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Five years ago, traveling the stretch of I-85 north of Henderson, North Carolina to and from Virginia, was less than ideal. The original concrete pavement, constructed in the early 1960s, was clearly showing its age. Original design standards called for thirty feet joint spacing and did not include steel dowels to provide load transfer across the joints. Over the years, increased truck traffic caused joint faulting and pavement cracks requiring the North Carolina Department of Transportation (NCDOT) crews to remove and patch sections of the roadway.

In late 2013, a project site visit and a one-day workshop were coordinated with NCDOT engineering staff as part of the “Concrete Overlay Technical Assistance Program” offered by the Federal Highway Administration (FHWA) and the National Concrete Pavement Technology Center (CP Tech Center). A report was prepared with recommendations based upon site observations and discussions with engineers experienced with concrete overlays from across the country. One of the key cost-saving recommendations was to leave the existing asphalt repairs in place, prior to placement of the asphalt wedge and drainage layers. This change in scope saved millions of dollars.

By March 2015, a $137-million “rehabilitation” project was bid by the NCDOT calling for a new unbonded concrete pavement overlay, built to current interstate standards, as well as improvements to vertical clearances under several bridges along the corridor. McCarthy Improvement Company, the paving subcontractor, batched the concrete on-site for the 661,877 square yard project—making it one of the largest unbonded concrete overlay projects in the southeast. The 10-inch unbonded concrete overlay was placed on top of an asphalt interlayer. Dowel baskets were placed at 15-feet intervals to help transfer loads between the slabs and protect against future faulting.

Beginning in late 2015, construction was phased by first constructing the southbound shoulder widening to permit head-to-head traffic flow, separated by a temporary barrier wall, as the northbound lanes underwent closure and construction. Upon completion of the northbound lanes, the southbound traffic was then diverted via a crossover to the new lanes, permitting southbound lane closure and construction. This process was repeated for different sections along the entire length of the twenty-mile project.

The project was initially expected to conclude by late 2020. However, two years into its construction, the NCDOT granted additional funds to the prime contractor, S.T. Wooten, to accelerate the construction and open all lanes earlier by incorporating off-season paving. McCarthy Improvement’s Project Manager Kevin Crusa said, “Due to good weather in 2017, we were able to pave 321,148 square yards, thus the entire 20 miles of southbound lanes.” The accelerated schedule enabled four more of the projects eight phases to be completed in 2017. The remaining two phases will be completed by November 2018, just in time for the holiday season!
Over the last decade, truck traffic has increased steadily. This section of I-85 currently carries nearly 40,000 vehicles per day (VPD), 23% consisting of trucks (9,200 VPD). According to *Freight Management and Operations*, freight truck traffic is expected to increase by another 40% in the next 30 years … bringing I-85’s average truck traffic to over 12,800 trucks per day. Unlike 4,000 pound cars that do little damage to roadways, trucks can weigh up to 80,000 pounds, and can quickly stress road surfaces, especially asphalt.

“Concrete pavements are designed to carry the increased truck loads. It’s not uncommon to see concrete pavements last up to 30 years before requiring preservation treatments. In comparison, interstates constructed of asphalt typically last only 8-10 years before needing a surface makeover,” said Greg Dean, Executive Director of the Carolinas Concrete Paving Association (CCPA).

If this 20-mile interstate had been re-built or overlaid with asphalt, future milling and resurfacing contracts would have been required. Not only resulting in higher repair costs over the life-cycle, but the additional work zones with lane restrictions would also create traffic back-ups that can result in increased accidents.

Rigid concrete pavements do not deform under the intense loading of tractor-trailer trucks, and last much longer than asphalt before requiring preservation treatments. Once the section of I-85 leading into Virginia is complete, travelers and truckers will enjoy twenty more miles of new interstate, maintaining North Carolina’s nickname “The Good Roads State” for many years to come!

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Bid Date: March 17, 2015  
Number of Bidders: 7  
Project Low Bid Cost: $137,353,711.23  
% Below Engineer’s Est.: 9.2%  
PCCP Units (Costs): 661,877 SY ($30.4M)  
Asphalt Units (Costs): 687,900 tons ($41.4M)
Concrete pavement performing well after 28 years

Most citizens seldom think of the need for a well-maintained highway system. North Carolina spends hundreds of millions of dollars each year just to maintain the existing infrastructure—the second largest highway system in the United States—nearly 80,000 miles.

One 16-mile section of concrete pavement on Interstate 40, about 30 miles east of Raleigh, will be receiving its first attention since it opened in 1990. YES, that is 28 YEARS AGO, and YES, pavements can actually last this long. Even better, pavement preservation treatments, like joint resealing, full and partial-depth repairs and diamond grinding, can be applied to old pavement so they perform like new again. Old pavements do not have to be disposed of, recycled, or covered with new layers. Instead, concrete pavements can receive PRESERVATION TREATMENTS that provide added years of continued service.

The I-40 Johnston County project will entail 525,000 square yards of diamond grinding, a process that improves the surface of the pavement for a smoother ride. Penhall Company was the low bidder for the $10.2M project. The project also entails joint repair and resealing (823,400 linear feet) to ensure minimization of water infiltration into the pavement base layers.

So, what is so amazing about this project? The actual travel lanes will require only a minimum number of repairs—far less than the typical patching amount needed for a pavement of this age. Because this section of pavement connects I-95 with the Raleigh metro area, traffic growth has increased significantly in recent years. The pavement today carries about 40,000 vehicles (2,500 trucks) daily.

This will be the first time in 28 years that the traveling public will see orange construction barrels or closed traffic lanes in this area. Only concrete pavement can offer this kind of long-life pavement and minimal amount of disruptions over its first 30 years.

Why is that important? According to a recent survey, 54% of contractors report vehicle crashes at construction sites within the past year. The Associated General Contractors' survey stated work zone crashes present significant risk for construction workers. Twenty-five percent of work zone crashes injure construction workers, and 3% of those crashes result in worker fatalities.

Concrete pavements can be designed to last a long time with minimum repairs. When you compare concrete pavements to the asphalt pavements east of this project between Wilmington, NC and I-95, many of those asphalt pavements have been resurfaced at least once and some sections are now being resurfaced a second time. Furthermore, when reviewing the resurfacing costs of asphalt interstate projects compared to the preservation treatment costs of concrete pavements, they are often 50% more and sometimes double the cost. In the review of contract documents, it's not unusual to see asphalt mill depths of 2 inches or more along interstate corridors. This means more asphalt material to be hauled away, more repair costs for the state and potential work zone crashes that may result in unnecessary injuries.

By:
Greg Dean, Executive Director
Carolinas Concrete Paving Association
Recycled Concrete Used for Shoulder Paving on Interstate 16 Near Dublin, Georgia

Halfway between Macon and Savannah, Georgia, lies just under 30 miles of concrete pavement near Dublin that was rehabilitated with new 491,747 SY of 11” thick mainline concrete paving and 626,000 SY of shoulder paving. The project also involved 1,188,466 SY of cement-treated base (CTB) and a pavement interlayer fabric between the CTB and concrete pavement.

The project was initially bid in October 2012 with roller-compact concrete (RCC) shoulders. However, the awarded contractor McCarthy Improvement Company (in 2012 dba APAC Ballenger) proposed changing the shoulders to Portland Cement Concrete Pavement (PCCP) and for the first time in Georgia, the “PCCP shoulder specifications” were modified to allow the use of recycled concrete as the aggregate in the PCCP shoulder. The PCCP shoulders averaged 4,800 psi strength at 28 days and were transverse jointed and sealed every 15 feet.

CTB combined with a fabric interlayer was used for the first time on an interstate in Georgia. The Georgia Department of Transportation (GDOT) chose CTB with cement because they wanted a strong base, but they still wanted a separator between the CTB and concrete pavement. The CTB was installed following a similar method used for FullDepth Reclamation (FDR). Cement was spread on the existing soil base, which included macadam, and then hydrated and mixed together with a reclaiming machine and then compacted with a roller.

“The first phase of the project required rehabilitating the inside high speed lane followed by diamond grinding the surface. Then we replaced the existing inside 4’ asphalt shoulder with a 10’ wide recycled concrete shoulder on top of the CTB. The CTB design, which was supposed to be 8” thick with 55 lbs of cement per square yard using standard methods, had to be changed due to existing base problems underneath. The GDOT materials lab changed the CTB design to 12” deep with 65 lbs per square yard,” said McCarthy Improvement Company Project Manager Kevin Crusa. “The outside 9’ shoulder was replaced following the standard method. All paving was completed in January of 2016. Also due to tight work areas, this paving had to be done using a “stringless” Topcon system where we locked into the pavement next to it and ran cross slope based on a robot, not a full GPS system. We had a cable barrier in the way on the inside shoulder and the sides of the paver legs were over the cable on the shoulder.”

This project was uniquely innovative for paving the shoulders with concrete pavement with recycled concrete under a very tight schedule and high traffic area.

By:
Michael J. Boyle
Chief Estimator
McCarthy Improvement Company
and
Steve Davis, MPA
Executive Director
Georgia Concrete Paving Association
The Governors Club, a gated private golf club community located in Chapel Hill, North Carolina, is well recognized for its amenities and often praised for its beautiful lifestyle. So when the time came to address the community’s aging streets, the Governors Club infrastructure committee turned to concrete. Phase One, completed in 2013, included the pavements at the community’s entrance. It involved complete removal of the distressed pavement, subgrade stabilization with cement, and then paving with 7 inches of concrete. The process worked well and resulted in the durable pavement that the community desired, but Roy Thornton, volunteer project manager, wondered if this construction method was the best way to move forward with future (street replacement) phases.

After conducting online searches and reviewing numerous publications, Thornton reached out to the Concrete Pavement Technology Center (CPTC) at Iowa State University to further his knowledge of pavements. He also consulted with our regional industry organizations, the Carolinas Concrete Paving Association (CCPA) and the Southeast Cement Promotion Association (SCPA), to discuss his options. The more information that was presented to him, the more he considered a concrete overlay as the best option for the next phase. Similar to the first phase, the committee wanted an aesthetically pleasing, long-life pavement. Along with the need to address some drainage issues that compromised the life of the original pavement structure in certain areas, Thornton also desired a pavement design that could be reopened to traffic fairly quickly minimizing the inconvenience to the homeowners and service industries who visit the community daily.

After careful thought about options, Thornton and the Governors Club consultant, Philip Post and Associates, chose a 7-inch concrete overlay to expedite construction. A replacement strategy with concrete overlays minimized exposing the subgrade to weather elements, thus minimizing the likelihood for construction delays. Over 24,000 Square Yards (SY) of pavement area were overlaid during this project. Another 1,000 SY of reconstructed pavement was needed for transition areas to tie into the existing pavement with the new overlay. The new, 4500-psi compressive strength pavement had a 12-foot joint design to help ensure drying shrinkage cracking occurred at the dowelled joints. One of the more innovative aspects of the project was a non-woven geotextile interlayer fabric material separating the old underlying pavement from the overlay. Thornton again used his resources to confirm the fabric material would perform comparably to other separation materials (e.g. asphalt). This decision not only saved money and construction time, but also reduced the final pavement surface grade by nearly an inch.

The project was bid in the summer of 2015 and after reviewing the submitted proposals, the Governors Club chose Granite Contracting, LLC, Cornelius, North Carolina to perform the required work. The contractor used fixed metal forms and a truss screed to place the concrete pavement. Careful staging
of the work enabled the Jack Nicklaus designed golf course and Governors Club Clubhouse to remain open for the community residents and guests. Daily communications on the neighborhood chat boards kept residents apprised of closures and available detours.

The contractor worked closely with Thornton and the residents to ensure the streets were opened in time for planned neighborhood social events. Where required, halfwidth paving techniques and high-early strength concrete mixes were utilized to help maintain traffic. One of the streets had 18% grades, so that too was unique, as it presented challenges in comparison to prior projects that Granite Contracting had completed.

Complex projects require the formation of close partnerships between the owner and contractor for success. Thornton summarized the project's success by stating, “From day one when the project team reviewed the bid response for mutual understanding, all the way through construction, and until the final day of completing the punch list items, there was never a question about the alignment of objectives: Best value and a superior product...Our community received both.”

What is an Unbonded Overlay  The purpose of an unbonded overlay is to restore structural capacity to an existing pavement that is moderately to significantly deteriorated. The term “unbonded” simply means that a bonding between the overlay and the underlying pavement is not needed to achieve the desired performance (ACPA Publication TB021.03P Guide to Concrete Overlays: Sustainable Solutions for Resurfacing and Rehabilitating Existing Pavements, 3rd Edition).
The residents of northeast Richland County now have a smooth, easy ride that is expected to be maintenance free for decades to come.

Interstate 20 in Richland County, South Carolina, east of Columbia between I-77 and Spears Creek Church Road, was constructed with plain jointed concrete pavement in 1965. When this 12-mile stretch of road was first built, the east side of Columbia was rural and undeveloped. Over the next 50 years, pine forests and farmland were turned into a highly developed residential and commercial area. Traffic on the formerly rural section of highway ballooned to over 60,000 vehicles per day.

The original 9-inch thick concrete was built on a sand-clay base and had a 20-foot joint spacing without dowels. Despite a design that is considered obsolete for interstate traffic by current standards, the pavement performed exceptionally well. The highway required only a single patch, grind, and reseal project in mid 1990s. But by 2012, congestion made widening the highway a priority.

The simple addition of a third lane in each direction was considered, but the geometry of the existing pavement was outdated and significant changes were needed to bring the road to current standards.

The South Carolina Department of Transportation (SCDOT) chose to remove and reconstruct the existing pavement while simultaneously adding a new lane. Concrete was selected for the project due to its long-life and minimal disruption to traffic for repairs over the next 40 years.

Zachry Construction Corporation was selected the general contractor. The project was expected to last 36 months, but changes to the staging plan allowed the paving to be substantially completed nearly one year ahead of schedule. Pavement removal and replacement was conducted under regular traffic conditions. Two lanes in each direction were maintained during daytime hours. Figure 1 shows how traffic was configured during construction. Medians split traffic and crossovers allowed for entering and exiting traffic.

Figure 1 — Traffic staging during construction

Continued on back
The total low bid for completing the project was $64,378,721. Concrete paving consisted of 304,737 square yards of 12-inch thick mainline paving at $30 per square yard, and 110,699 square yards of full-depth concrete shoulders at $22 per square yard. In addition, 67,333 square yards of fast-track concrete paving was done at night and off-peak times around the two interchanges for $32 per square yard.

Another significant element of the project was the widening of two overpass bridges at Alpine Road to accommodate additional lanes. The existing concrete pavement was removed and taken to a nearby location to be crushed, screened, and sold as graded aggregate base, as permitted by SCDOT specifications. The removed concrete and steel was recycled and very little waste was created. The sand-clay subbase was graded and re-compacted.

An 8-inch course of graded aggregate base was constructed for the new lanes. Once prepared, the subbase was overlaid with 2-inches of dense graded asphalt surface to provide an improved, nonerodible base. The original pavement design called for tied concrete shoulders. However, Zachry proposed SCDOT use asphalt shoulders to facilitate construction staging. The concrete compressive strength required for acceptance increased from 4,000 psi to 5,200 psi to adjust for the edge support loss. Finally, the new surface was diamond-ground to provide the smoothest, quietest surface possible. The cost of the grinding was $2.04 per square yard.

The project was substantially completed on February 11, 2015, approximately 28 months after it began.
Since 2008, the West Virginia Department of Highways (WVDOH) has bid six projects on Corridor H between Moorefield and Davis, as alternate design alternate bid (ADAB) projects. All six of these projects went concrete instead of the asphalt alternative and collectively saved the Department more than $13 million compared to the low asphalt bids. Once all these projects are completed, there will be more than 45 miles of new concrete 4-lane divided highway between Moorefield and Davis.

“Instead of one material being chosen ahead of time, the market determines what material will be used,” said Darrell Allen, former deputy state highway engineer of WVDOH. “ADAB is more economical and we plan to continue to use it.”

The Mid-Atlantic Chapter of the American Concrete Pavement Association (ACPA) was instrumental in the implementation of ADAB with the WVDOH.

The first Corridor H project was 10.6 miles long and used 473,000 square yards of concrete (39,400 tons of cement). Located near Moorefield, West Virginia, it was the first formal ADAB in the state. The second project was 3.3 miles with 147,000 square yards of concrete (12,300 tons of cement). The third project was 5.1 miles with 228,000 square yards of concrete (19,000 tons of cement). The fourth project was six miles with 268,000 square yards of concrete (23,300 tons of cement). The fifth project was 11.8 miles with 526,000 square yards of concrete (43,800 tons of cement).

The sixth and most recent Corridor H project stretches from Scherr to Bismarck, West Virginia, and was let by the WVDOH in 2013. The project includes 8.5 miles of new 4-lane divided highway, which consists of 10-inch plain-jointed concrete pavements with 15-foot joint spacing and tied concrete shoulders (380,000 square yards of concrete and 32,000 tons of cement). Golden Triangle Construction Company, Inc., of Imperial, Pennsylvania, an ACPA member, received the 2015 West Virginia Contractor’s Association/West Virginia Division of Highways Concrete Quality Award for their work on this project.

Golden Triangle began work on the sixth project on July 26, 2013, and completed it in November 2014. The contract included a unique interim completion date that required one lane of traffic to be open to traffic in each direction by October 28, 2013. Golden Triangle met this requirement with not just one but two lanes of traffic open in each direction by October 28. This was a particularly impressive feat given the extreme weather conditions and terrain in this part of the state. Rainfall is typically 20 percent higher in the project area, and temperatures are about six degrees colder than in the rest of the state.

Additionally, the typical slope of the mainline paving in this mountainous terrain is much greater than usually encountered, reaching six percent in many areas.

The contractor used stringless technology for the grading all the way through the placement of the pavement. The paver used a dowel bar inserter to place the dowels and it also incorporated the use of a real-time profiler to allow the crew to monitor the smoothness in the plastic state. All this resulted in a smooth, high quality, award winning project.
Sitting at the junction of one north-south freight corridor (I-65) and two east-west corridors (I-40 & I-24), Nashville, Tennessee, is a center for the transportation of goods and services. This ideal location plays an important role in the city and state economies. Although Interstate 65 was originally built using concrete pavement, it since has been resurfaced with asphalt numerous times. Two previous contracts addressed the reconstruction and widening of Interstate 65 north of Briley Parkway. Concrete soundwalls, concrete bridges, and new jointed plain concrete pavement were key improvements to the road in these two projects.

In 2012, the Tennessee Department of Transportation (TDOT) awarded the third project along this corridor to widen and reconstruct with concrete pavement to Rogers Group, Inc. who submitted the low bid just below the engineer’s estimate on the $50.7M contract. ACPA-SE member, APAC-TN-Memphis, was hired to perform the concrete paving work, which began in 2014. Current annual average daily traffic levels exceed 140,000 vehicles, requiring project teams to address the challenges of constructing the concrete pavement under traffic.

TDOT incorporated an evaluation of two-lift concrete pavement on a section of this project. This method utilizes wet-on-wet construction techniques that allow for use of surface aggregates with improved physical characteristics, use of recycled aggregates in the lower lift, or other combinations of materials which might improve pavement performance and economy. According to TDOT Materials and Tests Division Director Brian Egan, PE, the department received assistance from the Federal Highway Administration’s (FHWA) Strategic Highway Research Program 2 (SHRP2) Implementation Assistance Program.

Tennessee agreed to become a lead adopter state in Round 4 under the category R21 for New Composite Pavement Systems. This mechanism provided the funding to evaluate wet-on-wet concrete pavement on an existing project in order to evaluate constructability and compare costs of polish-resistant aggregate in full-depth concrete versus a composite pavement with resistant aggregate only in the top portion of the pavement. APAC-TN and Irving Materials, Inc. (IMI) coordinated to assure timely delivery and placement of concrete mixtures for both the lower and upper lifts. IMI furnished concrete pavement from its nearby central mix plant utilizing dump trucks for delivery of the lower-lift mix and truck mixers for delivery and placement of the upper lift mix.

In the fall of 2014, FHWA’s Mobile Concrete Laboratory visited the jobsite for testing and evaluation of the two-lift concrete paving process, materials, and finished product. In addition to the tests typically performed for concrete pavements, the mobile lab performed the following tests on the concrete: air void analyzer, super air meter, calorimetry, surface resistivity, and coefficient of thermal expansion. Additionally, the mobile laboratory located load transfer dowels and determined concrete pavement thickness using magnetic tomography technology. The FHWA followed the field implementation work with a two-day workshop for TDOT and industry to highlight field observations, best practices, and lessons learned from the two-lift concrete pavement demonstration.

The results of the project are best summarized in a quote from Jamie Waller, PE, TDOT materials and tests manager for aggregate, concrete, & soils, “...after reviewing the data it appeared that the composite section was successful. TDOT will be reviewing some of these testing measures and equipment to possibly include in our program for the future.”
To foster innovation and accelerate construction, North Carolina Department of Transportation (NCDOT) took steps to coordinate construction work on three separate concrete pavement projects that will complete the I-485 Outer Loop and widen I-85 near Concord, North Carolina, and northeast of Charlotte.

NCDOT utilized the design-build method to integrate the projects, all of which were awarded as concrete pavements. Two of the projects were completed in 2014; the third project, completing the last loop section of I-485, will open in the spring of 2015.

The first project involves the construction of a new 8-lane section of I-485 from west of N.C. 115 (Old Statesville Road) to west of I-85. NCDOT awarded the project in May 2010 as a 13-inch concrete pavement, using nearly 496,500 square yards of concrete pavement (42,000 tons of cement). This 5.7-mile section links I-77 to I-85. ACPA-SE member McCarthy Improvement Company, formerly Ballenger Paving Company, is completing the concrete paving for this project (photo 1).

McCarthy Improvement located their on-site batch plant in the median of the project to expedite transportation of the concrete paving mix to the paving spread equipment (photo 2).

The second project involves the widening and reconstruction of approximately seven miles of I-85 from four to eight lanes. The project stretches from south of Bruton Smith Boulevard/Concord Mills Boulevard to north of N.C. 73 in Cabarrus County. Awarded in July 2010, the job entailed a 14-inch concrete pavement that used 448,500 square yards of concrete pavement (41,000 tons of cement). The project also includes improvements to roads around the interchange. ACPA-SE member Lane Construction was part of the design-build team and completed the concrete paving in 2014. Mike Holder, NCDOT chief engineer, noted the excellent ride quality of this finished roadway during the NCDOT/Industry Rigid Pavement Committee meeting. Once the Charlotte Outer Loop is completed, this will help the already heavily traveled I-85 accommodate additional traffic.

The third project involves the re-construction of the I-85/I-485 interchange to a “turbine interchange” (photo 3). A turbine interchange utilizes smaller, single-span bridges, smaller columns and flatter roadway profiles, thus resulted in significant project savings. It is the first time North Carolina has installed this type of interchange. The turbine interchange design minimized traffic impact during the construction phase. Awarded in October 2010, Lane Construction was part of the design-build team and completed the concrete paving in 2014. It used 196,000 square yards of concrete pavement (16,600 tons of cement). The entire project utilized diamond grinding to enhance the final riding surface. One ramp of the interchange was selected to demonstrate ACPA’s “Next Generation Concrete Surface” to further enhance the pavement texture and produce the quietest ride possible.

These three projects have a combined value of more than $350M. They contain in excess of 1.1M square yards of concrete paving and will consume nearly 100,000 tons of cement within the pavement items only.
Maryland Route 210 is a busy corridor that feeds the Washington D.C. beltway. With heavy commercial and private traffic on this 1.43 mile long, 3-lane roadway between Farmington Road and Maryland Route 373, a durable pavement solution was needed that did not require constant, delay-causing repair and maintenance. To minimize construction delays and maximize project life, the Maryland State Highway Administration (SHA) chose a concrete overlay (whitetopping) to address the corridor’s current and future needs.

According to SHA’s press release prior to construction, “Whitetopping is a concrete overlay that will address recurring rutting issues caused by heavy volumes of traffic. It can provide a longer service life and reduce traffic impacts for maintenance.” One of the most significant benefits of using whitetopping is that it actually extends the lifespan of the pavement by 20-30 years while virtually eliminating the need for resurfacing and other maintenance.

Maryland had already worked with concrete overlays on Maryland Route 3, Cronson Boulevard Intersection in Anne Arundel County, Maryland Route 355 and Route 27 in Montgomery County, and a truck climbing lane on I-68 in Garrett County. With Route 210’s completion in summer 2015, it is the largest of the 10 whitetoppings (1.43 miles or 40,269 square yards) completed so far with an even larger one planned for 2016.

The American Concrete Pavement Association (ACPA) Mid-Atlantic Chapter worked closely with SHA, especially District 3, in the selection, design, and construction of the concrete overlay. The project presented the most significant traffic management and constructability issues to date in Maryland.

The pavement was designed as a bonded overlay 6 inches thick. Four inches of the existing asphalt pavement was milled off to accommodate the overlay. The concrete overlay was sawcut into 6-by-6 foot panels.

To ensure that at least two lanes of traffic remained open throughout the process, the SHA made use of the shoulders for daily traffic. Cones, barrels, concrete barrier walls, and portable variable message signs guided motorists through the work zone. All three lanes and both shoulders were overlaid in one month. For a smooth surface and a quiet ride, the finished product was then diamond ground.
Interstate 75 in Dooley County, Georgia was originally constructed in 1961 as a four-lane concrete roadway; two additional lanes were added in the 1990s. After 53 years of service with high traffic volume, improvements were needed to replace the original four lanes and widen the outside shoulders.

“This is an exciting project for our industry both from a contractor and supplier perspective. Replacing 50-plus years old concrete highlights the value of concrete and should be a shining example why longer lasting pavements are both economical and feasibly superior,” said Steve Davis, executive director of Georgia Concrete Paving Association.

This project, awarded to McCarthy Improvement Company (MCI), was designed to replace an 11.6 mile section of the original four lanes of roadway (10-inch concrete on a 12-inch base) with new lanes (12-inch concrete on 12-inch base), as well as widening the 10-foot inside and outside shoulders. A single batch plant was used for the 200,000 cubic yards of concrete; cement (55,000 tons) was provided by Argos USA. The mainline full-width paving (25 feet) was performed while using an eight-inch narrow track for the southbound lanes, which was only separated from the barrier wall by 12 inches.

The construction was performed under excessive traffic conditions with more than 53,000 vehicles a day. Thirty percent of that was truck traffic. The National Highway System (NHS) estimates that by 2030, traffic on this section of I-75 will increase to more than 80,000 vehicles a day. Therefore, these improvements will enhance the national traffic ratings from “D” level service to a “B” level.

Maureen Bush, project manager for McCarthy Improvement Company, stated, “This project certainly had its challenges dealing with the close proximity of traffic at high rates of speed, but I think it is a testament of our employees’ professionalism and determination. In addition to the traffic, we faced very wet conditions and our crews did an excellent job keeping the project moving forward. This project will certainly serve the area well for another 50 years.”

By: Steve Davis
Executive Director
Georgia Concrete Paving Association
For over a year, Project Manager Andrew Smith of Robert Smith Inc. of Chattanooga, Tennessee had been discussing Roller-Compacted Concrete (RCC) with Alley-Cassety Brick & Block in Murfreesboro, Tennessee. Alley-Cassety was looking for a cost-effective solution to replace the pavement in its brick lay down yard and parking lot around sales office. They had originally considered using asphalt but preferred concrete to achieve a longer-lasting solution. Andrew Smith recommended RCC because it offered similar strength as conventional concrete (approximately 4,000 PSI), a quicker turnaround, and 10% lower in cost than asphalt. As a result, Alley-Cassety contracted with Robert Smith Inc. to install RCC for its pavement project.

The 3,000 square yard project started in late March 2017 with removing approximately 4,000 tons of existing material to achieve 1-1.67% grades. “A grade of 0.75% was needed around the office area in order to address a drainage issue. This typically would not be done in RCC due to the technicality of slope and “cut up” areas but Robert Smith Inc. is not your typical RCC contractor either,” said Smith. Robert Smith’s team did a large amount of intricate work on the site which showed its true talent as an RCC paving operation.

IMI Ready Mix supplied the RCC material for the project from its central mix plant three exits up from the Alley-Cassety site. IMI did a fantastic job of handling the production with on-time deliveries as well as maintaining a consistent mix. The project completed on May 7, 2017, but would have been completed weeks earlier had the constant rain not been a factor. In October 2017, Alley-Cassety decided to do another 5,000 square yards. Weather wasn’t a factor this time so the second phase was finished in under 2 weeks.

“Alley-Cassety was a great client, because they were patient in working around us while we worked around them too. They are ecstatic to have a solid durable surface for all their trucks and forklifts to run on now,” said Smith.

Conveniently located nearby in Murfreesboro is the Concrete Industry Management (CIM) program at Middle Tennessee State University (MTSU). The CIM program is a Bachelor of Science degree program that provides students opportunities to enter a broad field that has an urgent need for skilled professionals. MTSU is the first university to integrate a technical education in concrete with business and communication skills needed to advance in the industry. With over 875 alumni working various jobs within the concrete construction industry, the program has gained in popularity among students as well as the industry as a whole. For every graduating senior, there are close to eight jobs available. Oddly enough, Murfreesboro has had every other type of concrete installed somewhere in the city except for RCC. So when Alley-Cassety decided to use RCC for its yard and parking lot, it filled that missing link for the CIM program’s concrete application site visits.

Several city and local engineers as well as some students from the CIM program were able to visit the project and learn about RCC. Actually seeing this process really puts it into perspective as to how quickly this application can be constructed. Alley-Cassety was very impressed with RCC and mentioned using it to complete the rest of the yard at a later date.
Caterpillar Uses New Paving Technology at its Athens, Georgia Manufacturing Facility

In Athens, Georgia, it is all about building and maintaining excellence in academic and athletic programs that compete with the best the Southeastern Conference (SEC) and the world has to offer. In bringing some “bark” to its business by coming to the Athens area, Caterpillar has created a world-class manufacturing facility that is second to none. The recently completed facility manufactures D-3, D-4, and D-5 Dozers and Hydraulic Mini Excavators. This world-renowned manufacturer of innovative, durable, and high-quality construction equipment decided to extend these qualities to its paving. To further its achievement of quality, innovation, and excellence, Caterpillar chose to enhance its equipment staging area with a tough, economical new generation of Roller Compacted Concrete (RCC) – Compacted Concrete Pavement (CCP).

**Compacted Concrete Pavement – RCC Benefits with Traditional Concrete Appearance**

CCP is a new generation of RCC that has all of the outstanding benefits of RCC but with the appearance of traditional concrete. This is achieved with the ACEiT admixture system developed by Andale Construction of Wichita, Kansas.

“I have worked with RCC for years and it’s a great material,” said Vice President of Andale Construction Matt Munsick. “But, getting a good surface texture is very tricky. Small variations in moisture content can create big variation in surface appearance. With the ACEiT admixtures, we can control this and achieve a consistent, uniform texture.”

The finish on regular RCC comes from being rolled. However, CCP is smoothed with a power trowel and then given a broomed finish, providing the smooth, handsome appearance of traditional cast-in-place Portland Cement Concrete. Additionally, the ACEiT admixture facilitates compaction, virtually eliminating the need for rolling; the CCP comes out of the high-density paver at 95 percent modified Proctor density or greater. In addition to improving the ride, the elimination of rolling reduces the cost of CCP, making it competitive with other paving alternatives in first cost and superior in long-term costs.

**CCP Can Take Harsh Loadings**

The new storage and parking area required the placement of 34,000 square yards of heavy-duty pavement capable of withstanding the rigors of constant traffic of heavy-tracked vehicles, many with steel cleats. To handle this difficult loading, Caterpillar chose 6 inches of CCP over a sturdy base of 8 inches of soil-cement. The CCP was mixed at an onsite portable pug mill and placed in a single lift with a high-density paver by Andale Construction of Wichita Kansas. The soil stabilization with Portland Cement was accomplished by Atlanta Paving and Concrete of Atlanta Georgia. All Portland Cement was provided by Argos USA. The result is a tough new pavement designed to withstand the abuse of tracked vehicles that move along this area.
path each and every day the plant is in operation.

Although CCP is often placed without any rolling, Andale used limited rolling to achieve the best surface texture with the particular local materials. "For some of the project, we used a 4-ton steel wheel roller for a maximum of 2 passes in static mode. The ACEiT admixture kept the mixture sufficiently pliable that no vibratory action was required beyond the paver’s screed," said Munsick. "After we made some minor mix design adjustments, though, no rolling was necessary."

The joints were cut on 15 foot intervals using an early entry saw, both transverse and longitudinal. Sawing began 2 to 3 hours after placement. Despite the prompt sawing, the joints were exceptionally sharp and the curing for the CCP was accomplished using ACEiT Blue curing compound. Because of the characteristic of ACEiT Blue, striping could proceed only two days after placement.

High Early Strength and Rapid Placement is No Problem

This facility needed high early strength in order to put the pavement into service quickly. Compressive strengths for the CCP reached 3500 to 4500 psi in 2 to 3 days. Ultimate 28 day strengths reached 6000 to 7000 psi. This allowed new tracked vehicles to use the CCP within 30 hours of placement, thus avoiding any slow-downs at the assembly facility. Overall, the 34,000 square yards of CCP were placed in 11 days, including several rainy days, while the site was still in use by Caterpillar.

Consider Using a Portland Cement-Based Paving Solution

CCP over soil-cement base is only one of many innovative, durable, and economical Portland Cement-based paving solutions. Whether you are building new pavement or rehabilitating pavement, contact the Southeast Cement Promotion Association and let us show you how you can apply the best paving solution for your next project.
Roller-Compacted Concrete Provides Long-Lasting Durability on Crossgate Road in Port Wentworth, Georgia

The Georgia Department of Transportation (GDOT) has placed thousands of square yards of roller-compacted concrete (RCC) over the past several years, primarily on shoulders of Georgia interstates. In fact a recent nationwide survey by the Portland Cement Association (PCA) showed that Georgia has placed more RCC than any other state transportation department in the country. Last fall, GDOT had the opportunity to bid a local project that was a good candidate for RCC pavement. The use of RCC will increase the structural capacity of the road in order to handle heavy trucks and spur new industrial and commercial development.

In July-August of 2016, A.G. Peltz Group, LLC placed RCC for GDOT on a section of Crossgate Road in Port Wentworth, GA. The roadway was GDOT’s inaugural project to utilize RCC as a final riding surface on a state travel lane.

A.G. Peltz has previously paved RCC for GDOT on interstate shoulders and turns lanes, dating back to 2006.

- I-285 Shoulder Replacement
- State Route 6 RCC Shoulders and Median Construction

This section of Crossgate Road was a two-lane HMA roadway with weight limit restrictions. According to GDOT personnel, replacing the existing HMA with 10 inches of RCC will increase the structural capacity of the roadway, improving its use for heavy truck traffic. According to Georgia Ports Authority (GPA) personnel, there are roughly 325 acres of undeveloped property on the existing roadway. The improved structural capacity of this roadway will spur industrial and commercial development along this corridor, thereby increasing the local tax base.

The project consisted of approximately 16,000 square yards of 10" RCC pavement. The RCC was placed in a single 10-inch lift utilizing a Vogele “Super” 2100 high-density paver and a Blaw Knox MC-30 material transfer device. The material was mixed using an ARAN 280C Mobile Mixing Plant. Coarse aggregate was supplied by Vulcan Materials Macon quarry via its Savannah distribution yard. The majority of the main roadway is 24 feet wide. The RCC was placed in a single pass, requiring the roadway to be shut down and detouring traffic. Since there are active businesses on the roadway, to ensure uninterrupted access, the RCC placement began in the middle of the project limits, which greatly helped with the traffic maintenance. In addition, the rapid strength gain of the RCC (4000 PSI within 2 days) allowed local traffic to get on the pavement within 48 hours. To meet the ride-ability requirement for this state project, the RCC was diamond ground for smoothness.

Utilizing RCC provides both GPA and GDOT a durable concrete pavement with the ability to carry heavy traffic with minimal long-term maintenance expectations. Roller-Compacted Concrete – Durable, Fast, Economical.
When the South Carolina Department of Transportation (SCDOT) built the J.A. Cochran Bypass in an undeveloped area around Chester, South Carolina, in 1974, minimal traffic used this route. Today, the Bypass serves as a major truck route shortcut between I-77 and I-85, in addition to connecting to Chester’s main shopping area. In 2014, the average daily traffic for this location was 15,300, which made it the busiest road in Chester County, outside of I-77. The original asphalt pavement was never designed for this loading and has been overlaid multiple times during the years, to the point the curb was nearly covered (Photo 1). Despite the extra thickness, the pavement cracked through, and became a maintenance issue for the local SCDOT office.

To solve this problem economically and with minimum disruption, the SCDOT turned to roller-compacted concrete (RCC). RCC provided the deep strength necessary to handle future traffic and allowed SCDOT to uncover the filled-in curb and restore its water-carrying capability. During the last seven years, SCDOT has performed more than 600,000 square yards of RCC on over 20 projects throughout the state. Most of these projects utilized RCC for reconstruction in urban areas with highly distressed curb-and-gutter pavement and little tolerance for extended disruption to adjacent businesses. Reconstruction of this particular route began with two earlier RCC projects constructed in 2012 and 2013.

Lane Construction Corporation was the general contractor. The RCC subcontractor was Site-Prep, Inc. of North Carolina. The RCC was produced at Site-Prep’s portable pug mill, which was set up within 15 minutes of the site.

The contract quantity for RCC pavement was 12,500 square yards to be constructed at a depth of eight inches. This project’s complicating factor was a tie-in to an active rail line; the railway elevation had to be met and work within the railroad right-of-way had to be coordinated with the railroad company.

The speed of construction was a key element in this successful RCC project. The entire RCC layer was placed in one operation, avoiding the necessity of constructing multiple lifts and exposing traffic in adjacent lanes to drop off between lanes for an extended time period. Another factor favoring the use of RCC was the ability to place limited traffic on the RCC almost immediately after placement.

Overall, the five-lane, 1,800-foot long project was completed in approximately two weeks. The RCC portion required three days, and the asphalt and various other work took five days. “RCC gives us a tool, among others, for rapidly reconstructing pavement against curb where we can’t raise the pavement elevation,” said SCDOT District 4 District Engineering Administrator John McCarter. “Reconstructing urban pavements with many points of access is always a difficult challenge. The ability to place the RCC base in one lift and then open it to light traffic immediately has benefitted us greatly in our engineering district.”

Continued on back
President of Site-Prep, Inc. of North Carolina John Edwards is sold on the benefits of RCC.

“RCC provides owners a cost-effective full-depth pavement replacement option with minimal impact to the motoring public due to the shorter project duration as compared to conventional pavement replacement options,” he said. He feels RCC is particularly well-suited to urban reconstruction projects. Edwards further stated, “In this particular application, the RCC can be placed to address previous drainage and cross slope issues to improve safety, improve ride ability, and achieve longer-lasting performance of the final riding surface. Due to its strength, RCC allows the owner the ability to utilize an overall thinner pavement section by which utility conflicts and costly utility relocation can be avoided.”

RCC is a proven, durable, and economical solution. RCC provides outstanding value for many types of paving projects.

**Typical Construction Sequence of Roller-Compacted Concrete Pavement**

1. Mill the existing asphalt approximately six inches to a depth of two inches below the original gutter elevation. The preferred pavement cross slope may be reestablished during this operation. During the milling operation, traffic is not exposed to any adjacent lane drop-offs greater than two inches and access to driveways is maintained. All lanes are open at the end of the day with drop-offs of an inch or less, and no overnight lane closures or detours are required (Photo 2).

2. Mill an additional eight inches and immediately replace with eight inches of RCC. This is achieved one 12-foot wide lane at a time (Photos 3-4). On this project, it was elected to mill and replace the median with RCC, but other projects have retained the existing median, depending on pavement conditions. White-pigmented curing compound was applied and pavement joints were cut every 16 feet to one-quarter of the RCC depth using an early entry concrete saw almost immediately after compaction was completed.

3. Although mainline traffic was kept off of the new RCC for 24 hours, traffic was permitted to cross the fresh RCC immediately to allow driveways to remain open, if alternate access was not available (Photo 5-6).

4. Approximately three days after placement, a few short rough spots in the RCC were milled to ensure a good final ride. Grinding is recommended if the RCC is the final riding surface due to the potential for minor joint damages; experience shows milling is acceptable prior to overlay.

5. After RCC was placed on the existing pavement, a two-inch asphalt cap was applied up to the level of the gutter pan for aesthetic purposes.

6. Finally, all driveways were adjusted to tie in to the new, correct pavement elevation, and damaged curb and gutter sections were replaced.

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and

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Roller-compacted concrete (RCC) was specified as the paving material for the new Marion County Regional Institute of Technical Excellence in Kimball, Tennessee. Local RCC paving contractor, Robert Smith, Inc., contacted NRMCA’s member, Sequatchie Concrete Services, to provide RCC for this job. A dry batch operation was the closest Sequatchie plant (six miles away) to this project. This was not a challenge for the Sequatchie operations staff since they have been providing RCC for most of the RCC projects in the Chattanooga, Tennessee area for more than 10 years. Most of their RCC has been produced at their central batch plant in Chattanooga. But, over the years, they have had to produce RCC from some of their smaller dry batch operations. During the last 10 years a lot has been learned from trial and error about making RCC out of a dry-batch operation. But, it can be done. Successfully!

So how was this dry-batch ready mix plant able to provide 300 cubic yards per day of RCC in four hours and only use two to three trucks, mostly two trucks per day, as per Jeff Bleil, operation manager, Sequatchie Concrete Services.

The process utilized is kind of unique, but not new. It was used years ago while providing RCC for a TDOT access road. Most RCC literature states a ramp is needed to elevate the ready mix truck higher than the dump truck (photo 1).

By dumping the RCC onto a concrete paved area (photo 2) and using a front-end loader to load the dump trucks (photo 3), it goes more quickly. Try to get 40 to 50 yards of material on the ground before the first dump truck arrives, enough material to fill five to six dump trucks. The paving contractor used six dump trucks for this job. While the front-end loader is filling the dump trucks, the ready mix trucks are refilling the RCC pile. The material never runs out. In this type of operation, there is always some time between when the last truck is loaded and the first truck returns for more RCC to be added to the pile. Even though the pile might get a little low, there is time to build it back up. With the proper mix, there is little segregation.

The standard RCC mix was used. It consisted of the following materials: 400 lbs Type I/II portland cement, 100 lbs Type F fly ash, 850 lbs of #67 and 850 lbs of #89 coarse aggregate, 1,415 lbs manufactures sand, 350 lbs natural sand and 25 gallons water, along with 4 oz/cwt of a polycarboxylate admixture. (The admixture is used for workability not water reduction).

Since the job was only six miles away and the mean day time temperature was 65-70°F, a retarder was not needed. (RCC is treated just like conventional concrete when it comes to hot and cold weather, retarders in hot weather and accelerators in cold weather.)
Loading and Discharge Sequence:

1. Use Clean, Well Operating Trucks!
   a. RCC is a product that needs to be mixed well

2. Check moistures of coarse and fine aggregates before loading procedures begin.

3. Make adjustments to the mix design weights accordingly

4. Loading:
   a. Make sure barrels are empty of wash-out water and returned concrete
   b. Loading sequence is the same as regular concrete
      i. 80% of design water
      ii. Admixtures
      iii. Dry materials
      iv. Remaining design water (*It is very important that all design water, minus moisture adjustments, is added during loading sequence.*)
   c. Mixing Time: Approximately 1 minute per cubic yard of material. This time may vary depending on truck.
   d. *It is important that roller-compacted concrete is mixed well.*

5. Quantity of load: five to six cubic yards per truck is all a 10 yard capacity truck can handle. Because of the dryness of RCC, if more than this quantity is put into a truck, the material will not mix well and discharging will take longer.

6. Wash out rack: *Light* washing of rear blades and hopper. Care should be taken to not get any water into the RCC mix.

7. RCC moisture check: A small amount should be discharged onto the ground and checked for moisture percentage by using a hand held moisture meter. This should be done by your quality control person, not the truck driver. (*Moisture content of RCC is very important. Too dry or wet is not acceptable.*)

8. Pull to unloading site and start unloading. Moisture should be checked when truck is half unloaded by the same means as in #7. Moisture adjustments can be made if needed.

Why was RCC used on this job?

During the planning stage of this project, the design-build contractor suggested using roller-compacted concrete paving for durability and cost savings. After the contractor took the architect and county officials to see a RCC project placed at a local bus depot, they were sold on RCC. Heidi Hefferlin, of Hefferlin + Kronenberg Architects said that the usage of roller-compacted concrete was the right choice.

Roller-compacted concrete pavement was a winner for everyone involved. The county got a paving product that will last a long time. The local ready mix producer got 1500 cubic yard job, and a local paving contractor also got work. Without a strong promotion effort, this parking lot and entrance/exit lanes would have been asphalt. The real winner was the NRMCA member, Sequatchie Concrete Services.

The bottom line is that high-quality roller-compacted concrete can be produced in a standard dry batch ready mix operation!
In the fourth quarter of 2012, the Georgia Port Authority (GPA) held a bid to expand the capabilities of its Ocean Terminal, located off the banks of the Savannah River in Savannah, Georgia, to provide more storage for the loading and offloading of medium duty cargo at their primary terminal.

Moffat and Nichols, the Port’s engineering firm, approved bidders the option of using roller-compacted concrete (RCC) for the paving material. GPA had been using a hot mix asphalt (HMA) design, consisting of five inches of HMA over a 10-inch base of granular compacted material, for all of its pavements. The engineering caveat was that RCC had to be structurally equivalent to their typical 5/10 HMA design without adding additional cost.

The project consisted of grading, base and paving as well as electrical work to provide lighting for the facility. Phase I provided 48,600 square yards of paving with the provision of adding an additional 30,000 square yards of paving if the budget allowed for it.

The successful low bidder on the project was Morgan Corp., which has a 70-year history of commercial and industrial development. Morgan Corp. started using RCC in projects in 2008 and has successfully completed projects totaling more than one million square yards of RCC in the Southeastern U.S. Some of their projects include the Nuclear Power Generation Plant in Georgia; BMW Automotive; South Carolina Inland Port; and Bridgestone Tire in South Carolina; and Prichard Intermodal in West Virginia.

Morgan Corp. provided value engineered options to GPA engineers that compared GPA’s typical hot mix design to RCC designs based on industry-accepted design methods. Morgan Corp. showed Port engineers that a seven-inch layer of RCC over a nine-inch layer of cement-treated base (CTB) would provide a 33 percent higher strength at an initial cost savings of 19 percent when compared to their typical HMA design. The Port was pleased with the proposal and approved the design for the project. In fact, the budget was approved to proceed with the additional 30,000 square yards as Phase II for the project.

RCC has been widely used in heavy duty paving applications in ports and intermodal facilities across the nation, particularly in the Southeast. RCC’s meteoric growth in those applications has been nothing short of incredible.

Industry leaders continue to seek additional GPA projects where RCC can be utilized to extend service life and reduce maintenance cost at a very competitive initial cost.
In construction, a $500 per minute liquidated damages clause leaves no room for error. ACPA-SE member McCarthy Improvement Company, paired with joint-venture partner C.W. Matthews, approached the Hartsfield- Jackson Atlanta International Airport (HJAIA) Runway 8L-26R Keel Replacement project with extremely detailed preparation.

A 9,000 foot-long Category III arrival runway, 8L-26R handles over 500 domestic, international, and cargo flights to Atlanta every day. Noting an approximate loss of $1.5 million a day for H-JAIA when a significant runway is closed, the design team, Aviation Infrastructure Solutions Joint Venture, and the client allowed only 29 days for the runway and high-speed taxiway portion of the project to be completed.

These 29 days were used to demolish and replace 99,684 square yards of 20-22 inch thick concrete (roughly 60,000 cubic yards of concrete), place 835,444 SY of welded wire fabric, install approximately 45,000 dowels, and do all of this around 520 newly installed light cans, requiring the reinforced concrete to be placed in two lifts. The team came up with an innovative, two-concrete layer installation paving train. It consisted of a modified Gomaco 2600 placer with vibrators and hydraulic controlled gates that would lift up as they approached a pre-set (pre-installed) light can to allow the paver (the placer) to pass without damaging the cans.

The paving train was followed by a welded wire fabric (WWF) cart that placed the fabric, a hydraulic crane for restocking the WWF, a Guntert S850 paving machine, a Gomaco profilograph machine, and finally, a Gomaco T600Texture/Curing machine. This set-up allowed crews to insert the wire mesh and pre-set the runway and taxiway centerline light cans.

This paving train was operated by two teams working in 13-14 hour overlapping shifts. Concurrently, another concrete team paved four other taxiways. Daily, approximately 300 trailers and dump trucks had to be coordinated, escorted, and kept separated, along with the 400-500 people working on this project.

There were unavoidable delays, including Air Force One landing at the airport on the first day of construction, shutting down the airfield for six hours, but ultimately the project was turned over to the owner ahead of the original schedule.

In an email, Norma Click, the City of Atlanta’s project manager, wrote: “I am happy!...It took a tremendous effort and...I appreciate all of the planning you put forth as well as participating in all of the logistics/coordination efforts.” The project will serve the Atlanta hub for years to come.

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1603.2
PCCP and FDR: THE RIGHT COMBO
for Elizabeth City Regional Airport in North Carolina

The Elizabeth City Regional Airport (ECG), located in Pasquotank County, North Carolina, is a joint-use facility with the United States Coast Guard occupying the northern portion of the airport and ECG occupying the southern portion.

The approximate 25,000 square yard asphalt ramp, located adjacent to the airport administration building, was in poor condition. The existing thickness had a high degree of variability due to prior modifications and rehabilitations. Portions of the ramp, used for parking a broad range of aircraft, were prone to ponding of water due to depressions in the pavement. Also, the section of the ramp that accommodated fueling operations did not adequately slope away from the administration building and thus did not meet FAA criteria.

During the preliminary design stage, the engineering consultant, Parrish & Partners, took into account vertical constraints and drainage and developed four (4) viable pavement design options for consideration. All the pavement sections were prepared in accordance with FAA requirements using FAARFIELD software. One of the pavement alternates included a 9” Portland Cement Concrete Pavement (PCCP) over an 8” Full-Depth Reclaimed (FDR) Base Course.

Pearl instant Cement and the Southeast Cement Promotion Association conducted training on the FDR with cement process. The training presented best practices and illustrated other case studies where FDR with cement had provided a homogenous and stronger base for general aviation pavements.

In the report prepared for ECG Airport Authority, four pavement alternates were scored on the following criteria:

1. Pavement longevity
2. Pavement fuel resistance
3. Compatibility with adjacent structures and pavements
4. Ability to withstand grade corrections
5. Cost
6. Environmental sustainability and ability to use recycled materials

Based on the analysis contained within the report and discussion with the North Carolina Department of Transportation (NCDOT)’s Aviation Department and the Airport Manager, the decision to use the combination of FDR for the pavement base and PCCP was made. The combination of PCCP and FDR scored the highest when compared to the other three pavement alternatives and represented the best overall value.

The project was bid in February 2015 and the first phase (slightly less than 1/2 of apron area) got underway in June. Like most projects, a strong project team was required to make adjustments to the original construction plan. The construction team included the general contractor, Barnhill Contracting; the full-depth reclamation contractor, Slurry Pavers; and the concrete paving contractor, McCarthy Improvement Company, who all worked closely with the consultant, Parrish & Partners, and the owner to ensure key schedules were met and operations continued at the airport.

Continued on back
“Due to the project location and limited local aggregate supply, it was apparent that FDR would provide an excellent option to reuse existing materials and provide the added strength of a cement stabilization. This also provided an excellent working platform to support the weight of construction equipment and allow anchoring of reinforcement and dowel baskets,” said Project Manager Tim Gruebel, Parrish and Partners.

After the first phase was opened in September, the construction team moved on to the second phase. Both phases used slipform paving equipment to consolidate the 650 flex concrete mix. The jointing plan, developed according to FAA guidelines, included panel sizes of 12.5 feet by 12 feet.

“Now that the apron rehabilitation project is complete we are starting to realize just how superior the concrete pavement performance is compared to our legacy section. We no longer worry about helicopter skids or Heavy aircraft nose gear shoving during high temperatures. We also appreciate the increased lighting reflectivity during night time operations. Faster storm-water sheet flow drainage and the ease of FOD removal due to a smoother surface was an unexpected added benefit as well. Knowing that the durability and service life will go on performing for many years makes the satisfaction complete. Compliments on the appearance keep rolling in as we relish in the wisdom of choosing the P-501 option. We truly appreciate and thank the entire planning, design and construction team for making this successful transition materialize before our eyes here in Elizabeth City,” said Airport Director Dion J. Viventi, PE, CFII, Elizabeth City Regional Airport.
Concrete Overlay: The Right Choice for Runway Rehabilitation at Greenwood County Airport in South Carolina

A five-inch overlay on Runway 9-27 was completed at the Greenwood County Airport in South Carolina. The plans, developed by Michael Baker International, called for milling off approximately three inches of the distressed asphalt prior to placement of the P-501, 650 flex concrete. The existing asphalt, nearly a foot thick in some locations on the runway exhibited various degrees of cracking and had become a safety concern.

Typically, late autumn in South Carolina is ideal for concrete paving with the average highs in the low to mid-sixties. Unfortunately, in 2014, the months of November and December exhibited very cool temperatures and wet conditions that added complexity to the project. Even with a second runway (5-23) available during construction, the owner wanted the closure time of RW 9-27 as minimal as possible.

Although the weather delays impacted the schedule by 31 days, the prime contractor, ACPA-SE member McCarthy Improvement paved the 55,500 square yard project and completed other improvements (lighting, asphalt paving of shoulders and taxiway tie-ins) in 75 days. A revised phasing plan enabled the elimination of a planned construction joint and expedited the concrete paving portion of the project. The original contractor's schedule illustrated 14 days for the concrete paving, and the revised plan enabled the contractor to finish in 10 days, a 30 percent reduction. The milling subcontractor controlled grade by using stringline and controlled cross slope by manually adjusting (every 25 feet) with each change. Even though the milling subcontractor incurred additional labor costs using this method, it significantly reduced potential overage of the concrete material. From start to finish, the owner and engineer were impressed by the efficiency and quality of the paving.

"The project had its challenges, particularly related to coordinating and making improvements to re-open the previously closed Runway 5-23, but I am proud of the way that the design team, owner, and contractor came together to innovate solutions to challenges to complete the project with exceptional design and construction quality while being sensitive to impacts to airfield operations," said Andy Busbee, project manager for Michael Baker International.

ACPA-SE hosted training and participated at state aviation conferences offering technical materials and overlay success stories from across the country. This was the fifth South Carolina airport to receive funding for a concrete overlay by the FAA-Atlanta Airport District office since 2009. Prior projects have been constructed (on runways) at Lancaster County (2009), Charleston Executive (2010), Berkeley County (2010) and Laurens County (2012). The ability to stay out of the subgrade and the longer life of the concrete made the concrete overlay strategy very appealing when compared to either reconstruction or asphalt resurfacing.

By:
Greg Dean, Executive Director
Carolinas Concrete Paving Association
The value of concrete, especially for aircraft parking aprons, is widely recognized by agencies and airport owners. The added durability, low maintenance, and coolness have all been attributes cited as reasons for preferring concrete over asphalt.

After factoring in existing pavement conditions and the need to upgrade in order to meet both business and recreational user requirements, the Grand Strand Airport, located in North Myrtle Beach, South Carolina, working together with the FAA, selected concrete as the pavement of choice to replace the aged and cracked asphalt apron.

Available federal project funding and the need to keep the airport open for operations meant the apron rehabilitation needed be completed in two schedules. A 10-inch (P-501) concrete section was utilized for both of the schedules. The first schedule was bid June 2013 and contained 25,950 square yards of pavement reconstruction; the second schedule, bid June 2014, replaced another 28,525 square yards of pavement.

Engineering consultant Talbert & Bright reviewed a possibility of a concrete overlay for this project, however, due to adjacent pavement grades, building elevations, future aircraft weights, and apron edge lighting, it was determined that a large portion of the ramp would require reconstruction to maintain drainage and transition to existing pavement. The final analysis of the overlay versus reconstruction strategy indicated that potential cost savings were not substantial enough when all factors were considered.

The ability to re-use the aggregate base within Schedule 1 also resulted in project cost-savings versus having to purchase and truck in new aggregate base coarse.

Contractors for both projects were able to start and complete paving during the late fall and winter months when the tourist traffic was at its lowest. This not only helped to minimize inconvenience at the airport, but also assured timely concrete material deliveries to the contractors’ slip-form paving equipment.

ACPA-SE member, Bobby Tillery of J. A. Long, stated the paving during Schedule 2 moved along well. The concrete supplier, Argos Ready Mix, provided the 650 flex strength concrete from their central mixed concrete plant. As a supporter of the industry, Tillery hopes to see other airports within the region benefit from long-life concrete.
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