

Rolling Out RCC On I-285

By Matthew W. Singel, P.E.

Roller-compacted concrete helps the Georgia Department of Transportation complete shoulder upgrades on portions of Atlanta's I-285 with minimum disruption to traffic.



The traffic volume on Interstate 285, the Atlanta Perimeter Beltway, may rise and fall – but it never stops. In some areas of I-285, volumes exceed 200,000 vehicles per day. Working on roadways under such traffic counts is a huge challenge, at best, and highway departments such as the Georgia Department of Transportation are always looking for ways to complete such work faster, better and with less disruption to traffic using busy interstates such as I-285.

In recent years, the Georgia Department of Transportation has spent time investigating roller-compacted concrete (RCC) pavement and its value in their program. The speed of construction and economy offered by roller-compacted concrete (RCC) pavement are attributes that help it to serve as a durable, long-term tool in the GDOT pavement management arsenal.

Although the use of RCC pavements dates back to the 1970s, its use in the

public sector is quite recent. When the west side of I-285 came due for rehabilitation, RCC represented a logical choice for the material to use during reconstruction of the failing shoulders.

Roller-compacted concrete is a stiff mix concrete (in fact, it has zero slump) that is placed with high-density or standard asphalt paving machines, then immediately rolled to 98-percent density – typically by utilizing a 10-ton to 12-ton steel drum vibrating (or oscillating) roller. This method of placement results in an initial cost that is competitive with asphalt yet offers the life cycle of a concrete pavement.

Beginning at I-85 on the southwest side of Atlanta and traveling north (along the west side of the city) for 17.3 miles to the community of Vinings, the overall I-285 project consists of concrete pavement rehabilitation (select slab replacements) on the mainline and reconstruction of the outside shoulders

both northbound and southbound. The general contractor for this project is Pittman Construction Company, based in Conyers, Ga. The mainline slab replacements and shoulder material removal is being performed by Costello Industries, Inc., College Park, Ga., with the RCC paving being handled by A.G. Peltz, LLC, Birmingham, Ala.

Traffic volume and minimizing impact to the traveling public are always serious considerations for the GDOT when evaluating any improvement project. The necessary one-lane closures for RCC construction start at 9 p.m. Friday evening and continue through 5 a.m. Monday morning, with the option of limited working hours at night Monday through Thursday as well.

Removal of the existing failed shoulders begins Friday evening with the

Above Left: At the heart of this RCC paving operation was an ABG Titan 8820 high-density paving machine with a dual tamping bar in the screed. This machine has the capability of paving to a width of more than 40 feet and nearly 10 inches per lift while achieving densities of up to 95 percent (modified proctor).

Below: A Gomaco RTP500 Material Transfer Vehicle was used to ensure a consistent flow of material which ultimately contributed to an improved ride quality.





Above & Right: After placement, the RCC was immediately rolled to 98-percent density. Here, a Hamm roller – one of two rollers used on the project – compacts the RCC.



milling out of the existing asphalt and subbase material to 11-1/2 feet wide. Milling is being handled by Pavement Products & Services, Inc. (PP&S) of Greenville, S.C., which is using a Roadtec RX60C and Wirtgen W2000 to complete the milling operation. The units use a grade control system to provide the required depth of removal at the mainline pavement edge and slope control to hold the depth at the outside edge. This equipment allows for the removal of 1.5 to 2.0 lane-miles of shoulder material between 9 p.m. on Friday and 5 a.m. on Saturday, an eight-hour period. Milled asphalt from the project is discharged directly into trucks for subsequent hauling to local interchanges, where it is being used for improvements.

ready for the Monday morning traffic. The shoulders are constructed 10 feet wide with depths of 6 inches and 8 inches as indicated by the GDOT design.

The RCC material is being manufactured on-site in a continuous pug-mill operation. This unit, an Aran ASR280B, produces RCC at rates of up to 500 tons per hour (250 cubic yards) to meet the demand of the paving crew.

The RCC mix design was developed by A.G. Peltz, LLC, in conjunction with CMS Labs of Locust Grove, Ga., and approved for use through the GDOT Office of Materials and Research. The aggregate is an evenly graded blend of fine and coarse aggregates with a nominal maximum size of 1/2-inch with cement and water rounding out the mix.

The paving operation consists of an ABG Titan 8820 high-density paving machine with a dual tamping bar in the screed. This machine has the capability of paving to a width of more than 40 feet and nearly 10 inches per lift while achieving densities of up to 95 percent (modified proctor). This paving unit is used in conjunction with a Gomaco RTP500 Material Transfer Vehicle to ensure a consistent flow of material, which, ultimately, contributes to an improved ride quality.

Compaction immediately follows placement, with both a Hamm HD 90 oscillating steel drum roller and an

Ingersoll-Rand CR-80 combination roller staying busy throughout the operation. The rolling pattern is established using a nuclear density gauge with a target of 98-percent density. This is accomplished using the roller in a combination of vibratory and static modes.

Immediately after placement and compaction, nuclear density tests are performed. The project requires a 98-percent average density with no test below 95 percent.

The paving contractor is completing the RCC placement process with an application of a white pigmented curing compound from Dayton Superior Construction Chemicals, which allows the RCC to retain the moisture required to build strength quickly. This curing compound is applied with a custom wheel mounted tank and spraybar unit for easy and uniform application.



Within the first two hours of placement, an early entry (Soff-Cut) saw cuts contraction joints to match the adjacent mainline pavement. Joint sealing and the grinding of rumble strips complete the process and provide a shoulder pavement that is a long-term performer.

As traffic volumes steadily increase and funding is continually stretched, roller-compacted concrete is becoming a pavement of choice for many applications. Its economical price, long-term performance, low maintenance, and quick return to traffic have positioned RCC pavement as a value-engineered pavement that should be well suited to many applications from warehousing and distribution centers to the roadway. ■

Matthew W. Singel, P.E., is specialty pavements engineer with the Southeast Cement Association. He may be reached at matt@secement.org.

www.rccpavement.info

PCA Portland Cement Association

www.cement.org/pavements



The RCC material is being manufactured on-site in a continuous pug-mill operation. This unit, an Aran ASR280B, produces RCC at rates of up to 500 tons per hour.