

TICRAT Workshop

Prior to my internship with the Historic Santa Fe Foundation, I was able to attend the TICRAT workshop and Terra conference which were held back-to-back in June.

TICRAT (Taller Internacional de Conservación y Restauración de Arquitectura de Tierra, or International Workshop on the Conservation and Restoration of Earthen Architecture in English) is organized every couple years by the National Park Service and INAH (the counterpart to NPS in Mexico). This year it took place in Abiquiú, NM, and included collaboration with University of Arizona, University of New Mexico, and Cornerstones Community Partnerships.

The TICRAT workshop was a great chance to meet people from many different career paths and places around the world. A significant portion of the attendees were employees of the National Park Service from western states. International attendees came from as far away as Algeria, Iran, Nigeria and Burkina-Faso. There were also professionals and laypersons representing several indigenous communities from the Southwest region of the USA.

There were two days of hands-on workshops, where we were divided in four groups and rotated through modules throughout the day: Introduction to Earthen Materials, Adobe Making, Exterior Plastering, Interior Plastering, Building Assessment, Adobe Wall Stabilization and Repair, Basal Erosion, Earthen Roofing.



INAH conservator Haydeé López Hernández teaches a module on lime applications



Adobe brick making workshop module

Buildings near the town square of Abiquiu, many of which were in various stages of significant deterioration, were used as real-life examples and teaching tools. These buildings had been owned and occupied by families for generations, but more recently had become vacant after Abiquiu's population and economy had declined. The current owners of the buildings were able to stop by and tell the students their memories of the homes. One of the goals of the workshop was to raise more awareness amongst the residents of Abiquiu about the importance of conserving and restoring earthen architecture.

I was particularly glad to have made friendships with the four INAH instructors from Mexico and look forward to connecting with them at a future TICRAT. Their backgrounds in archeology and building conservation were a valuable addition to the weekend.



An example of a deteriorating home in Abiquiu, NM



During and after a series of preservation treatments that addressed the eroded base of the wall, and the replacement of bricks on the side and above the window opening

Terra 2022 World Congress

Immediately following TICRAT was the Terra 2022 World Congress on Earthen Architectural Heritage, which is sponsored by the Getty Conservation Institute, National Park Service's Vanishing Treasures Program and University of Pennsylvania's Stuart Weitzman School of Design. The conference happens every 3-4 years around the globe, and was last held in New Mexico in 1990. The keynote speeches highlighted the trajectory of the study and preservation of earthen architecture during the last 50 years since the first World Congress held in Yazd, Iran.

The conference also featured keynotes and roundtable discussions focusing on indigenous inhabitants of the area and the way these communities have stewarded their earthen architecture. Representatives of the National Park Service acknowledged the ways in which indigenous sites and buildings have not always been given the care they deserve.

Brian Vallo, Governor of the Pueblo of Acoma, spoke about his childhood memories of his family's adobe home which is located on Acoma's main square. He recalled how, during social and ceremonial events, it became common for hundreds of people to gather on the roof of the home to have a view of the square. His family eventually decided to upgrade the structural support system of the roof using unconventional industrial materials to accommodate this weight in a safe manner. It was a decision he didn't take lightly, but was a compromise made that recognized how important the practice of hospitality toward visitors had become to his family. Governor Vallo highlighted the ways his community and its built environment is facing new challenges (including Covid), and how these were being approached in a holistic manner.

Several other speakers talked about the influx of government housing assistance to Pueblos, which led to manufactured homes being erected on the outskirts, leading to the center of town being abandoned and important building and seasonal maintenance skills being lost. One speaker alluded to the vision of bringing back the life of the central square by rehabilitating surrounding homes, and said one goal was to have elders be able to sit on their thresholds surrounding the square and have conversations, just as in previous eras.

I had the opportunity to attend dozens of other presentations by authors of papers across 'Tracks' (Care by and for Communities, Conservation Research and Practice, Education, Archaeological Sites, and Historic Buildings and Structures). I'm including a brief synopsis of some of the more memorable presentations:

The Past and Future of Adobe Heritage at Ohkay Owingeh (presented by Shawn Evans): Shawn Evans emphasized the importance for tribal communities to implement self-determined preservation priorities and practices, even when these approaches might not always be in line with Secretary of Interior Standards. The project he was a part of in the Ohkay Owingeh community showed that "...vernacular authenticity extends beyond historic materials, that change can be accommodated, and that integrity lies in the relationship between community life and place."

Teaching Earthen Construction and Conservation of Monuments in an Architecture Department in Peru (presented by Luis Andres Villacorta Santamato): Luis Andres Villacorta Santamato is an architecture professor at one of Lima's top universities. Peru has a long history of earthen architecture, yet up until recently, there was little formal focus of this in university curricula. The presenter spoke about implementing mandatory classes as part of the architecture degree, the first of such initiative in the country. Students engage with hands-on design and build projects that feature various earthen building techniques, and become familiar with the care of Peru's rich earthen architecture heritage.

Earthen Architecture of the Ancient Ohio Valley (presented by John E. Hancock): This was part of a symposium of several other papers focusing on the Hopewell Ceremonial site in Ohio. In preparation for a nomination of this site for consideration on the UNESCO World Heritage List, research has been conducted to understand the intricacy of the design that went into this often-overlooked site. New analysis has revealed ways that these mounds were accurately oriented relative to many celestial phenomena.

A Framework for Identifying and Monitoring Site Vulnerabilities and Establishing Sustainability Indices for Earthen Ruins in the Arid West (presented by Evan Oskierko-Jeznacki): Fort Union National Monument in New Mexico is the location of almost 300 earthen wall segments. Preservation of these ruins needs to be informed by an awareness of climate change and site-specific weather patterns. Researchers set up time lapse video cameras as a way to discover subtle ways that snow and precipitation was affecting walls, and thus able to prescribe preservation plans that took these details into account.

Cross-Disciplinary Approach to the Analysis and Preservation of Earthen Architecture Heritage: The Case of La Joya, Veracruz, a Classic-Period Mesoamerican Site on the Mexican Gulf Coast (2004-2020) (Presented by Annick Daneels): The use of bituminous (petroleum-based) additives in earthen preservation is often controversial, as it is seen as a modern solution that isn't 'compatible' with traditional buildings. The presenter made a compelling case for their use in preservation treatments at this specific archaeological site, in part because of recent research that shows the presence of bitumen in the makeup of the historic earthen mixes. The presenter also offered some interesting considerations that went into coating an entire pyramid in a protective coat of temporary earthen plaster, which will be removed once the archaeological site is able to acquire funds to implement a longer-term preservation plan.

Under a Modernist Skin: Preventive Conservation of Traditional Adobe at Georgia O'Keeffe's Home and Studio (Pamela W. Hawkes): Research is showing the ways in which the maintenance and changes made by Georgia O'Keeffe to her 19th century adobe home in Abiquiu are holding up, and what lessons can be learned by some of the approaches she used, some of which are now discouraged as they may cause more harm than good in the long run.

The Southwestern US Modern-Era Adobe, 1910-1960: A Conflict of Materials and Methodology (Ione R. Stiegler): Similar to the O'Keeffe case study mentioned above, this paper looked at how approaches

to adobe construction and preservation have changed over the last century. “What does a conservator do when the very historic fabric one is to preserve is deteriorating the structure?”

A special mention should be made of one of the attendees at the Congress, Sandro Canovas. Sandro is an activist and earthen architecture enthusiast, and he brought and displayed his collection of hundreds of books, manuals, and other ephemera on vernacular and earthen architecture. He firmly believes that ‘Adobe is Political’, a slogan on one of his posters (a good introduction to the politics of adobe can be found at <https://www.youtube.com/watch?v=fr61tgMl4gY> and <https://www.nps.gov/articles/000/defend-the-adobes-discriminatory-taxes-on-adobe-homes-in-west-texas.htm>).



A portion Sandro Canovas' impressive library

The Terra 2022 conference ended with a tour to see the Fort Union National Monument and Pecos National Historical Park. Our group had a chance to hear from Park employees and from Frank Matero, who is a professor of Historic Preservation at the University of Pennsylvania, and has worked extensively in New Mexico in preservation projects with the NPS.



Pecos National Historical Park

At Fort Union, we saw up-close how the walls are deteriorating, and measures put in place to slow this down. Adobe walls, whether in traditional pueblo buildings or in more recent settler buildings, depend on roof beams to maintain structural integrity. However, re-building roofs on these wall ruins is not currently feasible under NPS preservation standards. Policies may need to change to allow roofs. The tour guides highlighted the ways that walls are surveyed, including the important switch in paradigm from identifying structures by the rooms they once housed, and shifting towards an resource inventory that identifies specific walls, which are each deteriorating at different rates due to varying exposure to weather and elements.



Fort Union National Monument



Structural stabilization of adobe walls that might otherwise benefit from having a roof system

Faith and John Gaw Meem Preservation Trades Internship

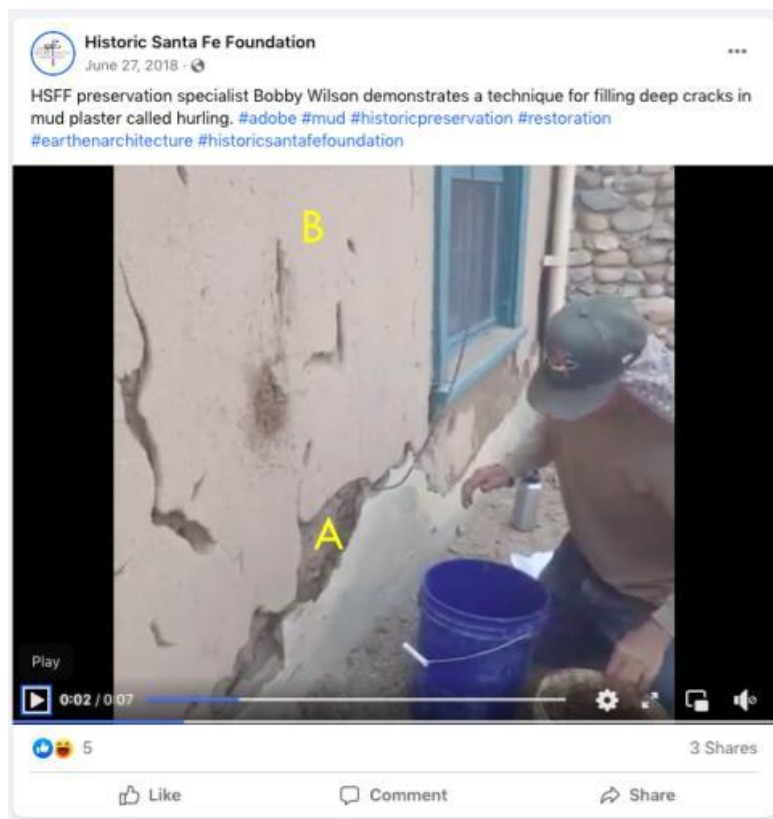
My internship with HSFF consisted of 6 weeks primarily on-site at El Zagan building located on Canyon Road in Santa Fe. My first week included an orientation to the city's historic neighborhoods and an overview of how the Foundation's work fits into a bigger context of preservation advocacy and community engagement in the region. My main project was to re-plaster the north wall of the main El Zagan structure that currently house's the Foundation's headquarters and gallery space. The building has two foot thick adobe walls and dates from the mid 1800s, and has seen many layers of maintenance and modifications since then.

I spent the first week locating areas of plaster along the wall that were loose and hollow. These loose areas would easily detach from the wall and were often located around areas composed of materials such as metal lathe mesh, electrical conduit, stone, brick, or concrete. The wall appeared to have two distinct exterior visible layers of mud plaster: an older layer of pink-hued mud with coarse sand, and a newer patchwork of repair plaster with a higher percentage of straw.



A: newer patchwork of repair plaster, B: older layer of pink-hued mud

Based on a HSFF Facebook video, the straw-rich layer is likely from repair work done to the pink-hue layer in 2018. It is unclear how old the pink-hue layer is.



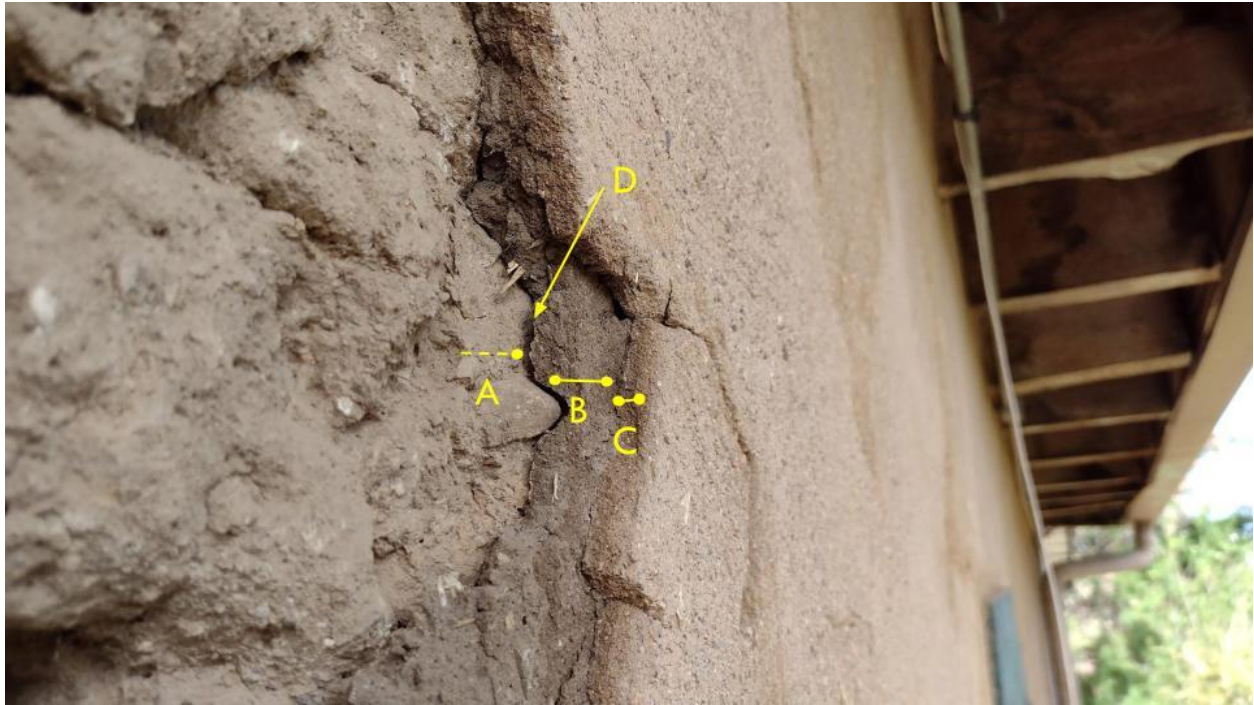
A: newer patchwork of repair plaster, B: older layer of pink-hued mud

Upon dampening the visible plaster layers, I noticed that some areas seemed to repel the water and would not darken like adjacent layers. The vertical pattern seemed to match that of a paint roller, so it is possible that a transparent sealant was added at some point on top of the pink layer.



Arrows indicate possible location of a less permeable treatment on plaster

Below the newer visible layers are several older layers on top of the adobe wall. It is assumed that the layer closest to the adobe is the mud plaster layer that first coated the building when it was first built, but there is no record of this or way to confirm this assumption.



A: adobe brick wall, B: early (original?) layer of earthen plaster, C: Newest layer of earthen plaster, D: Gap typical of areas where early earthen plaster had separated from adobe wall

It is worth noting that the plaster would often detach from the wall at this location where the oldest plaster layer and the adobe wall meet. Tapping the loose plaster with a tool would often result in loose material falling out of this gap. This suggests that subsequent layers of mud plaster had good adhesion with each other, but the oldest layer becomes delaminated from the adobe wall with greater ease. This may be because of a silt-rich, clay-poor plaster mix with poor adhesion having been used as the first layer when the building was first coated. The layer closest to the adobe wall had a dull brown color and felt dusty and crumbly to the touch.



A: Likely a layer of the adobe brick that adhered to layer B, B: earliest layer of earthen plaster C: latest 'pink' layer of earthen plaster

I located areas on the wall that already had cracks, or were notably hollow-sounding, and removed these loose areas of plaster first. Behind these loose areas were often empty spaces between adobe bricks, or places where the mortar had crumbled or become unsound. These areas often had cobwebs or other loose material stashed by small animals.



Example of area with loose/crumbled adobe bricks and presence of cobwebs

The longest continuous hollow area behind the wall, and also the deepest that I encountered, was at the location where the early adobe building and a subsequent addition came together. The crack ran from the base of the wall up to the roofline.



Before (left) and after (right) removing the plaster around the gap between the newer (A) and older (B) building



Use of drywall mesh tape used in previous repair efforts near large gap



View of entire Northern wall during crack repair, before earthen plastering began

The bricks from the two different walls seem to have separated approximately 2 inches at the widest part of the gap. This is likely caused by the foundation and walls settling at different rates. However, given that there was no significant widening of crack on the most recent layer of plaster, it can be assumed that this settling and separation happened early on in the building's history. Subsequent removal of loose material I did in this area opened up the gap even more, and the adjoining exterior plaster to an even greater extent.



Separation of adobe bricks at union of new and old wall

If the building had shifted more recently, and after the most recent layer of plaster, a more obvious superficial crack would be visible. Ideally, when the addition was built, some bricks would have been removed from the old wall, and the new wall would have been 'stitched' into the old wall every few courses of bricks.

Once the gaps and cracks were cleared, the next step was to fill in with earth up to the level of the adobe bricks. I did this with two types of mixes depending on the ease with which they could be applied. The first type was a 'dry mix' of the same proportions of clay, sand and straw used for plaster, but with little water. This would be tamped into gaps. However, the loose nature of this 'dry mix' was difficult to apply to hard-to-reach areas, and often resulted in most of the material falling out of the gaps while I attempted to pack it in. I found that a wetter cob-like mixture with higher proportions of straw was much easier to apply, in particular in the large gap by the addition.



Left: Large gap between old and new wall is partially filled, Right: Gap has been fully patched

After the gaps between the adobe blocks were filled in, and areas around doors sculpted back into form, I patched up the gap in the plaster with another layer of plaster so that the plane of the wall was mostly contiguous and even.



Left: Before crack repair and filling Right: after repair



Loose material around door is removed (compare with next photo)



Yellow outlines highlight areas that had significant filling and repair, this wall is now ready for final exterior plaster

Once this was done, it was time to add a final layer of plaster. I began this process of adding a final layer of plaster on the western end of the building even while there was still repair work to do on the remainder of the wall. We had a group of Youth Conservation Corps members who helped add a layer of plaster along the lower half of the wall near the gallery window.



Members of the Youth Conservation Corps applying the first layer of new plaster

I worked my way east along the wall, working in segments approximately 4' wide at a time using various trowels. I would try to find a place along the wall with the shortest length to stop for the day. Blending a fresh layer of plaster with the layer that had been applied the previous day was a little difficult, so smaller dry bonds were best.



When the plaster is freshly applied, the straw contrasts with the damp clay

The mix I used for the plaster was 8:5:1 clay:sand:straw by volume, and each batch tended to be that ratio measured in gallons (ie 8 gallons, 5 gallons, 1 gallon respectively). The clay was from a stockpile stored near the HSFF parking area, and the sand was Quickcrete Play Sand from a hardware store. The straw was chopped with a leaf mulcher. The measurement for the straw was the least consistent across batches, as the straw was processed into varying degrees of fineness by the mulcher.



A gallon of prepared earthen plaster ready for application

I would try to prepare a batch of plaster one day ahead of being used, so that all the materials, especially the straw, would have enough time to hydrate completely and evenly. Enough water was added to make a plaster easy to handle and spread. Throughout the day, water would be added to the mix, as it tended to dry out in hot summer weather rather quickly. A mix that had dried out too much would feel too sticky and required too much effort to spread evenly.



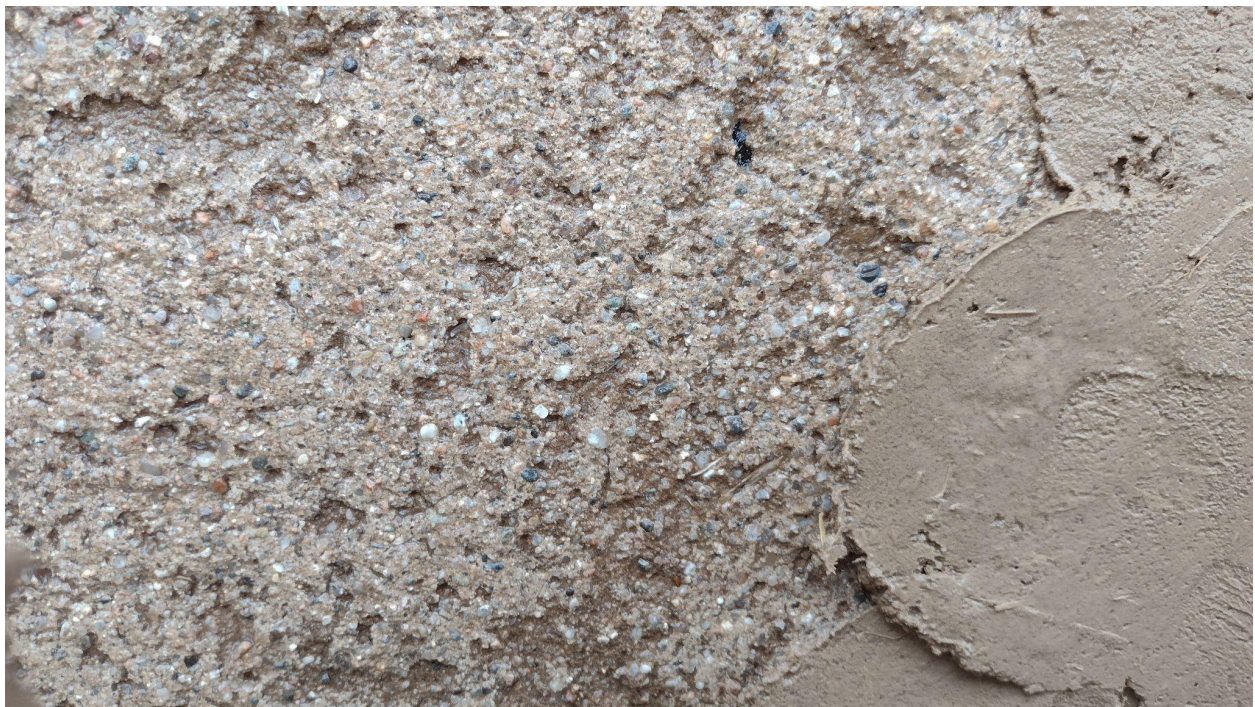
This plaster has become too dry and stiff to easily work with

As the plaster would dry, there were areas that began to show cracks. These tended to be in places where the thickness of the newly applied plaster was inconsistent, or where there were two adjoining surfaces of differing materials (ie electrical conduit, etc) or differing batches of plaster (ie in a location with a newly repaired patch with cob adjoining to an older plaster area). To remedy these cracks, the wall was misted and pressure was applied around the cracking area with a trowel to slightly spread the drying plaster across the crack. If the wall had dried out completely overnight and

cracks were present, I would dampen the area, add some extra-fine sand and clay mix into the crack by hand, and massage the area so the newest material would blend into the plaster.



Freshly applied plaster using coarse trowel strokes, which are then smoothed over in another pass with the trowel while it dries



Freshly applied plaster (right) contrasts with the 'pink' layer underneath



Much appreciated assistance to get the final layer of plaster applied

The doorways and window presented a challenging task of adhering the plaster to an overhung surface. I found that the typical plaster mix I was using would often peel off. I smeared a thin layer of very moist clay to the older plaster, this seemed to help the newer layer of plaster adhere to the overhangs. The curves of the door and window openings were difficult to apply plaster on a perfectly smooth fashion, so I opted to leave slighted fluted trowel strokes parallel to the length and width of the openings.



Final plaster layer applied to curved door opening

While working on the last part of the wall, I found some problems in the upper eastern corner that I had previously overlooked due to it being a difficult area to reach by ladder. This corner is where the timber rafters from the interior sit on the wall, alongside a lintel, some bricks, an electric conduit, a leaky downspout, and the stone buttress. Part of this area had been patched up with a cementitious plaster that had almost no adherence to the adobe wall. There were also areas that had been burrowed by an insect that had left large larvae behind, and plenty of loose cobweb. Removing the loose mud and mortar left a large area exposed. As with the other part of the wall, this was built up using a cob mixture, and finally, a couple layers of mud plaster.



A: Modern stucco plaster, B: cement element, C: recent earthen plaster (note insect entries),
D: 'pink' layer of plaster



Removing layers of loose cement plaster



Recent insect burrowing and larvae



Corner area once all loose material had been removed



Corner area with voids filled with cob and initial layer of plaster covering wooden elements



Final layer of plaster on northeast corner of wall

Aside from the replastering project on the wall at El Zaguan, I had a chance to work on painting a wall at the Randall Davey House, further up Canyon Road. Previous work had already been done to repair deteriorating material along the staircase to the second floor of the house. The wall needed a couple more coats of limewash, which is a simple mixture of lime and water.



Limewashed wall along stairwell at Randall Davey house