Stabilization and Restoration at Russell Cave

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In the past few years as much as eight feet of debris, rocks, and sand from upstream have been deposited in the Dry Creek stream bed within Russell Cave's boundaries. The increased silt deposits, created through poor land management practices in areas surrounding the park, have changed the stream flow near the cave and caused serious undercutting of the protective talus pile at the cave entrance. In 1989, the talus slope began to slump and stabilization measures were necessary to reinforce the embankment area (McDade 1992). These measures, however, were temporary. By the spring of 1992, stream bank erosion at the base of the talus slope had become so serious, there was concern for the integrity of the cave and its cultural deposits (figure 1). Erosion at the base of the embankment continued to expand with each succeeding rain storm.

Fig. 1. Erosion at the base of the cave embankment. Notice position of stream in relation to the two large unprotected trees that are in danger of being dislodged. Cave entrance is visible in upper left-hand corner of the photo.

Near the northeastern corner of Alabama the Tennessee River sweeps down through the Sequatchie Valley, which is bordered on the west by the Cumberland Plateau. The edge of the plateau is notched and scalloped by coves and valleys….One of these valleys in Jackson County, Alabama, is called Doran Cove, and here Russell Cave is located….[A]t Russell Cave, the valley walls forming Montague Mountain rise about 1,000 feet above the floor of the cove….This is limestone country, abounding in sinkholes and underground channels. At the base of Montague Mountain, a large sinkhole has exposed a cross section of the underground drainage system extending into the mountain. The system has two chambers, separated by a massive rock pillar….One chamber is open to the level of the floor of the sinkhole and carries a stream of water into the mountain; the other is a rock shelter filled with fallen rock and the debris of prehistoric occupations. (Griffin 1974:1)

Buried in this second chamber is one of the most significant archeological sites in the southeastern United States. With the discovery of a Beaver Lake projectile point (Transitional Paleo) in January 1993, Russell Cave is now believed to have had continuous occupation spanning no less than 10,000 years of prehistory.

Archeological site stabilization specialists from the Interagency Archeological Services Division (IASD) of the National Park Service along with Tennessee Valley Authority civil engineers visited Russell Cave and agreed that to save this valuable portion of our heritage, stabilization of the talus slope in front of the cave entrance was vital. However, stabilization demanded more than simply an engineering solution. We knew it would be unacceptable to undertake a treatment that altered the spatial character of the landscape. By studying old photographs and documents, we felt we could accurately duplicate the eroded historic vista by rebuilding the entire landscape out of local materials. We decided on a stone bulwark using immediately available river gravels, sands, and rock.

Because the park had neither the physical resources (manpower and machinery) nor the funds to hire a contractor to undertake the emergency measures, we contacted the Alabama National Guard to ask if they would be interested in undertaking a "training exercise" in archeological site protection. To our delight and relief, the Guard agreed to assist the park. During the weekend of July 11–12, 1992, Park Service personnel from the Southeast Regional Office, Russell Cave NM staff, and members of Company A of the Alabama National Guard's 151st Engineer Battalion began a major stabilization and erosion control project in the park.

The Undertaking

In the early, misty morning hours of Friday, July 10, 1992, a small D-4 Caterpillar moved down Dry Creek toward the sink hole in front of the cave entrance. Using some of the tons of rock and silt in the creek bottom, this machine prepared a temporary access into the sink hole so that the National Guard could bring the

rest of their heavy equipment—a back-hoe and a front-end loader—into the work site.

After preparing the access, the D-4 used its blade to remove and reposition a depositional island of coarse rock, sand, and silt that had built up at the cave entrance. The formation of this island, precipitated by previous flooding, was the primary cause of the realignment of the stream against the toe of the slope. The material in the island was pushed up the face of the talus slope. This material served as the substratum for the stabilization effort. Because it filled up the many voids and crevices in the slope, it also served as a leveling mechanism. Next, a channel was prepared approximately three feet below the water line along the base of the talus pile. This trench traversed approximately 150 linear feet. The excavated sands and gravels from this channel were also pushed up the slope.

After some minor "landscaping" of the substratum, a heavy-gauge 15'-wide filter fabric (Mirafi 140-N, purchased by IASD) was rolled out over the bedding material (figure 2). The fabric was laid down like shingles on

Fig. 2. Primary panel of filter fabric being stretched out. Base of the fabric is anchored in the channel seen in the lower left-hand corner of the photo. Rocks are being placed over the fabric to firmly anchor it in the channel.

a roof. Approximately 60% of the first and lowest panel was set underwater in the channel that had been prepared at the base of the slope. The second and third panels were then placed in a step-like manner, moving up the slope and leaving at least a 5'overlap.

With the filter fabric in place, the National Guard began working in earnest. They used their equipment to move large granite boulders (500–2,000 lbs.) on top of the filter fabric already placed in the channel. This provided the anchor and the foundation for the bulwark construction. Once the channel was filled, additional large boulders were placed as riprap (Russell Cave NM had purchased and stockpiled 100 tons of riprap from a local quarry) up the face of the filter fabric. Creek bottom sediments were spread over the top of this large riprap, filling in all the voids and naturally cementing, or bonding, the riprap in place.

At this stage of the construction, the top 10' of the uppermost panel of filter fabric was folded down over the bonded riprap and the entire bulwark was covered with a final layer of river sand and gravel. This final

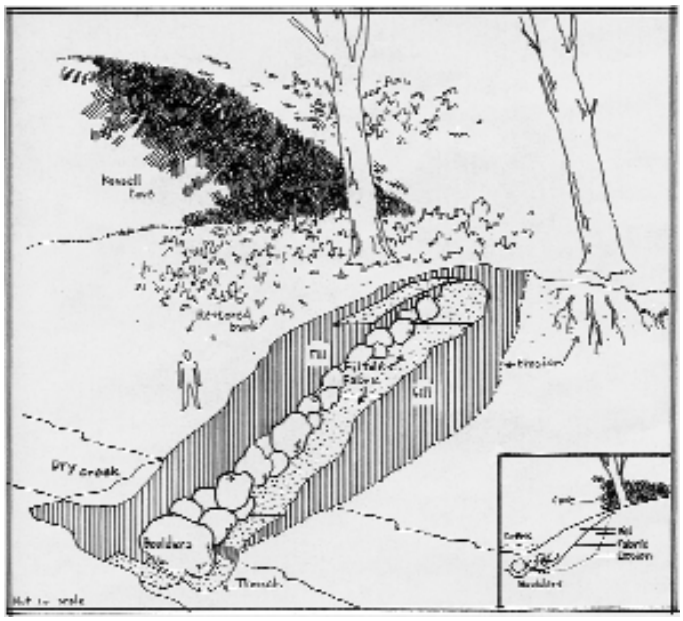

Fig. 3. Cross section of completed bulwark.

layer was no less than 6' thick at the base and gradually tapered to approximately 2' thick at the top (figures 3 and 4). As a final measure, to help insure the security of the bulwark, the bulldozer angled its blade and dug out a new stream channel, which, in fact, turned the water course away from the embankment and returned it to its historic location.

Fig. 4. View of completed bulwark. Compare with Fig. 1. Notice reconfiguration of the stream and position of the two large trees. Cave entrance is in the upper left-hand corner of the photo.

Summary

The construction portion of this project, including site preparation, was completed in three days. Up to 12 Guardsmen assisted in the work, depending on the task involved. Their participation was especially important during the positioning of the large riprap. In building the bulwark we used local, compatible materials, fashioning it in such a way so as not to adversely affect the historic view or terrain. Every effort was made to retain the important visual connection between the landscape components. In less than four months after the project was finished, visitors to the park and cave who did not know

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(***Cave***—*continued from page 29)*

about the stabilization project were completely unaware of any alterations to the landscape.

In March 1993, excessive accumulation of snow and extremely heavy rains provided the first good tests of the bulwark. Heavy flooding breached the banks of Dry Creek, and high water inundated much of the low-lying areas of Russell Cave NM for several days (figure 5). When the water receded, study of the bulwark revealed

Fig. 5. View of cave entrance during March 1993 flooding. The two large trees provide reference points.

that it was unaffected. Throughout the late spring and summer months of 1993, volunteer grasses and bushes sprang up rapidly (figure 6), conveying the same visual appearance of the landscape prior to slumping of the talus slope.

Designing and implementing a stabilization solution patterned after naturally occurring accretion and stabilizing mechanisms and using techniques effectively implemented elsewhere have assured protection for the archeological deposits and resources while retaining the historic appearance. However, the latchkey to the

Fig. 6. Bulwark in September 1993. Compare with Fig. 4. Notice growth of grasses and bushes.

successful outcome of the project was the proactive interagency cooperation between the National Park Service, the Tennessee Valley Authority, and the Alabama National Guard. We especially appreciate the concern and volunteer efforts of the National Guard and commend the members of Company A, 151st Engineer Battalion for their fine performance. Without the Guard's personnel and heavy equipment, this urgently needed project could not have been completed.

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Photos by the author.