Case Studies in Stabilization

Introduction

The Cultural Resource Program at Saguaro National Park (SNP) has the responsibility of performing regularly scheduled condition assessments for both prehistoric and historic resources. These assessments document environmental and structural changes, including vandalism to cultural resources in the park

These reports provides the Park the necessary information to allocate funds and personnel to rectify conditions that might otherwise lead to the loss of a resource. In this resource brief two stabilization projects are reviewed: the reconstruction and stabilization of historic retaining walls along King Canyon Road, and the stabilization of adobe-walled structures at Camp Pima, a Civilian Conservation Corps (CCC) camp. Both projects took place in the Tucson Mountain District of Saguaro National Park.

Stabilization projects fall into two catagories: cyclic or on an as-needed basis. Cyclic stabilization is work that has to be undertaken on a regular schedule or cycle. For instance, adobe structures are constantly under assault from wind and rain, which causes deterioration of the adobe bricks and mortar. Therefore stabilization of adobe walls, adobe repair, sacrificial caps, and repointing of mortar joints (filling voids in mortar joints), is needed on a continuing, regularly scheduled basis. Stabilization on an "as needed basis" refers to an unexpected incident that needs to be corrected immediately or routine work that may be needed only occasionally, perhaps on a five or ten year basis.

The reconstruction and stabilization of historic stacked rock retaining walls along King Canyon Road is an example of the latter type of project. The stabilization of adobe-walled structures at Camp Pima is an example of a cyclic maintenance program.

Case Studies

King Canyon Road. The King Canyon Road is a 1.5 mile long cut and fill road built along the steep slopes of King Canyon Wash and connects Mile-Wide Mine to Kinney Road. The first 0.9 miles of road, from traihead to Mam-A-Gah picnic area, was worked on by the CCC in the 1930s, and is part of the King Canyon Trail, a park maintained public trail.

Figure 1. Top: the collapsed portion of the stacked rock retaining wall. Bottom: same wall segment as in top photo after reconstruction.

In 2010 portions of two stacked-rock retaining walls unexpectantly suffured catastrophic failure (collapse) due to water erosion. The collapsed portion of walls left the remaining intact portions susceptible to further erosion and possible total collapse. The collapsed wall segements also threatened the stability of the public trail (Figure 1).

A stabilization crew form Tumacacori National Historical Park (TNHP), in collaboration with the SNP maintenance program, were asked to help stabilize and rebuild the collapsed wall segments. All work was done by hand.

A grip hoist was used to move and position the very largest rocks, some of which measured up to 3 feet by 1 foot in size. All of the rock used to reconstruct the wall segments was found at the base of the collapsed wall. No mortar was used. The rocks used to repair the walls were stacked and battered to match the adjoining original wall segments. Fill, in the form of crushed rock, also found at

the base of the collapsed wall, was used to fill in behind the reconstructed walls (Figure 2). The work area was restored back to its natural condition and no evidence of the work remained for the visitor to see.

Figure 2. Stabilization crew working on retaining wall along King Canyon Road.

Photos documenting the condition of the walls, before and after stabilization, were taken. Photos documenting the work itself were also taken. Safety protocols were reviewed each day before work began and were stringently adhered to throughout the work day. No injuries were reported during this project.

Camp Pima. Camp Pima is a Civilian Conservation Corps camp that operated from 1933 to 1941. Several of the buildings were constructed of adobe brick and mortar. Little is left of the adobe-walled buildings; eighty-plus years of weathering and probably some vandalism have taken its toll (Figure 3). Only three buildings still have standing wall segments.

Saguaro National Park has initiated a cyclic maintenance program under which stabilization of the adobe walls at Camp Pima will be conducted on a three to five year cycle. The cycle will depend on the yearly condition assessment.

In 2014 a stabilization crew from Tumacacori National Historical Park was brought to the park to conduct the first stabilization effort under the cyclic maintenance program. The project at Camp Pima included the repointing of mortar joints, filling voids between adobe bricks and filling basal erosion to create a stable foundation for the wall (Figure 4). A sacrificial layer or cap of adobe was also applied to the tops of each wall. The cap will help reduce erosion along the top course of adobe bricks.

All work was well documented. Photographs documenting the condition of the walls prior to, as well as post stabilization, were taken.

Post Script. Not long after the stabilization work on the adobe walls at Camp Pima was completed the Tucson Mountain District received an unusually heavy amount of rain during the summer monsoon. We were very fortunate that the stabilization of the walls was completed when it was, without stabilization several sections of wall would no doubt have collapsed due to erosion caused by the heavy rainfall.

Figure 3. The remains of an historic adobe-walled structure at Camp Pima.

Figure 4. The remains of an historic adobe-walled structure at Camp Pima. Left: Photograph of the NE corner showing basal erosion and loss of original mortar. Right: The same corner as in the photograph at left after stabilization. Mortar joints have been repointed and material has been added to the base to create a solid foundation.

These two projects are examples of park units (TNHP and SNP) sharing resources in order to accomplish a common goal – the preservation of our resources.

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