2016 International Workshop on the Conservation and Restoration of Earthen Architecture
or
TICRAT (Taller Internacional de Conservación y Restauración de Arquitectura de Tierra)

March 14-18, 2016
Tumacácori, Arizona

Submitted by:
Adam Springer and Alex B. Lim
Tumacácori National Historical Park
From March 14-18, Tumacácori National Historical Park hosted 100 participants in the 2016 Taller Internacional de Conservación y Restauración de Arquitectura de Tierra (TICRAT). Also known as the International Workshop on the Conservation and Restoration of Earthen Architecture, TICRAT is a bi-national, hands-on workshop focused on learning the traditional techniques and materials of conserving earthen architecture, adobe, lime plaster, and painted architectural finishes. The workshop series was started in 1994 in partnership with Mexican counterparts with INAH (Instituto Nacional de Antropología e Historia). Each year, the workshop alternates being held in the United States and Mexico, with all sessions taught in English and Spanish.

In celebration of the NPS Centennial, this year’s TICRAT involved more partners than any previous event. The workshop was attended by 37 NPS employees from 14 parks and five states, along with IMR and WASO staff. Additional participants came from INAH’s protected sites; tribal organizations; non-profits; six U.S. universities; two Mexican universities; private industry; and federal, state, and county government agencies. The event was coordinated to highlight cross-border as well as domestic partnerships with workshop stations held at Empire Ranch (Bureau of Land Management), Tubac Presidio State Historic Park (Arizona State Parks), Historic Hacienda de la Canoa (Pima County Natural Resources, Parks and Recreation), and Mission San Xavier del Bac (Tucson Diocese of the Catholic Church & Tohono O’odham Indian Reservation).

This year’s event also included presentation of the Director’s Partnership Award to R. Brooks Jeffery, Director of the Drachman Institute and Chair of the Heritage Conservation Program at the University of Arizona. The award was presented by Dr. Stephanie Toothman (Associate Director of Cultural Resources, Partnerships, and Science) to recognize Mr. Jeffery’s 15-year partnership with the NPS, the Desert Southwest Cooperative Ecosystems Study Unit (DS-CESU), and facilitation support of the TICRAT workshops. Additional dignitaries included José Luis Perea González (INAH State Director for Sonora), Francisco Rios (INAH State Director for Sinaloa), and Tom Lincoln (IMR Assistant Regional Director for Cultural Resources). Coordination for this year’s TICRAT was provided by Tumacácori National Historical Park. Funding was provided by the Southwest Border Resource Protection Program through the Desert Southwest CESU.

Developed by NPS preservation staff and colleagues from INAH (Instituto Nacional de Antropologia e Historia), TICRAT offers hands-on field opportunities for preserving fragile earthen architecture. Numerous historic earthen architecture sites within the NPS suffer from neglect and historical use of incompatible preservation materials and techniques. The workshop is designed to bring together experts from the NPS, INAH, universities, non-profits, and the private sector to share information and skills related to preservation. Through the course of the workshop, participants transform worksites from once deteriorating and collapsing historic structures to well-preserved sites capable of withstanding the impacts of weathering, neglect, and damage.

Through the TICRAT workshops, the NPS builds the skillsets of preservation staff while improving the consistency and quality of preservation practices being used across protected sites. Students in the U.S. and Mexico participate from a breadth of disciplines including architecture, engineering, archeology, planning, landscape architecture, and historic preservation. These students are given exposure to leading preservation specialists in their fields and become advocates for the work of the NPS and INAH. This field-based training and collaboration with diverse partners builds the capacity of NPS staff to enhance the protection of NPS resources and sites.

**PARTICIPATING ORGANIZATIONS**

Partnering Federal Agencies

- Bureau of Land Management
- Forest Service
Pima County Natural Resources, Parks and Recreation
   Historic Hacienda de la Canoa
Arizona State Parks
   Tubac Presidio State Historic Park
Instituto Nacional de Antropología e Historia
   State Division of Morelos
   State Division of Sinaloa
   State Division of Sonora
National Park Service
   Arches National Park
   Canyonlands National Park
   Channel Islands National Park
   Desert Southwest Cooperative Ecosystems Studies Unit
   Intermountain Region Office
   Fort Bowie National Historic Site
   Fort Union National Monument
   Hovenweep National Monument
   Montezuma Castle National Monument
   Natural Bridges National Monument
   Salinas Pueblo Missions National Monument
   Santa Fe IMR Archeology Program
   Santa Fe Historical Preservation Program
   Sunset Crater Volcano National Monument
   Tumacácori National Historical Park
   Tuzigoot National Monument
   Vanishing Treasures Program
   Walnut Canyon National Monument
   Washington Office
   Wupatki National Monument
Non-profits
   California Missions Foundation
   Empire Ranch Foundation
   Friends of Tucson’s Birthplace
   Pimeria Alta Historical Society
Tucson Diocese of the Catholic Church
   Patronato San Xavier
Private Industry
   IS Architecture
   Pat Taylor Inc.
   Vint & Associates
Tribes & Affiliated Organizations
   Fort Apache Heritage Foundation, Inc
   Sustainable Nations
   Tohono Restoration
   Tohono O’odham Indian Reservation
Universities - Mexico
   Universidad Autónoma Metropolitana - Xochimilco
   Universidad de Colima
Universities – United States
   Columbia University
SUMMARY OF EVENTS

March 14th, Monday
Best Western Hotel, Green Valley

• TICRAT Registration
• Welcome Reception

March 15th, Tuesday
Tumacácori National Historical Park, NPS and Tubac Presidio State Park, State of Arizona

• Opening Ceremony
• Introduction to Earthen Materials, Part I: Soil
• Building Assessment: Convento
• Adobe Wall Stabilization and Repair
• Building Assessment & Stabilization Treatments Tour
• Picnic Lunch in TUMA

March 16th, Wednesday
Empire Ranch, Bureau of Land Management

• Cement Plaster Removal and Wall Assessment
• Mud/Lime Plaster Application
• Adobe Wall Repair
• Interior Plaster Repair and Patching
• Chuck Wagon Lunch

March 17th, Thursday
Historic Hacienda de la Canoa, Pima County

• Adobe Wall Construction
• Introduction to Earthen Materials, Part II: Lime Cycle
• Lime Plaster Application
• Wall Removal and Mud-work
• Live Music and Dinner

March 18th, Friday
Tumacácori National Historical Park, NPS

• Painted Surface Finishes (Presentation)
• Demonstration of Surface Finishes Treatment
• Guided Tour of Ongoing Preservation Projects at TUMA
• Visit to Mission San Xavier del Bac
• Closing Ceremony
Day 1: Tumacácori National Historical Park (Opening Ceremony and Modules A & B)

Mission San Jose de Tumacácori is a Spanish Colonial Franciscan adobe church, originally founded by Father Eusebio Kino. Built between 1801-1848, it was declared a National Monument in 1908 and is protected by the National Park Service.

Opening Ceremony

Dr. Stephanie Toothman, Associate Director for Cultural Resources, Partnerships and Science, made a special appearance to commemorate the 100th Anniversary of the National Park Service and to kick off the workshop. Professor R. Brooks Jeffery was presented with 2016 NPS Director’s Partner Award for his 15-year partnership with the NPS, the Desert Southwest Cooperative Ecosystems Study Unit (DS-CESU), and facilitation support of the TICRAT workshop. Additional participants in the opening ceremony and awards presentation included Alex B. Lim (TUMA Exhibits Specialist), Tom Lincoln, IMR Regional Assistant Director for Cultural Resources, TUMA Superintendent Bob Love, and two dignitaries from INAH, José Luis Perea González (State Director for Sonora) and Francisco Rios (State Director for Sinaloa).
Presentation of the 2016 NPS Director’s Partnership Award (from left: Bob Love - TUMA Superintendent, Dr. Toothman, R. Brooks Jeffrey, Tom Lincoln - IMR Assistant Regional Director for Cultural Resources). NPS Photo by Maggie Zamarripa.

Characterize soil and make sun-dried bricks.

Clockwise from top left: (from left) Frida M., Tom L., and Katerina V. making soil extrusions to test for plasticity; (from left) Kate G., Eloy W., Patrick R. and Andrew V. testing soil mix; (from left in uniform) Billy O., Sean H., and Ray M. making adobes as Dr. Toothman looks on. NPS Photos by Maggie Zamarripa.
Module B: Building Assessment (Convento Ruin)

Review earthen architecture conditions and graphically annotate them based on the glossary of conditions.
Day 1: Tubac Presidio State Park (Modules C & D)
Tubac Presidio State Park consists of the ruin of Spanish presidio (fort) founded in 1752 and late 1800’s adobe houses of the town of Tubac, including the ruin of Tack House. The community of Tubac has protected the site through Public-Private partnership with the state of Arizona since 2010.

Module C: Adobe Wall Stabilization and Repair (Tack House)
Introduction to basal repair and wall capping

Clockwise from top left: (from left) Kristina C., Bill O., and Chris S. reconstructing an adobe wall; Erica A., Jose C., and Nicole L. stabilizing wall top; Alex N. and Isaac R. examining adobe wall. NPS Photos by Maggie Zamarripa.
Module D: Building Assessment and Stabilization Treatments Tour (Pennington House)

Review of treatment strategies for vernacular earthen architecture

David Y. (seated) sharing the history of the Pennington House. NPS Photo by Adam Springer

(From left) Pat T., Eirini B., Vincente G., Rachelle H., and Elizabeth P. examining wall base. NPS Photo by Maggie Zamarripa
Day 2: Empire Ranch (Modules E, F, G, and H)

Empire Ranch is a working cattle ranch consisting of several adobe structures including the main Ranch House and Hay Barn, among others. It was one of the largest in Arizona. Since 1988, it has been administered by the Bureau of Land Management in collaboration with the Empire Ranch Foundation.

Module E: Cement Plaster Removal and Wall Assessment (Ranch House)

Removing failing stucco and examining conditions

Top: (from left) Chris S. and Ray M. examining deteriorating wall base
Bottom: (from left) Donald H. and Tania A. applying soil render. NPS Photos by Alex Lim
Module F: Mud/Lime Plaster Application (Ranch House)

Treatment of eroded adobe wall base

Top: Katerina V. dry mixing clay and sand.
Bottom: (from left) Donelle H. and Dempsey Q. applying soil render. NPS Photos by Alex Lim
Module G: Adobe Wall Repair

Techniques for tuck pointing and soil plaster edging

Top: Students tuck pointing adobe wall
Bottom: (from left) Bob H., Erica A, and Jessica B. tuck pointing. NPS Photos by Adam Springer
Module H: Interior Soil Plaster Repair and Patching

Techniques for assessing and repairing interior soil plaster

Top: (from left) Francisco U. and Luis F. characterizing soil size using readily available plastic bottle.
Bottom: Francisco U. exploring the causes of structural cracks. NPS Photos by Alex Lim
Day 3: Historic Hacienda de la Canoa (Modules I, J, K, and L)

Hacienda de la Canoa was established in 1821. The existing structures were built by the Manning family in the early 1900’s. Pima County Natural Resources, Parks and Recreation division and site volunteers take care of the site.

Module I: Adobe Wall Construction (Boundary Wall)

Building an adobe wall
Module J: Introduction to Earthen Materials, Part II: Lime

Basics of lime and the use of cactus mucilage, soap and alum to extend lime service life

Clockwise from top left: (from left) Luis F. and Todd S. evaluating lime putty; (from left) Eloy W., Luis F., Fernando R., and Erica A. examining lime polish; (from left) Adam S., Jessica B., and Erin G. listening to the instructors. NPS Photos by Alex Lim
Module K: Lime Plaster Application (Foreman House)

Safety instruction on the use of lime, mixing techniques, and application on adobe wall

Top: Francisco U. and Pat T. checking the wind condition with a handful of soil during lime mixing.
Bottom: Mark A. applying lime render. NPS Photos by Alex Lim
Module L: Wall Removal and Mud-Work (Courtyard Site Walls)

Removal of failing plaster, assessment, and soil rendering

Top: (from left against the wall) Richard H. and Simon H. reviewing the drying soil render. NPS Photo by Adam Springer

Bottom: (from left) Katerina V., Gabrielle M., Sheldon B., and Vanessa F. throwing mud balls onto adobe wall. NPS Photo by Alex Lim
Day 4: Tumacácori National Historical Park (Module M and Closing Ceremony)

**Module M: Architectural Surface Finishes**

*Review of methodologies for investigation and characterization of surface finishes and treatment demonstration*

Top: Presentation on Mission San Jose de Tumacácori Facade conservation project

Bottom: Frank M. demonstrating the use of hydraulic lime for injection grouting. NPS Photos by Adam Springer
Closing Ceremony

2016 TICRAT ended with certificate hand-out by José Luis Perea González (INAH Sonora), R. Brooks Jeffery (the University of Arizona), and Bob Love (TUMA Superintendent).
Additional Photographs from 2016 TICRAT Workshop

Clockwise from top left: Greg Kleppinger; Ann Galer; Randy Skeirik; Maureen McDonald and the Empire Ranch Foundation Volunteers; Cab Belk and Lori Thwaite; Stacy Tomczyk; and Norman Albert. NPS Photos by Adam Springer and Alex Lim
Clockwise from top left: Shaw Kinsley of Tubaci Presidio State Park; Alex La Pierre (TUMA); Francisco Lopez (TUMA); (from left) Billy Olivarrria and Ray Madril (TUMA); Alex B. Lim (TUMA); and Maggie Zamarripa (TUMA Intern). NPS Photos by Alex Lim and Adam Springer.
Lopez Waila Band from San Xavier Indian Reservation performing at Canoa Ranch dinner, NPS Photos by Alex Lim
Clockwise from top left: Gabriell Miller; Ian Hough; (from left) Adam Springer, Bob Love, Isaac Romero, and Francisco Rios; Martín Terán Danzós; and Alaa Eddin Arar. NPS Photos by Alex Lim
Clockwise from top left: Eric Herrera and Martín Terán; Eirini Boutasi; (from left) Roger Portillo and Lauren Meyer; and (from left) Noreen Fritz and Sarah Reddan. NPS Photos by Alex Lim
Top: (from left) Luis Fernando Guerrero Baca, Todd Scarbraugh, Nicole Lavely, and Andrea Sforza
Bottom: Cab (Charlie) Belk. NPS Photos by Alex Lim
Clockwise from top left: (from left) Frida Mateos and Luis Fernando Guerrero Baca; Chris Schrager; David Yubeta; and (from left) Pat Taylor and Francisco Uviña Contreras. NPS Photos by Alex Lim