawn Transverse Joints

- Generally no sawn joints. Cracks at 6 to 18m
- If using joints for aesthetics or to prevent cracks, joints cut at 6 to 8 m or 4 to 6m for thinner slabs
- Easier to seal joints than cracks
- Joints allow isolation of structures
- Using early entry saws – no sealing required

Sawn Longitudinal Joints

- 4 to 6 m for pavements less than 200 mm
- 6 to 8 m for thicker slabs

Longitudinal Construction Joints

- Fresh construction joints within 60 minutes (no retarders)

- Cold construction joints more than an hour.

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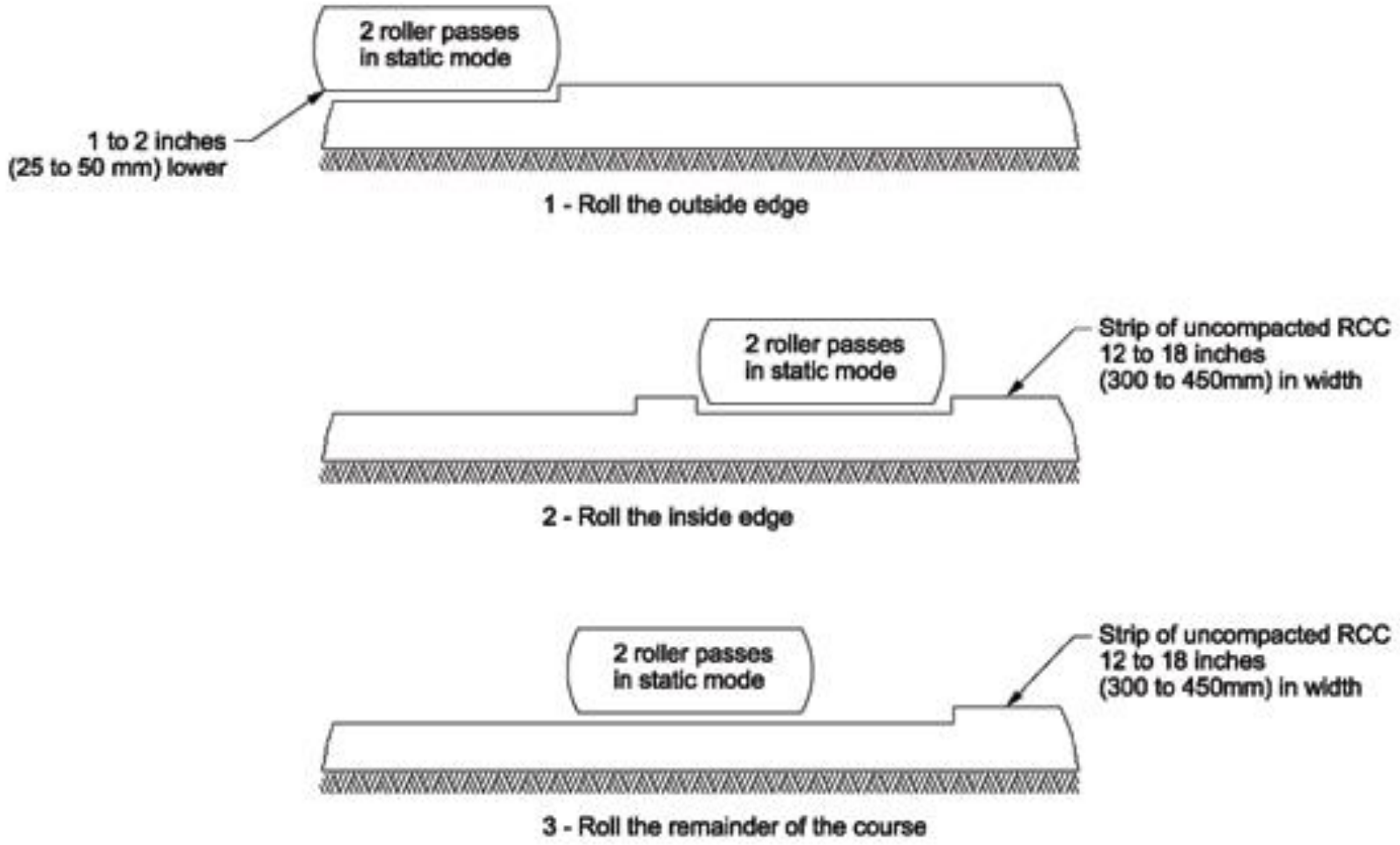
Longitudinal Construction Joints



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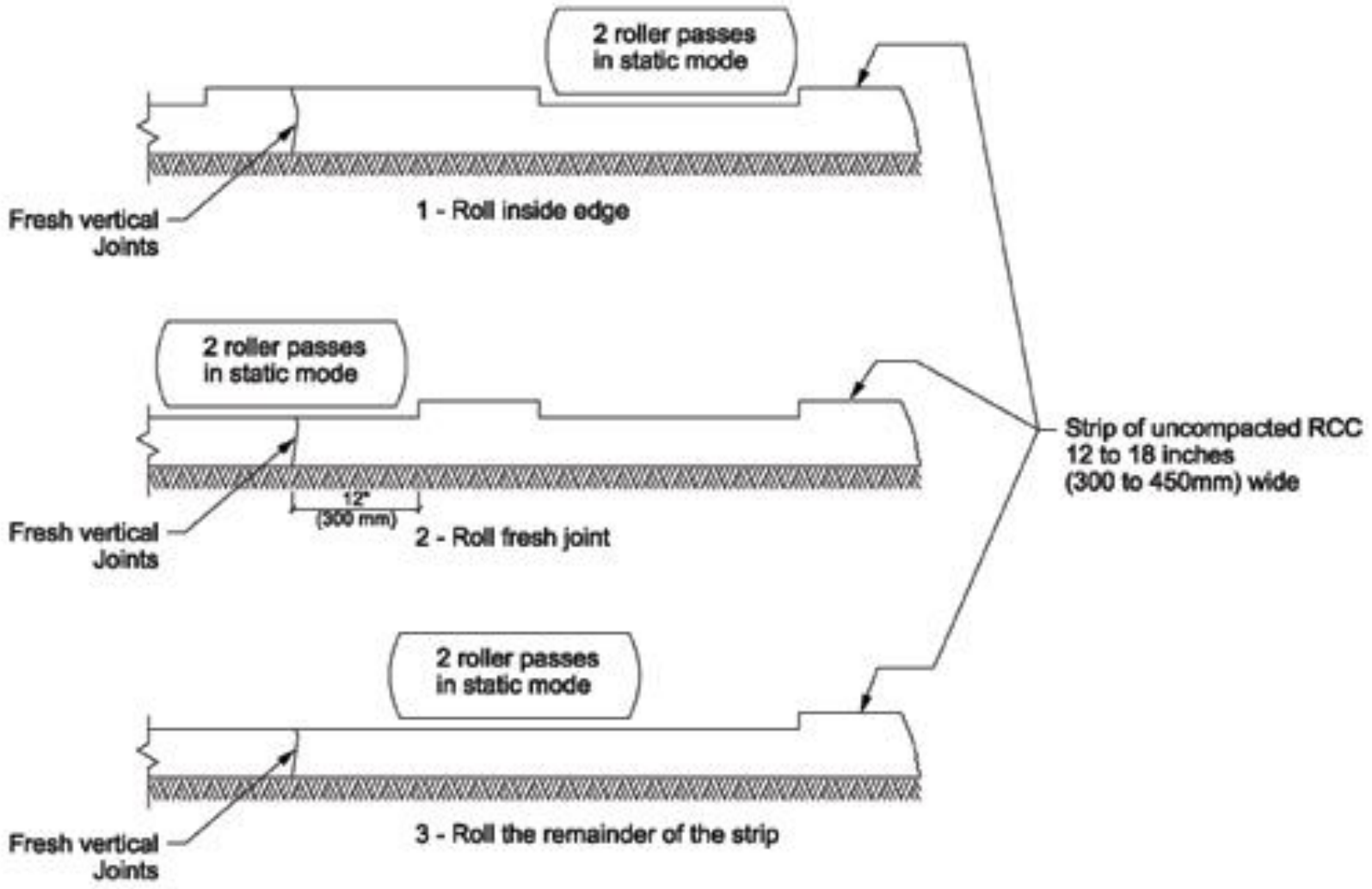
Longitudinal Construction Joints



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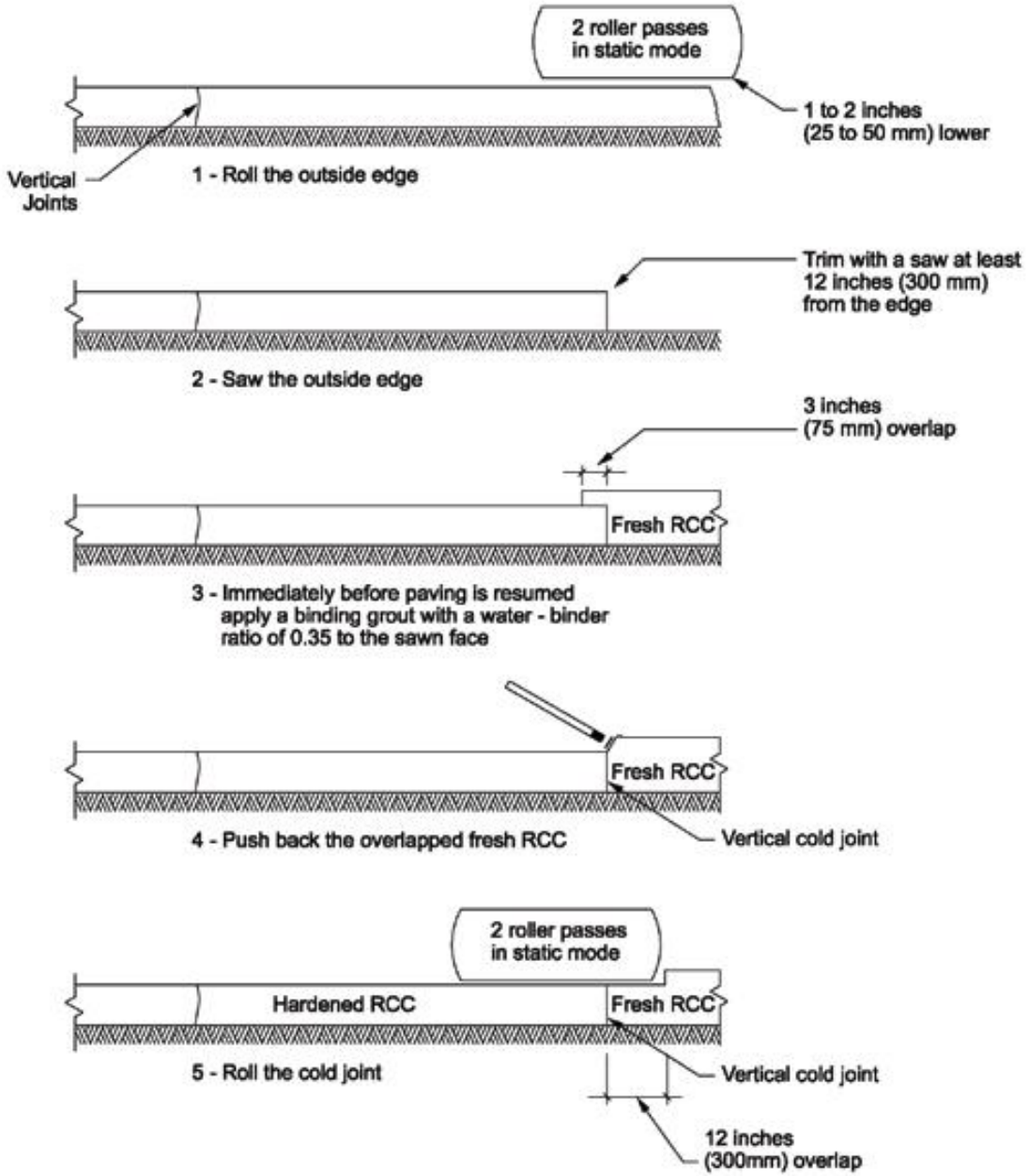

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Curing

Resources

National Concrete Pavement Technology Center

GUIDE FOR ROLLER-COMPACTED CONCRETE PAVEMENTS

AUGUST 2010

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Institute for Transportation

PCA Portland Cement Association

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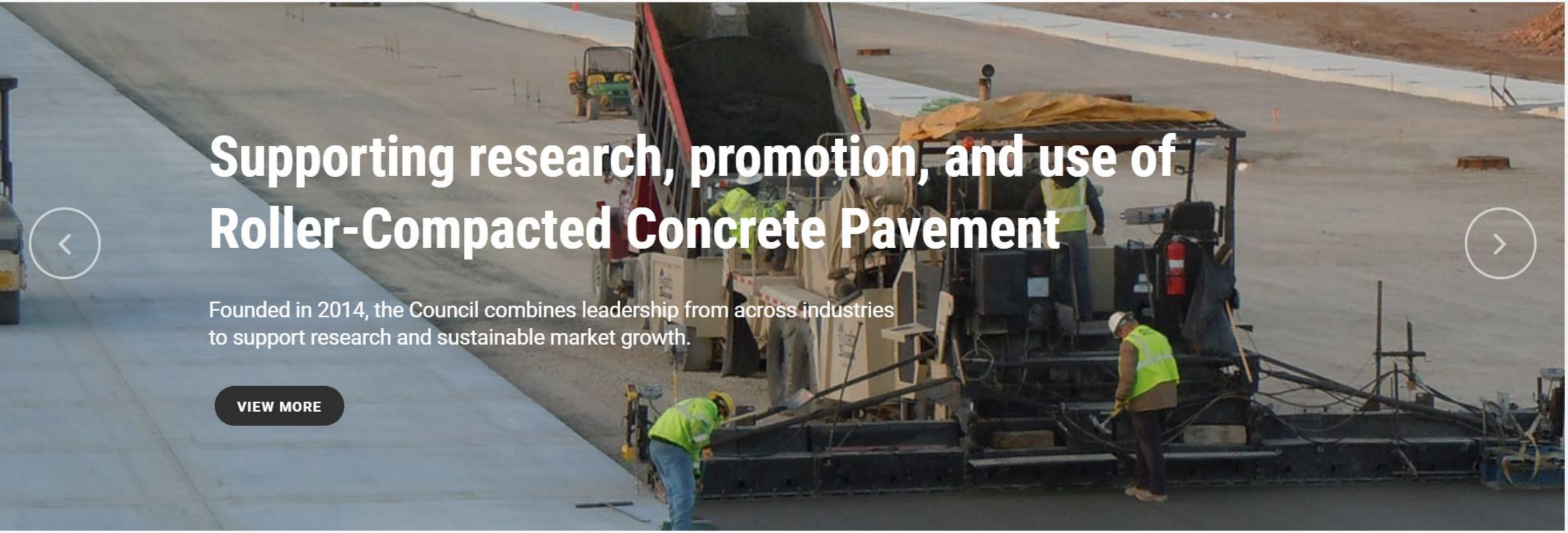

Supporting research, promotion, and use of Roller-Compacted Concrete Pavement

Founded in 2014, the Council combines leadership from across industries to support research and sustainable market growth.

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Roller-Compacted Concrete (RCC)

A Different Kind of Concrete

SECOND EDITION

Integrated Materials and Construction Practices for Concrete Pavement:

A STATE-OF-THE-PRACTICE MANUAL

IOWA STATE UNIVERSITY
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Questions?

Thank you

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