

Introduction to RCC Pavements

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Definition:

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

- Zero slump (consistency of damp gravel)
- No forms
- No reinforcing steel
- Consolidated with vibratory rollers



Roller-Compacted Concrete

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



Which one is RCC?



Roller Compacted Concrete

An Evolutionary Process

1970's

- Canadian logging
- From CTB to RCC

1980's

- Military and intermodal
- Pug mills and high-density pavers

1990's

- Intermodal, storage, smaller projects
- Dry batch, central mix, jointing

2000's

- Intermodal, storage, parking, State DOTs, cities
- Pug mills and high-density pavers

2010's

- Intermodal, storage, parking, State DOTs, cities, counties, military
- Diamond grinding, asphalt alternative, pervious, contractor experience

2020's

- Military and intermodal
- Pug mills and high-density pavers

Not air-entrained

Lower water and
paste content

Higher fine aggregate
content



RCC compared to conventional PCC

Percent by
Volume

Conventional PCC

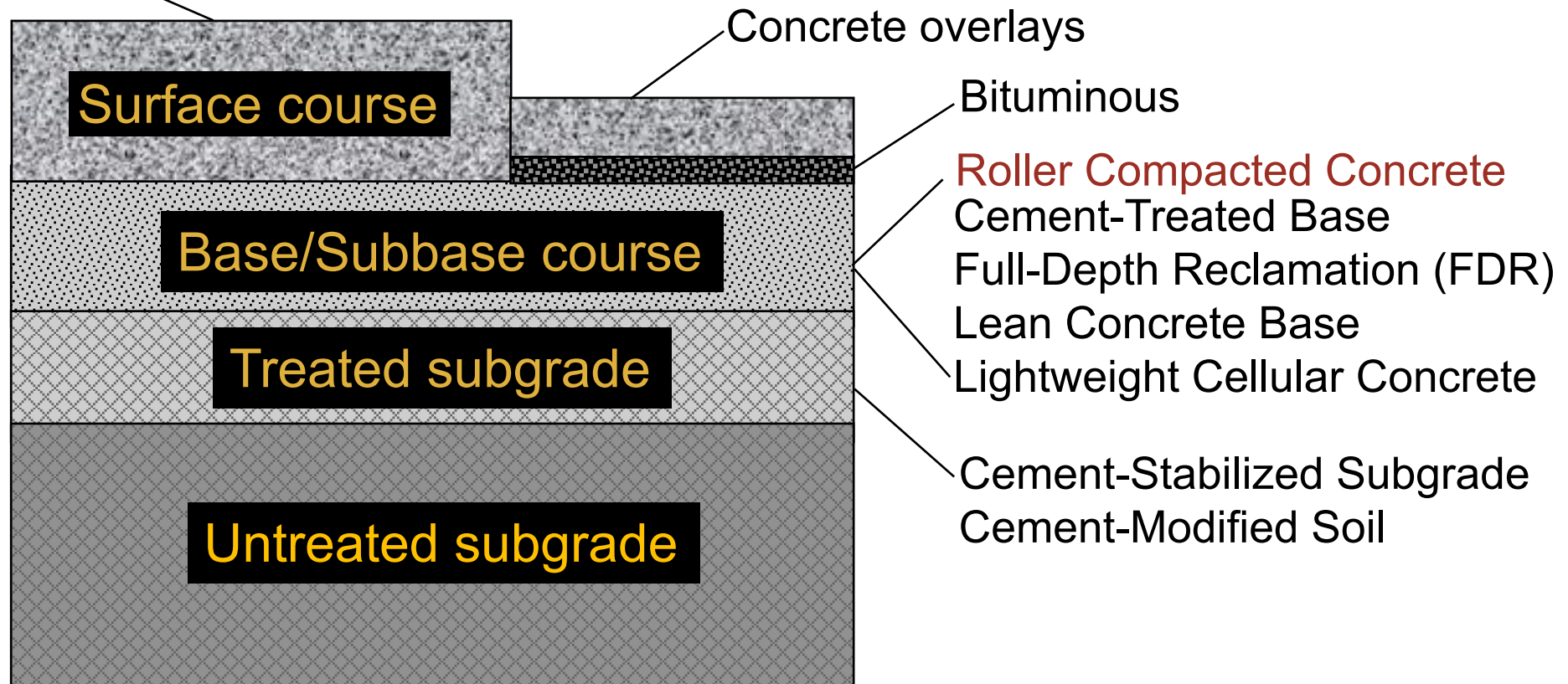


Roller Compacted Concrete



RCC Compared to Conventional PCC

Conventional, Pervious, Precast, and **Roller Compacted Concrete**



Basic Construction Sequence

- **Produce** RCC material
- **Transport** by dump trucks
- **Place** with an asphalt paver
- **Compact** by steel drum and pneumatic-tired rollers
- **Cure** with water or curing compound

Continuous Pug Mill

- High-volume applications
- 250 to 1,000 tons/hour models
- Mobilize for large projects (25,000 sy plus)



Placing

- Layer thickness
 - 4-inches minimum
 - 8-inches & greater in two equal lifts
 - 10-inches & greater with high-density pavers in two equal lifts



Placing Equipment

- High-Density Pavers
 - High initial density (90%-98%)
 - High-volume placement (up to 3,000 tons/shift)
 - Smoothest RCC surface
- Conventional Asphalt Pavers
 - Provides some initial density (85%-92%)
 - Relatively smooth surface
- Aggregate Spreader/Motor Grader
 - Low initial compaction
 - Surface smoothness & texture vary significantly



Compaction

- Proper compaction is critical for strength and durability
- Compact to 98% of modified proctor
- Vibratory roller
- Non-vibratory steel wheel roller
- Robber tire roller



Curing

- Immediately after compaction
- Ensures surface durability
- Low water content in RCC
 - Must keep moisture sealed in
- Three methods:
 - Moist cure (7 days)
 - Concrete curing compound
 - Asphalt emulsion
- Preferred – No Traffic for 72 hours.

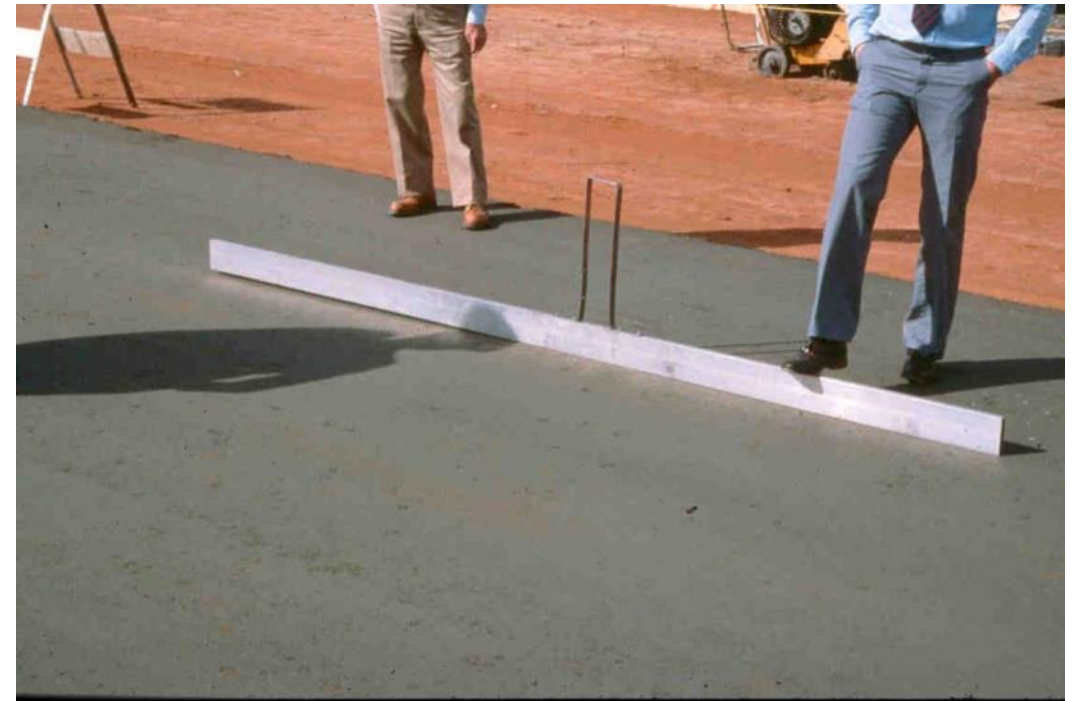
Saw Cut Joints

- More aesthetically pleasing
- Early entry saw very effective, shortly following placement
- Should saw within 12 hours to avoid uncontrolled cracking
- 1/3 to 1/4 of total layer thickness



Surface Smoothness

- **3/8-inch over a 10-foot length (standard)**
- **Others require 1/4-inch over a 10-foot length (strict & will reflect in bids)**



Diamond Grinding



RCC Deviations for Conventional Concrete

- RCC differs from conventional concrete in some ways
 - Surface texture
 - Texture resembles asphalt
 - Pavement smoothness
 - Handwork finish details

Benefits of RCC

- Fast construction
- Cost-effective
- Supports heavy loads
- Open to traffic shortly after placement
- Resistance to shoving and pushing
- Long life pavement
- Minimal maintenance required
- No rutting, no potholes
- Resistance to hydraulic fluid and fuel spills
- Will not soften under high temperatures
- Light surface reduces lighting requirements and urban heat island effects



Applications

- Ports, intermodal yards and military hard stands
- Warehouse facilities
- Parking areas
- Maintenance & storage yards
- Airport service areas
- Arterial roads
- Highway shoulders
- Local streets & intersections

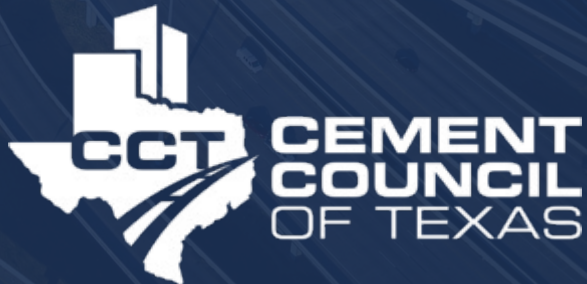


Design – Engineering Properties of RCC

- Similar to those of conventional PCC pavements
- Achieved using different mixture proportions and construction techniques
- Based on tests of cylinders from actual paving projects as well as full-scale test sections
- Compressive strength
 - 4,000 to 6,000 psi
- Flexural strength
 - 500 to 1,000 psi
- Modulus of Elasticity
 - 3,000,000 to 5,500,000 psi



**When your
asphalt
pavement can't
handle your
industrial
application**



**High PI soil that
is treated with
4% lime and 4%
cement for
strength and
expedited
construction**



Hoyer Yard – Pasadena, TX





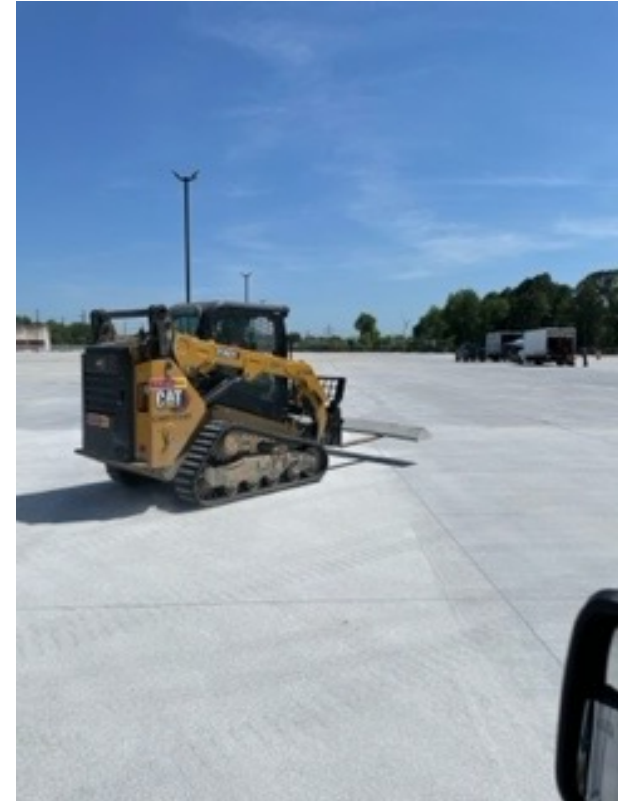


Distribution Centers





Swift Transportation Yard



Liberty County subdivision





Available Resources

- **RCC Pavement Council**

<http://rccpavementcouncil.org/>



- **PCA**

[https://www.cement.org/roller-compacted-concrete-\(rcc\)-old](https://www.cement.org/roller-compacted-concrete-(rcc)-old)

- **ACPA**

<https://www.acpa.org/solutions-and-markets/types-of-concrete-pavements/roller-compacted-concrete-pavement/>

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