

Advancement in DOT Uses for RCC

Webinar June 15, 2021

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RCC Pavement Council

Co-Chair & Research Committee Chair



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Agenda

- Brief Introduction
 - Morgan Corp.
 - The RCC Pavement Council
 - RCC Pavements
- Latest Trends in RCC Pavements
- RCC PC Sponsored Research
- Example Projects of Industrial Facilities with Roadway Components

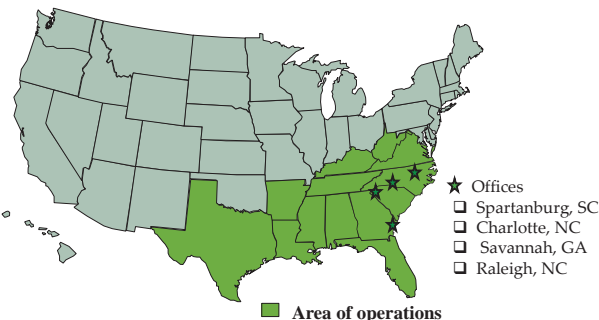


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Morgan Corp. www.morgan-corp.com

- Founded in 1945, purchased by current owners in 1971
- Heavy industrial and commercial site development and RCC for pavements and dams / reservoirs
- RCC business added in 2008



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The RCC Pavement Council

- Mission: To sustainably advance RCC pavements through research and promotion activities
- Membership: About 30 members - RCC paving contractors, materials suppliers, equipment manufacturers, and consultants
 - Voting membership: \$3000/yr
 - Non-voting associate membership: \$500/yr
- All volunteers – 100% of dues is invested in research and promotions
- Two committees, one vote per member on each committee
 - Research Committee
 - Promotion Committee
- Five members Board of Directors
- Although all decisions are made independent of our industry partners with whom we collaborate closely (ACPA, PCA, NRMCA, CPTech Center, etc.), ACPA has been graciously managing our finances

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The RCC Pavement Council

- Developed Resources
 - Comprehensive website: www.rccpavementcouncil.org
 - Promotional Videos
 - Project performance review reports
 - Market promotion publications
 - Research reports
 - Published TRB papers
 - Example projects with a link to the RCC Explorer on ACPA's website
 - Helped fund and provided technical support during the development of PavementDesigner.org
- Exhibits at Conferences
 - ICCP; AREMA/REMSA; ASCE Ports; NACE; DBIA; MODEX

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RCC Pavements Are Not New

- Started in industrial and military applications
- Now proven to be a valid option for the vast majority of pavement applications



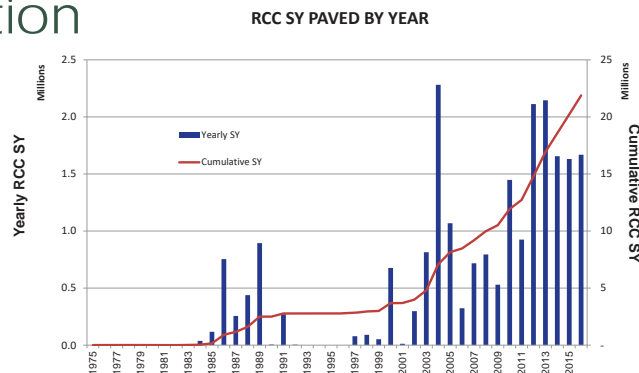
Courtesy the CPTech Center and PCA, Guide for RCC Pavements, 2010

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RCC Utilization

- RCC utilization showed momentum mid-1980's and started increasing rapidly since the 2000's
- Preliminary reports indicate that RCC utilization is now increasing rapidly

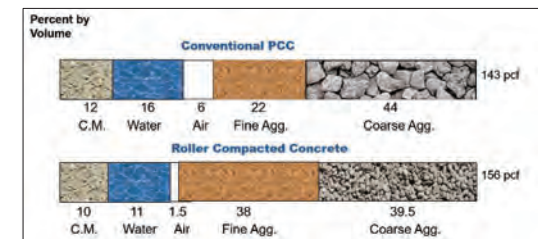


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RCC Mixture Ingredients

- Like conventional concrete
 - Well graded combined aggregates
 - Cementitious materials
 - Water
 - Chemical admixtures (if used)



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How is RCC Mixed?

- Continuous pugmill mixing plants are used on most projects: most efficient, and most consistent
- Other mixing machines such as revolving drum batch mixers, horizontal shaft mixers, and batch type pugmills have been used



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The RCC Paving Train



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RCC Curing



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RCC Pavements Latest Trends

- Mixture Design
 - Cementitious content
 - In most cases controlled by workability and surface durability not strength
 - Minimum 450 pcy. Range for most projects is 450 to 525 pcy
 - Nominal maximum aggregate size: $\frac{3}{4}$ " max and preferably $\frac{1}{2}$ "
 - Smaller top size to reduce segregation and improve surface quality
 - Combined gradation methods: 0.45 Power Curve; Tarantula Curve
 - On-site blending: Combining a minimum of 2 aggregates is strongly recommended. Single stockpile is not recommended and may not be permitted on some projects.

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RCC Pavements Latest Trends

- Joints Layout
 - Follow joint layout design similar to plain undoweled conventional concrete
 - Nominal maximum transverse joint spacing = 15 ft.
 - Longitudinal joint spacing depends on placement width and locations of obstacles in the field of the pavement
 - For most applications with $t \geq 7''$, pave 24 to 34 feet wide and saw cut the centerline of the pull

RCC Pavements Latest Trends

- Compaction
 - High density screeds should be required for density and smoothness
 - Rolling in vibratory mode should be required



RCC Pavements Latest Trends

- Finishing Methods
 - Traditional RCC finish with steel drum or rubber tire rollers continues to be used by many contractors and accepted by owners
 - Troweling or troweling and broom finishing RCC surfaces is gaining recognition
 - Multiple finishing aid products are available to facilitate troweling

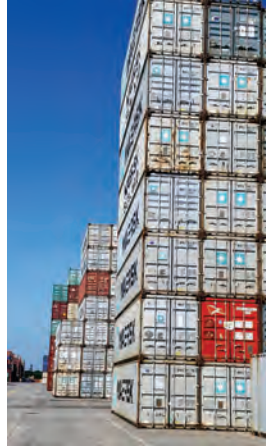


RCC Pavements Ongoing Research Sponsored by the RCC Pavement Council

- UIUC Fellowship: Effects of Paste Content on RCC Workability and Compactability
- Teas A&M Fellowship: Volumetric Changes, Curling, and Warping of RCC
- MTSU Study: Relative Abrasion Resistance of Troweled RCC Treated with Various Finishing Aids

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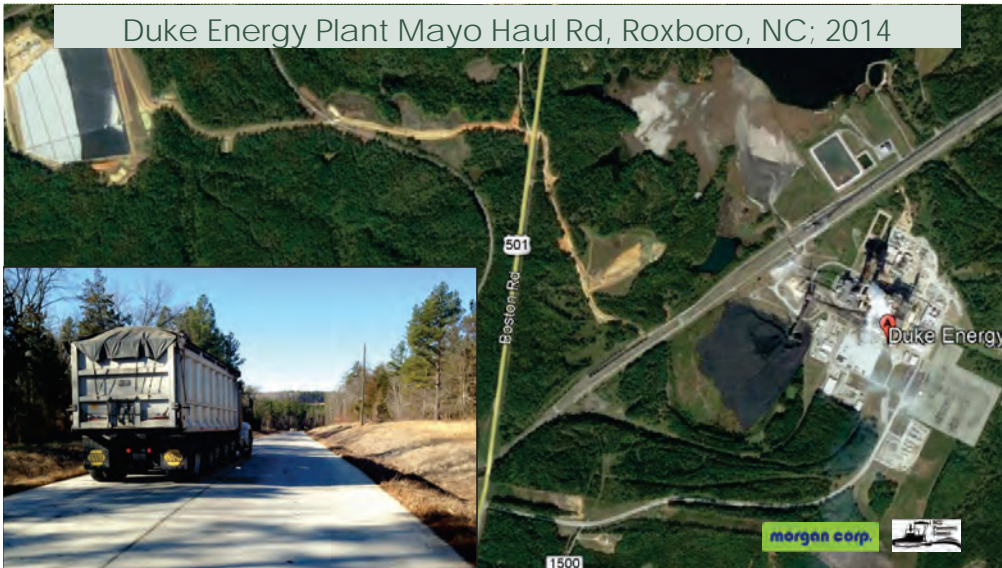
South Carolina Inland Port, Greer, SC; 2014



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Duke Energy Plant Mayo Haul Rd, Roxboro, NC; 2014



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ACPA 2015
Gold Award
Winner

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Walmart DC, Mebane, NC; 2015



Thank You!

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www.rccpavementcouncil.org



RCC Roadway Projects Overview

Andy Johnson, PhD, PE (SC)

Pavement Design Engineer

Southeast Cement Promotion Association

June 15, 2021

IOWA STATE UNIVERSITY
Institute for Transportation



National Concrete Pavement
Technology Center

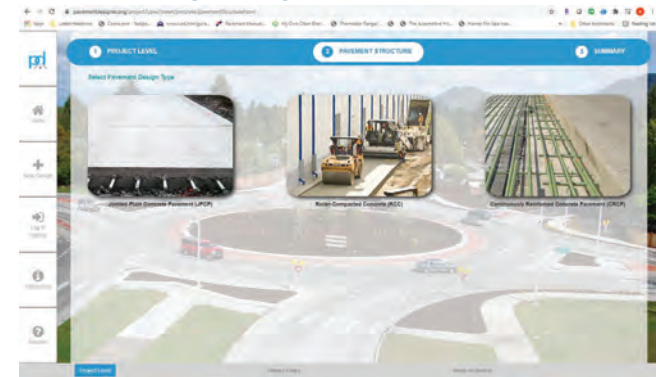


Why use RCC?

- Economical - Compared to conventional PCC, RCC can be cheaper due to reduced labor costs. Price can approach or beat the initial cost of heavy-duty asphalt in sufficient quantities.
- Fast – Entire pavement can be placed at once, can open to traffic very early.
- Durable – Can last decades with little maintenance.
- White Pavement Benefits – No heat island, reduced lighting

How do I design RCC?

- www.pavementdesigner.org



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How do I design RCC?

- www.pavementdesigner.org



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RCC Roadway Projects

Powell Pond Rd., Aiken, SC - 2002

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US-78, Richland Avenue, Aiken, SC - 2009



2009



US-78, Richland Avenue, Aiken, SC - 2019



SCDOT since 2009

- SCDOT has let over 30 RCC projects containing approximately 750,000 sy of RCC.
- Since 2010, SCDOT has overlaid RCC projects with asphalt for aesthetic reasons.
- Given advancements in RCC mix design, this policy is being revisited.

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45th Street Reconstruction, Bel Aire, KS - 2012

15

45th Street Reconstruction, Bel Aire, KS - 2012



16

45th Street Reconstruction, Bel Aire, KS - 2012



45th Street Reconstruction, Bel Aire, KS – July 2019



Grand San Jacinto Development, Cleveland, TX - 2015

19

Grand San Jacinto Development, Cleveland, TX - 2018



Grand San Jacinto Development, Cleveland, TX - 2018



Grand San Jacinto Development, Cleveland, TX - 2018



22

I-85 Exit 111, Archdale, NC - 2018

23

I-85 Exit 111, Archdale, NC - 2016



I-85 Exit 111, Archdale, NC - 2018



25

Hercules Way, Greenville, SC - 2021

Hercules Way, Greenville, SC, September 2020



Hercules Way, Greenville, SC, May 2021



Hercules Way, Greenville, SC, May 2021



Hercules Way, Greenville, SC, May 2021



Black Creek, Chattanooga, TN – June 2021

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Black Creek, Chattanooga, TN – June 2021



Black Creek, Chattanooga, TN – June 2021



City of Chattanooga Multi-Use Path, May 2021



Conclusions

- RCC is a proven, durable, economical pavement type for a wide variety of facilities from neighborhood streets to primary arterial highways.
- RCC can be designed like undoweled plain jointed conventional PCC.
- The aesthetics can be excellent where needed.

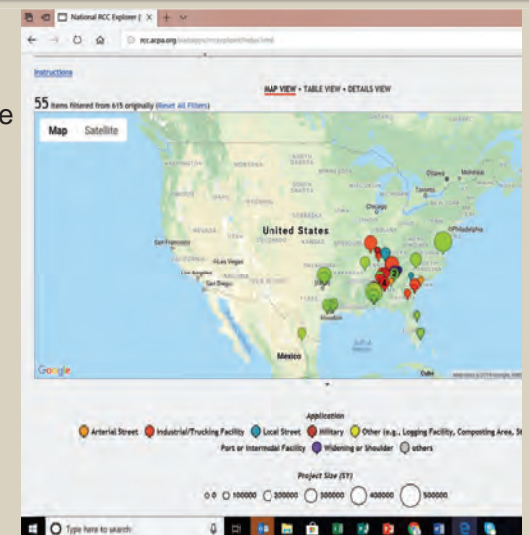
Thank You!

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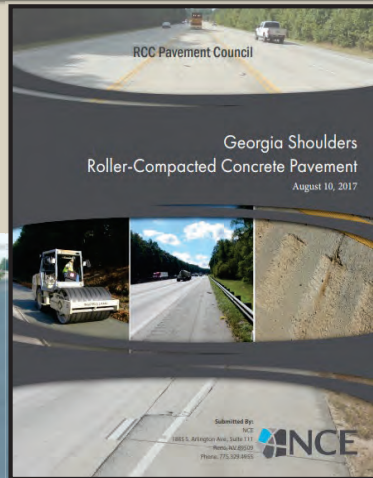
Who & Where? Introduction to AG Peltz Group, LLC

- Started in RCC in 1999
- Managing partner very active in the field
- Most of key employees have 10+ years RCC experience
- Based in Birmingham, AL – less than 20% of work in Alabama
- Over 9M Square Yards of RCC Placed
 - Manufacturing, Distribution, Port & Intermodal, Dam, Roadways, Military





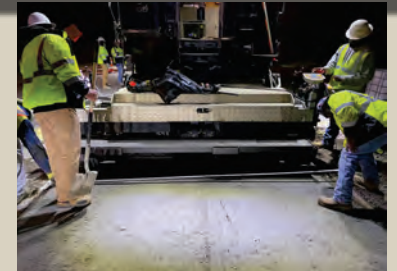
Background: GDOT I-285: Life Cycle Pavement Distress Review



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

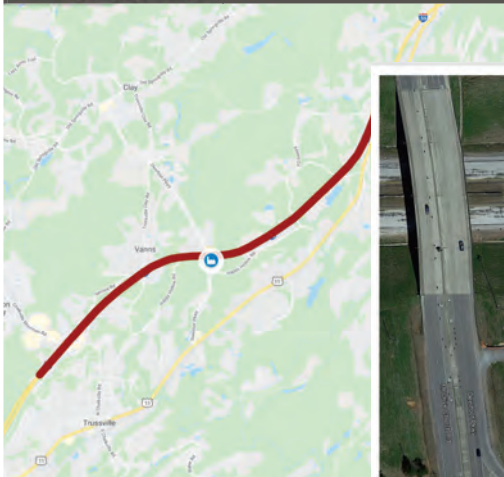


Additional Details

- 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.



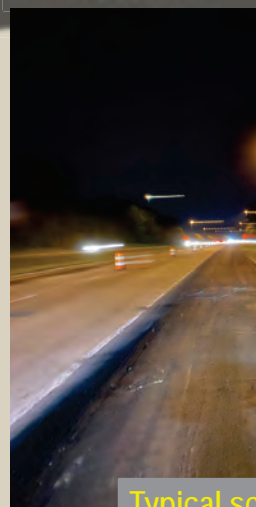
I-59 Shoulder & Ramp Replacement Birmingham, AL



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



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)



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.



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.



Questions and Contact Information

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