



**SOUTHEAST CEMENT
PROMOTION ASSOCIATION**



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Southern School of Energy and Sustainability “Walks the Walk” of Sustainable Paving in Durham, North Carolina



1 Southern School of Energy and Sustainability chose FDR with Cement to repair its bus maintenance and parking facility.



2 The pavement was mixed and pulverized to a depth of 10 inches, then initially graded to provide a 2 inch reveal for the new asphalt surface.



3 Ruston Paving spread 50 pounds of cement per square yard using a computer-controlled spreader.

Like most school districts, Durham (NC) Public Schools (DPS) has to maintain a substantial amount of pavement in driveways and parking lots. When it came time to repair the bus maintenance and parking facility at the Southern School for Energy and Sustainability (SSES), a STEM magnet high school, DPS chose an energy-saving, sustainable paving process – Full-Depth Reclamation (FDR) with Cement.

Quick and Cost-Effective

FDR is a rapid, inexpensive process that takes the existing pavement, as well as a portion of the underlying soil, and pulverizes it in-place into a uniform mixture with pieces typically no larger than two inches. The pulverized mixture is rough-graded to the desired grade, then mixed with a carefully controlled amount of water and cement determined from laboratory testing of the in-place materials. The mixture is then compacted and fine-graded to the final grade. The resulting product is a strong, long-lasting base that is ready to receive a final surface, typically 1.5 to 2 inches of asphalt for parking areas. Combined with periodic preservation treatments to counter the effects of aging on the asphalt surface, the resulting pavement should last indefinitely and be capable of handling trucks and buses.

“If a pavement needs more than 10 or 15 percent patching prior to overlaying, then it is definitely a candidate for FDR with Cement,” said Tim McConnell, Pavement and Soils Specialist with Ruston Paving Company, Inc. of Durham, NC, the FDR subcontractor for the project. “At that point, the FDR option may actually be cheaper than patching on

first cost, not to mention the long-term savings from increased durability,” said McConnell.

Although waiting a few days prior to overlaying with asphalt is desirable, asphalt may be placed on the new FDR base as early as the next day. Automobiles and light trucks can temporarily use the unpaved base immediately and the finished pavement can be opened to unrestricted traffic within three days in non-freezing weather.

Uses In-Place Materials

The sustainability benefits of FDR come from its long life and the use of materials that are already in-place. Substantial energy is used to manufacture virgin materials and haul them to the point of use. FDR uses this valuable resource in-place, avoiding the unnecessary hauling operations and preserving new materials for other uses.

When properly designed and constructed to specification, the strength of the FDR base should provide an infinite fatigue life when loaded with vehicles that can be legally operated on public roads. Once reclaimed, the pavement is ready for the long haul.

Reclaimed in Three Days

The bus parking area at SSES in Durham was in need of quick repair to avoid disrupting school activities. Reclamation to a depth of 10 inches was chosen and 50 pounds of cement per square yard was used to create the strong base. The area of the parking lot is 13,000 square yards, which is equivalent to 1.8 lane miles of roadway. The FDR process began on July 25, 2017 and was completed



4 Ruston's mixer-reclaimer pushes a water tanker that feeds a precision water injection system to obtain optimum moisture content as the cement is mixed with the pulverized pavement and base.



5 As mixing operations continue in the foreground, a motor grader performs fine grading on areas that have been compacted with padfoot roller.



6 Completed pavement for the bus maintenance and storage facility.

a short three days later on July 27.

"The project at SSES is very typical for us," said McConnell. "Most of our projects of this size are completed in a matter of days and we can work around the owners' schedules. This is ideal for schools, who want their facilities to be available on very specific dates and intend to use the pavement for decades to come."

For parking areas that have been overlaid multiple times, the FDR grading process allows curbs that have been covered with asphalt to be re-exposed. The final grade

can be set to have the new asphalt flush with existing gutters and minor drainage issues can be corrected.

Let Southeast Cement Promotion Association Assist You

The Southeast Cement Promotion Association has an experienced team of engineers who are experts in pavement design and construction. We are here to help you successfully use cement in your paving work. Whether you are procuring new pavement or repairing existing pavement, let us help you save money and achieve longer pavement life for whatever paving needs you have.

Typical Construction Sequence of Full-Depth Reclamation 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 sheepfoot roller are used to roughly regrade the base and prepare it to receive cement.
- 5 Spread 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 sheepfoot 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.

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