



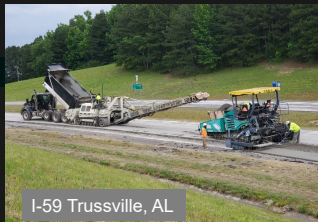
RCC Pavement Construction and Project Case Histories



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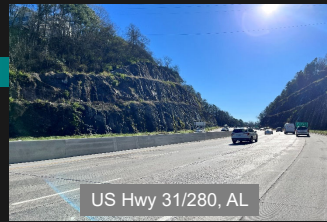
Utilization of RCC for Roadways



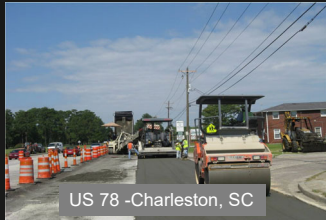
I-59 Trussville, AL



Crossgate Road, Savannah, GA



US Hwy 31/280, AL



US 78 -Charleston, SC



SR 6 - Powder Springs, GA



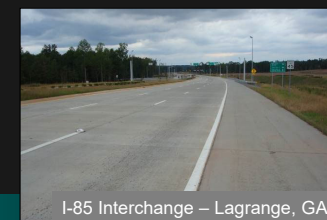
I-516 Shoulder, Savannah, GA



McAshan Road, Birmingham, AL

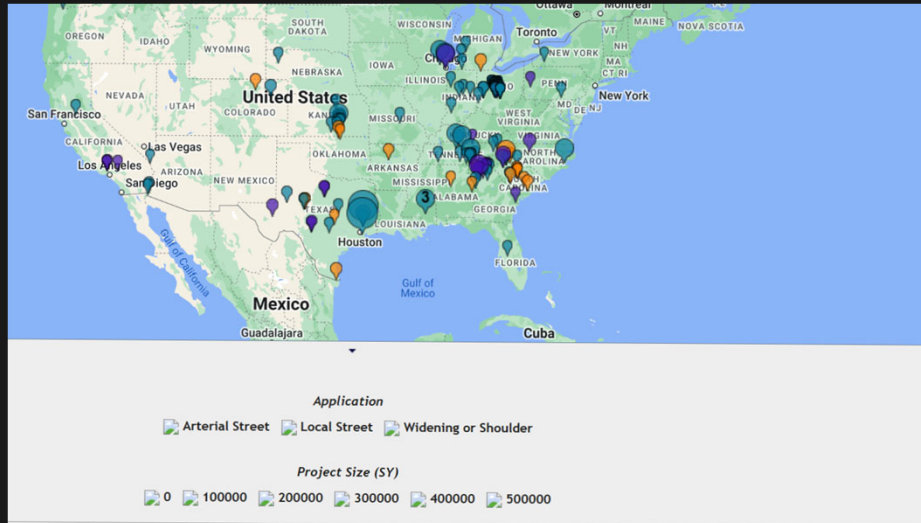


I-285 Shoulder - Atlanta, GA



I-85 Interchange - Lagrange, GA

Utilization of RCC for Roadways



Source: ACPA RCC Explorer

RCC Pavement Why are DOT/Agencies interested?

- **Improve Structural Capacity of Existing Roadways**
- **Urban/fast-track construction**
 - Lift thickness limitations
 - Drop-off limitations
 - Maintenance of cross-traffic
 - Construction speed
- **Use RCC as base under asphalt**
 - Success with Cement Stabilized Aggregate Bases
- **Stimulation of competition**
 - Lowers cost to the taxpayer
- **Expand the portfolio of pavement types available**
 - Price run-up of asphalt binder
 - Uncertain petroleum supply in future
- **Concrete pavement at a initial price competitive with HMA**



Roadway applications for RCC Project Types Used to Date

- Composite Pavements
- Interstate Shoulders
- Turn Lanes
- Lower Volume Roadways

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Crossgate Road Port Wentworth (Savannah), GA

Pavement
Design
Information

- Owner: Georgia DOT
- Use Type: Travel lane
- Year Built: 2016
- Thickness: 10"
- Quantity: 16,000 SY



Additional
Details

- First use of RCC as a final riding surface on a state travel lane
- RCC Placed in single pass, 24 feet wide in most cases
- 325 acres of undeveloped property on existing roadway
- Project Diamond Ground for smoothness
- 3000 PSI achieved within 2 days allowing quick return to traffic



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Crossgate Road, Port Wentworth, GA



HMA Roadway prior to replacement with RCC: GDOT wanted to improve structural capacity of the roadway.

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Crossgate Road, Port Wentworth, GA



Majority of the roadway was pulled at full 24-foot width. Operations were started at midpoint to allow traffic to be maintained at all times. 3000 PSI reached in 48 hours.

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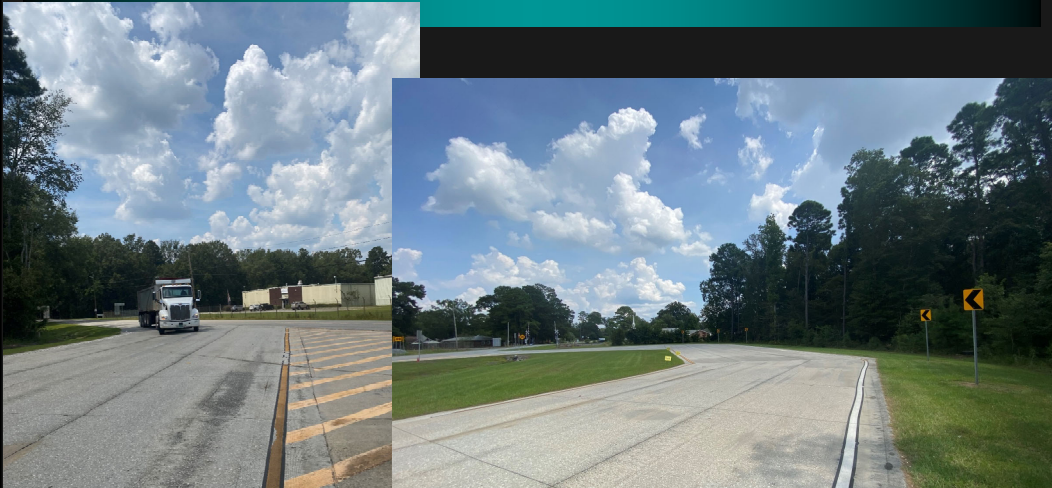
Crossgate Road, Port Wentworth, GA



FHWA Pavement Safety Edge was built into screed per project requirements. AG Peltz used a custom edging shoe.



Crossgate Road, Port Wentworth, GA



Truck turnaround: Pavement placed in three 12' lanes to facilitate ability of paver to navigate radius.



Crossgate Road, Port Wentworth, GA



Joints were sawcut using early entry saws at 15-foot intervals. Joints were sealed with DOW 888 Silicone Sealant as per GDOT Specification.

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Crossgate Road, Port Wentworth, GA



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Project was Diamond Ground for smoothness. GDOT did not require a ride spec, but they did take PRI readings, which showed good results (i.e, avg PRI under 12.5 inches/mile).

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RCC was sawn full depth at transitions to create a good interface for adjacent asphalt.

Roadway Applications for RCC What have we learned?

- Proper joint construction is Critical
- RCC can be diamond ground to achieve a smooth ride.
 - Helps improve surface texture.
 - IRI numbers in the 60s are achievable.
- RCC can be milled if it is going to be covered.
 - Milling can cause joint damage.
- 10"+ RCC can cause problems when placed with specialized RCC equipment WG2
- Even with best practices, surface texture is varied and material dependent
- RCC can be placed in an urban environment without excessive traffic disruption.
- Surface spalls repaired with flexible hot polymer.
- You only get one shot at doing it right!

Slide 14

WG1 Will Gray, 3/9/2023

WG2 This almost reads that it would be easier with non specialized equipment,
Will Gray, 3/9/2023



Hot Polymer Repair - Fibrecrete



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Questions?

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Additional Project Slides

Roadway applications for RCC Project Types Used to Date

- Composite Pavements
- Interstate Shoulders
- Turn Lanes
- Lower Volume Roadways

- **Composite Pavement System – Volume 1 – HMA/PCC Composite Pavement**
 - Part of SHRP 2 – Renewal Research, complete in 2013
 - Study looked at composite pavement systems using a variety of HMA and concrete pavement types, thicknesses, etc.
 - New and existing composite pavements evaluated
 - Composite systems utilizing JPC, CRC, RCC, and CTB as base layer
 - Several RCC jobs were included in the study – 8”, 15” RCC with 1-3” HMA cap

- **Summary findings**
 - Excellent surface characteristics can be obtained from thin (1”-3”) asphalt top layers.
 - Allows rapid renewal of the surface while maintaining high structural carrying capacity in the rigid base.
 - There is an avoidance of certain distress types that occur in conventional pavements.
 - Fatigue cracking in HMA was minimal because pavement is almost always in compression
 - Fatigue cracking in PCC was reduced due to the insulating effects of the HMA
 - Rutting is minimized due to high quality materials and thin layer of HMA
 - Transverse cracking controlled through sawing and sealing techniques



SCDOT RCC Roadway Projects

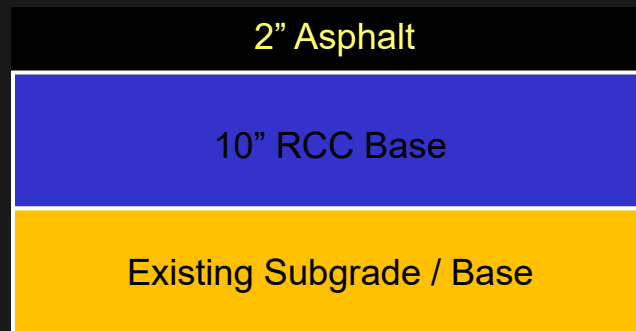
- Powell Pond Rd, Aiken County (Demo. Project)
- SC 5, York County
- US 78, Charleston County
- New State Road, Lexington County
- Greystone Boulevard, Richland County
- S. Beltline Boulevard, Richland County
- Richland Street (US78), Aiken County
- SC 9, Horry County
- S-11-171, Cherokee County

Note: Majority are composite pavements

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US 78 Ladson, SC Pavement Cross-Section



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SCDOT US 78 Ladson, SC 2009

- State route with heavy truck traffic
- Poor & wet subgrade/soils resulted in consistent rutting



SCDOT US 78 Ladson, SC 2009

Must be able to get compaction/density,
subgrade improvement may be necessary





US 78 Ladson County Completed Project



Inverted Base Pavement

- **Alternative flexible pavement structure where the stiffness profile *does not decrease* with pavement depth.**
 - **Primary used in foreign countries, including significant use in South Africa.**
 - **Buildup consist of a thin HMA surface layer over an unbound aggregate base (crack relief & load redistribution layer) over a cement treated aggregate base (which provides strength & stiffness).**
- **GDOT did two field test of this concept in 2008, including the LaGrange Bypass in Troup County, GA.**



GDOT Troup County Inverted Base Pavement Section



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Troup County, GA



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Inverted Base Troup County, GA Pavement Review 2020

- GDOT's 2014 report noted the following:
 - Inverted base pavement outperformed their conventional counterparts
 - Reflective cracking is greatly reduced when a granular base sits between the CTB and HMA layers.
 - Pavements can be cost effective from both an initial construction and life cycle standpoint.
- AGP 2020 review noted that the roadway was structurally sound and performing as intended.
- Noted transverse and longitudinal cracks would need to be addressed soon.



Roadway Applications for RCC – Project Types Used to Date

- Composite Pavements
- Interstate Shoulders
- Turn Lanes
- Lower Volume Roadways



I-285 Shoulder Replacement Atlanta, GA

Pavement Design Information

- Owner: Georgia DOT
- Use Type: State Route shoulder
- Year Built: 2006
- Thickness: 6 & 8" RCC
- Quantity: 35 lane miles 38,500 CY



Additional Details

- 2006 SCAN Innovation Award
- Material placed on weekends only
- Removal of shoulders on Friday night starting 9:00 PM
- Had to be off the road by 5:00 AM Monday morning (\$5,000 per hour fine)
- Typically 1.5-2 miles per night



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I-285 Shoulder Replacement Atlanta, GA





I-285 Shoulder Replacement: Completed Shoulder



I-59 Shoulder & Ramp Replacement Birmingham, AL

Pavement Design Information

- Owner: ALDOT
- Use Type: Interstate shoulder & ramps
- Year Built: 2021
- Thickness: 5" RCC
- Mainline is 5' & 10' shoulders – Ramps with 5-16' paving
- Quantity: 128,686 SY



Additional Details

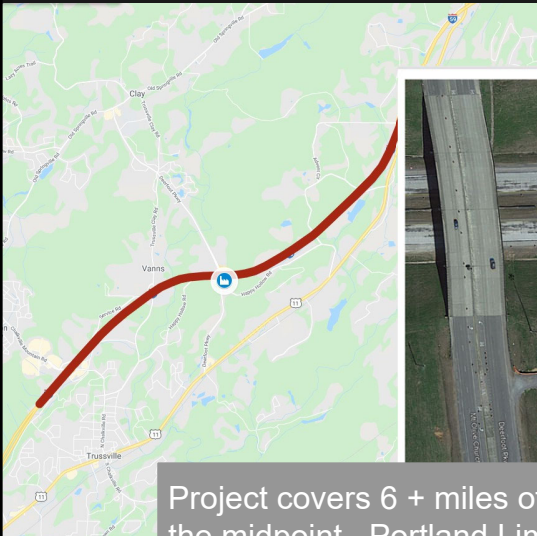
- Material placement split between nighttime and daytime depending on primary traffic flow.
- Night work from at 7:00 PM to 4:00 AM and day work from 10:00 AM to 6:00 AM. \$ time penalties.
- Existing mainline milled and rehabbed. RCC shoulder used as travel lane during construction.
- Typically 2,500-2,800 LF placed per shift.



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I-59 Shoulder & Ramp Replacement Birmingham, AL

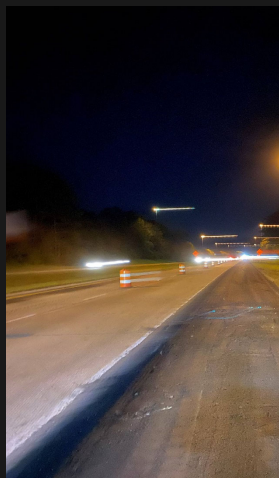


Project covers 6 + miles of I-59 with the plant site near the midpoint. Portland Limestone Cement (EcoCem) from Lehigh was utilized on the project. Pilot project for ALDOT and AGP.

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I-59 Shoulder & Ramp Replacement Birmingham, AL



Typical schedule for night paving: Traffic Control at 7:00 PM, Milling 8:00 PM, RCC 10:00 PM. All milled areas must be filled with RCC prior to opening to traffic (i.e., interstate drop-off requirements)

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I-59 Shoulder & Ramp Replacement Birmingham, AL



Outside shoulder paved at 10' with sawed joints every 10' feet. 95% density achieved through paver. RCC used for longevity and to provide structural value without getting into edge drains.

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I-59 Shoulder & Ramp Replacement Birmingham, AL



Paver modified by AGP to place inside shoulder at a 5' width. Daytime work allowed based on traffic flow. Start 10:00 AM and usually done with RCC paving by 7:00 PM. Road opened by 6:00 AM.

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