An Interior Conditions Assessment of Mission San José de Tumacácori

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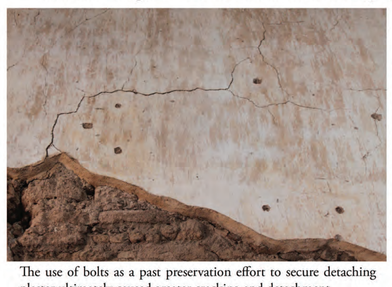
Introduction

The oldest mission site in Arizona, San José de Tumacácori was established by the Jesuit padre Eusebio Kino as part of a 75-mile chain of missions through the Pimeria Alta (the area of modern day southern Arizona and northern Sonora, Mexico). In 1908, the mission complex, with extant Franciscan church, was among the first heritage sites to be designated a National Monument by Theodore Roosevelt under the Antiquities Act.

Soon after its inception, the National Park Service (NPS) assumed stewardship of the mission, assigning as custodian the famed early preservationist Frank "Boss" Pinkley, who immediately took rehabilitative action to the historic ruin. Over the subsequent decades under NPS supervision, the mission church at Tumacácori underwent various phases of reconstruction and repair, functioning in essence as a laboratory for testing preservation methods and materials. As a consequence, the church structure embodies in microcosm the evolution of NPS preservation theory and action over the past century.



The use of bolts as a past preservation effort to secure detaching plaster ultimately caused greater cracking and detachment

The history of preservation at Tumacácori must necessarily inform all modern conservation efforts. Assessment and documentation of the condition of the mission church, in response to both natural forces of deterioration and mechanical responses to failing preservation techniques, is thus integral to the adaptive, cyclical maintenance of the adobe structure.

This project was jointly conceived and executed by the NPS and the Drachman Institute at the University of Arizona to aid the Tumacácori National Historical Park crew in preparing and archiving a record of conditions and treatments in order to evaluate the performance of past treatments, monitor change, and prepare appropriate future treatment plans. Additionally, by connecting technically trained graduate students with the preservation specialists at Tumacácori, the collaboration sought to address the critical lack of training opportunities in Southern Arizona for students to engage in the preparatory documentation integral to adobe treatment and maintenance.

"The history of preservation at Tumacácori offers insight into the development of historic preservation in the southwestern United States. The types of materials used, application techniques, and preservation philosophies all changed over time. These changes, and the preservation successes and failures, result in the church we see today. By studying the success or failure of different treatments at Tumacácori we gain the perspective of nearly 100 years of experimentation in preservation methods." --Jeremy Moss, "Of Adobe, Lime and Cement"

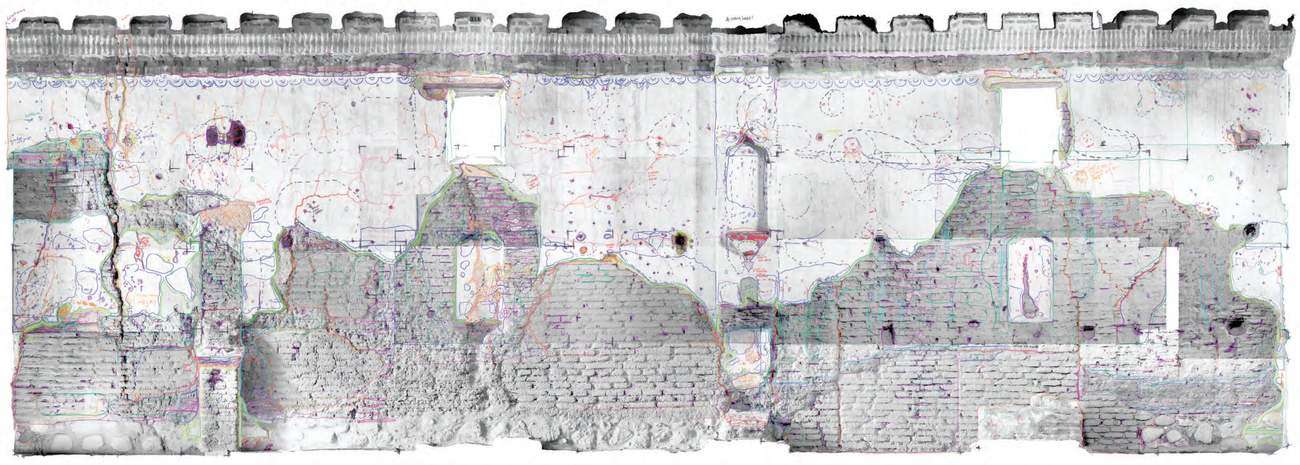
Methodology

The project employed four graduate students with backgrounds in archaeology, heritage conservation, engineering and landscape architecture under the direction of the Agreement Technical Representative (ATR), Alex Lim, who serves as the architectural conservator and exhibit specialist at Tumacácori National Historical Park.

Material Integrity	Historical Features	Conditions
+Loss +Repair -Edging -Fill -Render -Reconstruction	+Surface Decoration -Incisions -Painted Surfaces +Historic Graffiti +Construction Details -Pugholes	+Structural Cracks +Superficial Cracks +Detachment +Delamination +Holes/indentations +Disintegrations +Loose mortar +Voids +Surface deposits

In preparation for the interior condition assessment, the investigators established and defined a list of conditions expected to be present at Tumacácori Mission Church (listed above), referencing the ICOMOS Glossary on Stone Deterioration Patterns (ICOMOS 2008), comparable analyses undertaken at the Spruce Tree House site (Lim 2010), and the expertise of ATR, Alex Lim.

Prior to the initiation of this project, laser scanner and photogrammetry documentation conducted by the NPS Southern Arizona Office (SOAR) was completed of the interior of the mission church, resulting in the creation of orthophotographic images of the interior surface (Degayner et al. 2014). These photographs were utilized as the base images over which condition documentation took place. Each photo tile produced by SOAR represented approximately 50 sq. ft. of wall space, subdividing the long nave walls into a seven by four grid of irregularly shaped photo tiles and a one by three grid for the choir loft and sanctuary.



Recorded conditions depicted n this photo include runneling (rivulets of mud washed down wall from previous moisture events), mortar loss, historic graffiti, historic repairs (including the edging of the plaster surfaces), various superficial cracks and chipping in the outer layer of the plaster surface

The student researchers mounted scaffolding to observe conditions high up on the walls, which they then transcribed onto transparent sheet protectors overlaying the 11x17 inch photo tiles. Conditions were graphically represented with either lines or closed polygons to aid in the digitization process.

After the field documentation was completed, the SOAR photo tiles were stitched together in Adobe Photoshop to create composite base images of each interior wall of the nave and sanctuary. The conditions assessments were then scanned and keyed into place over the composite base images (pictured above). These data were imported into AutoCAD for digital rendering, and subsequently adjusted in Adobe Illustrator for legibility.

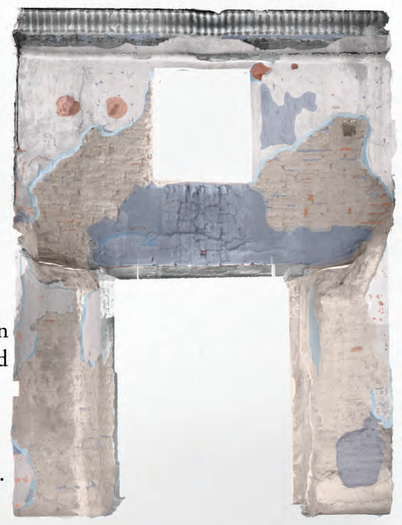
Products and Results

The results of the interior conditions assessment of Mission San José de Tumacácori yielded:

Layered Interior Walls Conditions Maps (pictured right)
These include a set of interactive maps of the interior walls of the church demonstrating the presence of various sets of conditions. The maps consist of black and white orthophotographic background images onto which CAD layers indicating various surface conditions are applied.

Illustrated Conditions Glossary (see attached)
The Illustrated Conditions Glossary describes and defines each condition recorded and provides an image demonstrating the feature as it appears both on the physical walls of the mission church and as it is represented on the final map.

Historic Graffiti Photo Documentation
All historic graffiti was documented with photographs keyed to the digital maps for easy reference. An Excel database was formulated to record all legible information ascertained from the historic present in the nave and sanctuary.



Conclusions

While in general the interior condition of the mission church is highly stable, with few observable threats either from age and weathering, the effects of previous incompatible or failing preservation techniques represent the most pervasive concern in the continuing conservation of Mission San José de Tumacácori.

Between the 1940s and 1970s, stabilization attempts using synthetic spray-on preservatives were applied to the plaster. Small nails and bolts were inserted at areas of failure in an attempt to keep the plaster pinned to the substrate. The walls of Tumacácori give an observable account of these methods, which impacted the historic integrity and continue to cause damage to the plaster. In this assessment, plaster detachment in areas was noted, resulting in subsurface voids, evidenced by a hollow sound when tapped and areas of significant bulging and cracking.

About 70% of the interior adobe bricks are original, however stabilization and restoration was performed where moisture wicking up into the walls through capillary action had resulted in severe basal coving. The bricks used for these repairs were stabilized adobe, and are discernible from the original fabric by their lighter color and longer, more regular form. Along the joints where the stabilized adobe repairs meet the original fabric, the historic adobes exhibited a distinct discoloration along with severe disintegration (characterized by the softness of the brick and extent to which the material crumbled when lightly touched). This discoloration and disintegration (pictured left) are seemingly indicative of a previous or current moisture issue where the historic and restored fabrics meet. Consequently these zones represent important areas of consideration in the continued maintenance and conservation of the mission church, potentially representing areas of incompatible repair.

While current preservation strategies at Tumacácori focus on the use of traditional building methods and materials, the identification and understanding of previous preservation theories and techniques is an integral part of the conservation plan. The interior conditions assessment represents a partial preservation history and schematic for future monitoring and intervention.

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