If you are native to Tennessee, you are familiar with the famous Lookout Mountain. Standing at 2,392 feet in elevation, Lookout Mountain is best known for Rock City, where they say it is possible to see seven states. Lookout Mountain and all of its many attractions shadow its sister mountain located just across the interstate. Aetna or “Etna” Mountain stands at only 1,950 feet in elevation and is best known by the locals for Raccoon Mountain Caverns and as a great place to ride ATVs. Most of the mountain remains undeveloped but a decade or more ago, the Chazen Family purchased part of the I-24 side of the mountain in Chattanooga and began developing it. Now, a beautiful community called Black Creek speckles the bottom valley of Aetna. Black Creek land owner and developer Andy Stone had bigger plans than just the bottom half of his property. Stone wanted the development to stretch all the way up to the very top of Aetna. “The view up there is just spectacular,” Stone said in a recent interview.

Planning for this stretch of mountain road started in 2017, and construction began in 2019. Cutting a two-lane road up the side of a mountain is no small feat. Due to its steep incline, safety was a concern. The City of Chattanooga required the road to have two 17-foot-wide lanes with one-foot curb and gutters and a median in between. “The road had to be safe, and the road had to be durable,” said Stone. The original plan was for the road to be constructed using heavy-duty asphalt. However, City of Chattanooga Senior Engineer Ariel Soriano suggested that Stone and the City of Chattanooga consider using Roller-Compacted Concrete, more commonly known as RCC.

Stone, having never worked with RCC, did his own research on RCC and its capabilities; after looking at RCC’s advantages, he was open to an alternate bid. Multiple people advised Stone to get in touch with Robert Smith Inc. (RSI). “I finally listened and called Andrew Smith, part owner of RSI, and knew instantly he was the kind of guy I wanted to work with on this project.” RSI was required by the city to supply a skid resistant surface. “We bid using a blended stone mix design,” said Smith. “We trucked in a granite 89 stone from Dallas, Georgia and mixed it with a limestone 67 stone, manufactured sand, and Type I/II Buzzi Cement from the Signal Mountain Plant.” Fortunately for Stone, the RCC bid came in 15% lower than the heavy-duty asphalt.

The heavy-duty asphalt section had 4 inches of asphalt to be installed in two lifts; a 2.5-inch lift of binder asphalt and a 1.5-inch lift of surface asphalt. The RCC design required 7 inches of concrete to be built in only one lift. Both alternatives were to be placed over 6 inches of compacted graded aggregate base. Stone is a civil engineer by trade and has many years of construction experience, so he knew that the asphalt construction would have also taken longer to complete in this site’s environment where there was constant traffic, a reduction of driving lanes and a post-January start date due to temperatures. RCC was the clear choice, but it still had its fair share of obstacles.

Robert Smith Inc. was awarded the contract and got started in mid-January 2021. RSI had recently purchased a brand new A240 Blend portable mixing plant and was able to position it halfway up the mountain road. The convenience of having the plant on site was crucial, since RSI wasn’t sure their paver would be able to push dump trucks loaded with RCC up the grade, which averages 14 percent and is as steep as 20 percent. RSI had a game plan if the paver couldn’t perform the impossible.
“I had booked 3 automatic-transmission dump trucks and 4 loaders to be on site to load the hopper with the RCC,” said Smith. He knew this would significantly decrease their production rate so, in the beginning, Smith had planned on production being 200 cubic yards a day. The first stretch of the road wasn’t very steep, and at 6% grade the paver performed perfectly. The real test was at the first bend where the road starts to get steep. Smith and his team watched in amazement as their 2009 ABG7820 HD Volvo paver pushed the fully loaded dump truck up the steeper grade. Production from that point on was 400 cubic yards a day on average. “We were in a really good situation,” said Smith. “We were running faster than the construction ahead of us, so that gave us time to go knock out 4 other projects in town and not have to move our plant.”

On June 15, 2021, RSI pulled their last run with a crowd of industry representatives watching. Many folks that work in pavement design were invited to see the construction process, most of whom had never seen RCC before and certainly had never seen it performed in this capacity. As Stone said, “Andrew and his team were off the critical path for sure with this project, but you would never have known it by watching them work. They are a fantastic group of guys, and I couldn’t have had a better team helping me build this road.” The efforts and services provided by both the earthwork contractor, Brown Bros., Inc. and the CBANW companies as consulting engineers were also much appreciated.

The City of Chattanooga deserves a lot of credit for this project, because they knew RCC would be the best application for this kind of road. “I think this is the first perpetual pavement structure built out of roller-compacted concrete that I’ve seen in a long time,” said Chattanooga Senior Engineer Soriano. “It certainly lends itself wonderfully to the perpetual pavement philosophy, doesn’t it?”

The Southeast Cement Promotion Association’s (SCPA) expert staff can assist with pavement design and construction that can save money now and in the future. Visit www.secement.org to find project spotlights like this one, technical documents, and contact information for the representative in your local area.

By:
Jessie Anna Boone
Pavement Applications Director
Tennessee
Southeast Cement Promotion Association