Howard Gap Road

Once a busy thoroughfare for settlers, Howard Gap Road in Henderson County, North Carolina now serves as an alternate route for travelers avoiding interstate traffic. Between 2006 and 2014, the road recorded the second highest number of accidents among rural roads in the county. Ninety-five accidents occurred on a 3.7 mile stretch including 21 curves, according to Brian Murphy with North Carolina Department of Transportation (NCDOT). To bring relief, the state approved Howard Gap Road to be widened and realigned. Plans for reconstruction included two 12-foot lanes with paved shoulders, adding a bike lane, turn lanes at several intersections, a roundabout and replacing two bridges. The goal is to improve the commute for both motorists and cyclists.

Before work could begin on the road, surrounding slopes needed to be stabilized to ensure the area remained safe during and after construction. Ameritech Slope Constructors (ASC) was selected as the geotechnical engineers. Slope stability problems can occur when the balance of rock faces or soil slopes are disrupted by either man made or natural events. Henderson County averages 55 inches of annual rainfall which can cause rock slides and washouts without proper slope stabilization.

The demand for these engineered slopes has increased the need to understand stabilization methods. Ameritech Slope Constructors used the technique of soil nailing to treat the unstable slopes. As the name suggests, soil nailing is essentially hammering nails into the soil; however, the nails are steel bars. For the Howard Gap Road project, the process began by drilling holes at a 20-25 degree angle into the soil where the nail will be placed. The nail, #7 rebar, was placed into the hole and grouted. US SPEC RA Grout was pumped into the hole to fully encapsulate the rebar. Full encapsulation protected the rebar from future corrosion. Once the rebar had been grouted, it was torqued to 18 kips. One kip equals 1,000 pounds of force. A metal plate capped the rebar, and the entire slope was covered in high strength steel mesh. This quickly describes the early stages of soil nailing. The entire technique is complex and varies on a job to job basis.

US SPEC's RA Grout, a rock anchoring grout, was designed with an aggregate free formula to allow the product to reach areas that are inaccessible with standard grouts. The lack of aggregate also allows for full encapsulation. Approximately three bags of grout were used per nail, totaling around 2,300 bags. The job required the grout used to reach a compressive strength of 3,500 psi in 28 days. RA Grout reached a compressive strength of 6,870 psi after only three days, surpassing the contractor's expectations. Workers were then able to move faster and torque the nails much sooner than anticipated. When the soil nailing process was complete, the slope faces were hydroseeded establishing, plant growth to cover the nails’ surfaces and the steel mesh. The slopes once again blended into North Carolina’s green landscape.

Ameritech Slope Constructors were very happy with the overall performance of RA Grout. Competitive grouts produced varied consistencies as well as clogged and damaged pumps, which slowed production. RA Grout’s non-aggregate formula flowed easily through the pumps and produced consistent batches every time. All work on the slope stabilization was completed by April 2014. Construction then moved to the widening and realignment of Howard Gap Road. Road construction took place in two phases and will be completed in November 2015. Motorists and cyclists can now look forward to a safer drive.