The Piedmont Triad of North Carolina includes the cities of High Point, Winston-Salem, and Greensboro. This metropolitan area is the third largest in the state with a population of 1,650,000, placing it only behind the Charlotte and Raleigh metropolitan areas. It is home to Mack Trucks and the Greensboro Coliseum, which is the second largest single seat arena in the nation, and is recognized as the “Furniture Capital of The World.” The Koury Convention Center in Greensboro is considered one of the premier conference facilities in the Southeast and is the largest between Atlanta and Washington, DC. All of these factors along with its central location helped the symposium’s steering committee to select the Triad as the perfect site to host North Carolina’s first Full-Depth Reclamation (FDR) Symposium.

After a lengthy planning process, the date and location were agreed upon, facilities were booked, a demonstration location was found, speakers were confirmed, and the advertising phase began. This culminated with 281 registered attendees for the Southeast Cement Promotion Association’s fourth FDR Symposium. Previous FDR Symposiums in South Carolina, Virginia and Georgia have together drawn nearly 1,000 attendees.

On April 24, 2019, as the transportation community was anticipating a busy construction season, this group of professionals gathered to consider another alternative to repair and improve their failing pavements. The group included engineers, contractors, consultants, government officials, and other transportation professionals. For two days they learned, explored, and observed how FDR with Cement can fix deteriorated and under-designed pavements quickly and economically while reducing environmental impact.

The Southeast Cement Promotion Association (SCPA), in partnership with the North Carolina Department of Transportation (NCDOT), the Asphalt Recycling and Reclaiming Association (ARRA), and the North Carolina Chapter of the American Public Works Association (APWA) held North Carolina’s event on April 24-25, 2019 at the Koury Center. City, county, and state transportation agencies were in attendance, along with FDR contractors, engineering consultants, equipment producers, private business and industrial groups, and asphalt and cement company representatives. Attendance was geographically diverse, with personnel from five state transportation agencies and 19 states present.

The first day of the program was devoted to informing attendees on the basic concepts of FDR. The program started with a presentation on pavement structure and performance, followed by another on pavement management and how FDR and other treatments are used from a network perspective. Next, presentations on recent developments in reclaimer and cement spreader technology as well as in-depth discussions of the FDR process, preliminary laboratory testing and mix design were given. This led into a session on sustainability, followed by FDR research. The final topic of day one was negotiating utility conflicts.

The second day covered a full array of case studies from locations around North Carolina as well as other areas of the Southeast. These studies included city projects, DOT projects, FHWA Federal Lands projects, private sector projects, and airport projects. The case studies were followed by a live demonstration conducted by Ruston Paving onsite at one of the Koury Center’s parking lots. FDR was performed at a depth of 10 inches with 40 pounds of cement to achieve a 300-psi strength.

Full-Depth Reclamation (FDR) Shown as Viable Paving Solution in Greensboro, North Carolina

The Koury Center employee parking area was sorely in need of repair and offered a perfect venue for an FDR process demonstration. Here, the water truck and reclaimer are ready to start.

After the existing pavement was pulverized by the first pass of the reclaimer, cement was spread on the surface of the pavement. The spread rate of cement is determined by an initial geotechnical investigation and must be carefully controlled to ensure good results.

Symposium attendees observe cement spreading. Note that a skirt around the cement spreader keeps fugitive cement dust to a minimum.
A chip seal was applied as a wearing surface. The cement for the demonstration was donated by Argos USA and all other equipment and supplies were furnished by Ruston Paving and Linder Equipment. Regarding the demonstration, Ruston Paving’s Pavement and Soils Specialist Tim McConnell, said, “We would have liked to have had a larger area to work with, but we were able to show the process to the attendees. Having an onsite location was convenient and preferable for this event.”

SCPA has eight cement industry members, of which six were in attendance. They are also supported by 26 Cement Reclamation Partner members, all of whom were in attendance. Fourteen partners also exhibited at the event. The support of these members and partners was essential to the success of this event.

The symposium was developed in cooperation with NCDOT, NC Chapter of the APWA (in particular, the cities of Greensboro, Charlotte, and Raleigh), Slurry Pavers, RoadWorx, Ruston Paving, ARRA, as well as the entire SCPA team. “My favorite part was that we brought in contractors, suppliers, local agencies, several DOTs and industry experts and delivered a program that provided tools for others to take back and identify places where FDR can be a real benefit to everyone,” said NCDOT’s Director of Field Support Chris Peoples, PE.

If you were not able to join us in Greensboro, please contact any member of the Southeast Cement Promotion Association team. They will be glad to help you learn how the full range of paving solutions using cement, including FDR, can provide a great solution for your paving needs.

By:
Stan Bland, PE
Pavement Applications Director
Carolinas/Virginia

Andrew Johnson, PhD, PE
Pavement Design Engineer
Southeast Cement Promotion Association

Typical Construction Sequence of Full-Depth Reclamation (FDR) with Cement

1. Investigate existing pavement: To ensure that the final results are optimized, always investigate the existing pavement structure and subgrade prior to reclamation. Typically, samples of the pavement and subgrade are collected to the desired depth of reclamation and tested by a qualified testing laboratory to determine the appropriate rate of cement addition. Either too much or too little cement may reduce the quality of the final product.

2. Plan operation to ensure a well-coordinated job: Mixing, curing, and paving operations should be sequenced to minimize traffic disruptions and cover the FDR in a timely manner. Although FDR base can carry traffic for a week or more with only a chip-seal treatment, extended exposure without further paving is not recommended.

3. Begin FDR by pulverizing existing pavement: As a first step, it is recommended that the existing pavement be pulverized to the desired depth using the pavement reclaimer. The maximum particle size after pulverization varies with different specifications, but is generally required to be 2 inches or less. The contractor may elect to add some water at this stage to reduce dust and ease initial shaping, as was done on this project. Under limited circumstances, such as when the existing asphalt is less than an inch thick, this step may be omitted.

4. Roughly reshape the pulverized pavement: A motor grader and sheepsfoot roller are used to roughly regrade the base and prepare it to receive cement.

5. Spread Portland cement: Cement is spread with a spreader that is calibrated to deliver the specified amount of cement within tight tolerances (typically +/- 5 percent). Actual spread rate should be measured in the field by testing technicians periodically during construction.

6. Mix cement, water, and pulverized pavement: The reclaimer will make a second pass to mix the cement and pulverized pavement. If additional moisture is needed, the reclaimer may also use an attached water tanker to simultaneously bring the final mixture to the appropriate moisture content as determined in Step 1.

7. Compaction and fine grading: The sheepsfoot roller is used to compact the reclaimed mixture. The motor grader works in tandem to achieve deep compaction while maintaining the desired elevation. Once initial compaction is achieved, the motor grader and vibratory steel wheel roller will complete the fine grading operation and provide a smooth surface ready for overlay. This step is critical in achieving a smooth base that is ready to receive further overlay.