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EARTH HERITAGE IN THE UNITED STATES : A “HISTORY FROM BELOW”

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Abstract

Thanks to the opportunity offered by the Richard Morris Hunt Fellowship, I developed a research project about earth architecture in the United States. During six months, I travelled all over the country in more than twenty states, not only in the most representative regions regarding earth architecture (Four Corners, California, ...), but also in more unexpected areas as the Eastern coast, the Finger Lakes, the Mississipi Valley and the South-East.

My approach is deliberately large and include the extraordinary variety of earthen techniques that we can find in the United States (adobe, rammed-earth, wattle-and-daub, cob, sod, tabby, mix of tires or bottles and clay, …), and also a large historical period from the pre-colombian mound-builders to the contemporary realizations, including Native, colonial and XXth century earthen heritage, when a continuum was established between earth and concrete techniques. Thanks to an architectural, social and ethnological approach, the goal is to establish some transverse connections between fields of research and between accepted cultural areas.

The results of this research, that I would like to develop for the very first time during “Earth U.S.A. 2013”, are based on this necessarily selective - but critical and vivid - inventory of earthen heritage, that highlight the close relation between political, social, geographical, scientific and cultural history of the United States. This research leads to the comparison and superimposition of thematic maps. They show how pre-colombian knowledge, migrations flows (from Europe, Africa, Haiti, China, Mexico, ...), climatic

conditions and geology, can justify the distribution of the different earth typologies used on this territory.

I also will focus on the influence of the Natives' believes and practices (Creation myth, women practices, ...) during the different earth architecture revivals (1880s, 1920-30s, 1970s, …).

In the end, this research propose an “history from below” of the North American territory, that is to say an history based on minor communities and populations, secondary events and belittled material. For instance :

- Earthen pre-columbian mounds reveal scientific and astronomical knowledge,
- Chinese rammed-earth hovels in California show the attraction of this area during the Gold Rush,
- Earthen houses in the North-East reveal the tremendous challenge of the Erie Canal construction,
- Earthen battlefields remind us the line of the Secession War,
- and adobe neighborhoods in major cities remind us the huge programs proposed by Roosevelt to raise the country...

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Keywords : constructive techniques, history, ethnology.

This study about earthen heritage in the United States was launched in 2012. After a six-months field-survey realized in twenty states, the wish to write of technical, architectural, social, and economical histories of this country through its earthen heritage was born. The « history from below » that resulted from that research is different from an official and political history : it deals with minor communities practices and refers to the question of the American identity, on a territory that poet Walt Whitman qualified as « Nation of Nations ».

The approach is deliberately expansive, not specialized in one technique, nor focused on a special period or region. But it is not a Prévert-style inventory either, that wouldn't make sense on an individual scale. The goal is to identify key examples and to connect observations in time (influences of Natives' practices until today, earth-revivals) and space (influences of European techniques during colonization,

internal migrations of the savoir-faire from the East to the West, …) in order to testify of a history « in motion », with both an architect's and a historian's point of view. For this reason, it was necessary to complete this research by showcasing a few topics. This paper portrays three of them in particular: Dutch earthen houses in Brooklyn, Chinese rammed-earth in California and adobe experimentations under President Roosevelt administration.

The sources that proved to be effective for this study vary from state to state. Where earth architecture is well developped, online databases were very usefull (National Register of Historic Places, H.A.B.S., digital public archives, S.H.P.O. and university inventories, archaeological reports, ...). In other states, the best ways to find examples of earth construction were to follow the National Historic Trails that gave directions of development during several decades, but also to study historic atlases of migrations and to considerate toponymy, that often signals nature of soils (i.e. *Mud Lake*) or a common local technique (i.e. *Adobe Road*). In some cities, fire insurance maps are relevant documents since they show what materials each house is made of (such as stone, timber or earth), for flammability ratings. Finally, the main sources were the buildings themselves, especially basements and attics that are often more genuine, and their owner's testimonies.

Dutch Earthen Houses in Brooklyn (17th-19th century)

Brooklyn, New York City. Along Kings Highway, between a car wash and a McDonald's, stands the **Wyckoff Farmhouse**, built in 1652 of wattle-and-daub. Like at least a dozen of other houses in Brooklyn, it constitutes an extraordinary testimony of the oldest new-comer's habitat in the United States. We are used to talk about the « Dutch houses », in reference to the Dutch roots of Brooklyn, but the origin of these houses is much more complex. Thanks to the collective involvement of architect Richard Pieper, the New York Landmark Conservancy and the Brooklyn Museum, who were very helpful to localize these houses inside a dense urban environnement, this chapter intends to identify this hidden heritage.

When the *Dutch West Indies Company* started to colonize the western part of Long Island (now, Brooklyn) in 1636, the land was inhabited by Delaware Indians. The colony area rapidly grew : large farms and six Dutch cities were established. In 1664, the English took control of this area and anglicized the toponymy : this region became Kings County[1]. Brooklyn's cultural heritage also comes from Holland (50% of the settlers), but also Germany (18%), Walloon and Flemish provinces (7%), France,

1 For a brief history of Kings County and its main Dutch houses, see DILLIARD (Maud Esther), *Old Dutch Houses of Brooklyn*, Smith, New York, 1945.

Scandinavia and England. These farmers brought with them many Black slaves, together with their knowledge about building skills (in function of their origin : framework, wattle-and-daub, cob or adobe) with their working tools, and adapted them to their new natural environnement, full of forests and ponds, that would provide timber and clay.

After a few attempts to build entirely wood houses (and consequently endure several fires), the settlers prefered a combined construction technique : half-timber with earth infill. The framework of these rectangular houses rests on stone or brick foundations. Made of parallel oak « H-bents », typical of Dutch architecture, the framework is hand-hewn and pegged. The space between these bents is filled with several kinds of material. Wattle-and-daub (mud and straw plastered on lath) has been observed in the original **Nicholas Schenck House** (1775). Some variants, like the ears of corn identified in the wattle-and-daub of the **Wyckoff Farmhouse** walls, show how settlers adapted this technique based on their environnement, and / or Native American practices. Another earth filling employed is nogging, entirely made of earth and straw. It may be formed as cob (wads of raw mud and straw) like at the **Hubbard House** (1830s) and **Joost Van Nuyse House** (1744), or as unburnt adobe bricks. More recently, lightly fired bricks were used.

The outside walls are covered with cedar shingle or clapboards, that protect raw-earth from humid climates. On the interior, they are plastered with 1-1/8" mud first coat and 7/8" mud and hair coat. A whitewash coat may be applied to this as in the **Wyckoff Farmhouse**. In wet rooms, such as cellars, harder lime coats made with burned clams have been observed (**Bennet House**, 1761). The best way to recognize these houses is to look at the profile of their roof. Inspired by Dutch architecture, the roof is overhanging and flared, resembling a witch's hat, and serves to protect the walls from driving rain. Floors are often made with white pine planks and

Figure 1 : *Stoothoff Baxter House in Brooklyn (NYC), built in 1747 and 1811.*

ceilings are insulated with mud and hair rough coating 1-1/8" thick applied on lath with lime finish coat as in the **Stoothoff-Baxter House** (1747). Original windows were wood with stretched linen, before glass panes were available in this area at the beginning of the 18th century.

Among the dozen of early houses still standing in Brooklyn, six have been identified as infilled with raw earth, including the **Nicholas Schenck House**, now presented as a period room in the Brooklyn Museum[2], **Wyckoff Farmhouse**, which is a museum, and **Wyckoff-Bennet**, **Hubbard**, **Stoothoff Baxter** and **Joost Van Nuyse houses**, which are all private residences. All are identified in the National Register of Historic Places, or classified as National Historic Landmarks. But a few others disappeared during the last decades, due to fire (**Duryea House**, 1775) or redevelopment projects (**Bennet House**, 1761). These losses should alert the public to the need for conservation of these houses, and the city of New York, in partnership with Brooklyn architectural historians, should protect this group of houses as a network of unique landmarks, and should propose a thematic trail that would underscore the importance of earthen heritage, in discovering the footsteps of the first settlers.

Chinese Rammed-earth Houses in California (1850-1880s)

Many are now familiar with the importation of rammed-earth in the United States by French architect François Cointereaux. However, few have heard of the pise revival that took place by Chinese migration in California during the Gold Rush.

Figure 3 : *Chew Kee store in Fiddletown (CA), built in 1850.*

Starting from the discovery of gold in California in 1848, 500 towns grew in a decade on the western foothills of the Sierra Nevada and in northen California. Gold seekers converged from many countries including China, where famines and political conflicts encouraged overseas emigration. Sino-American population increased in 1865-69 in the U.S., due to demand for workers building the Transcontinental railroads. These workers lived in seasonal and removable wooden camps. Others settled in new towns and offered specialized

2 See the analyse of the Nicholas Shenck house in STAYTON (Kevin), *Dutch by Design - Tradition and change in two historic Brooklyn houses*, Phaidon Universe, New York, 1990.

services. As a rather closed community at this time, Chinese settled in special plots, in what would become the first Chinatowns. Whereas Europeans built these cities with wood or stone and Mexican with adobe bricks, Chinese built rammed-earth houses, taking advantage of this free and fire-proof materials. Many Chinese settlers came from Guangdong (or Kwangtung) province, in Southeastern China. These Haka peoples brought with them the ancestral technique of pise, used in their homeland for un-fortified clusters of houses.

Today, only half of these « Gold Cities » still stand, and even less are still inhabited. On top of that, most of the Chinese migration archives were destroyed in San Francisco during the earthquake of 1906. But a few examples of these Chinese houses have been identified as part of the present study, and allow us to understand the basic pattern of this Chinese house typology. All are rectangular, one story, and have thick pise walls (11'-23"), with variable mold height up to 23". The composition of the rammed-earth is different on each site. At **Dutch Flat** for instance, a Chinese store built in the 1870s is made in earth, red gravel and vegetal fibers. At the mining city of **Calico**, Chinese migrant architecture is made with a deep red earth, a high density of gravels, small blue-yellow stones and small pieces of coal. Interestingly, Calico is a tourist attraction while the associated Chinatown is not well documented or visited. Even if the walls of this group of two or three Chinese houses are ruined today, and weakened by rising damp and salt crystallisation, it is the most authentic part of this large camp that has been entirely built in rammed-earth in 1881 after two fires, but then modified by a large concrete retrofit campaign during 20th century. Otherwise, earth walls are sometimes elevated on stone foundations, just like in **Dutch Flat,** located on the high slopes of the Sierra Nevadas, where snow falls are frequent. This small store also has fine stone splays which are planned to be plastered. It's difficult to know what the original top coat might have been because all of the examples visited have been entirely coated with mud or painted with colors imitating earth tint. On top of the horizontal lateral walls, an attic is delimited on each end with a wood gable, and is covered with wood rafters and metal sheets or wood shingles. Several archives, like the 1903 fire insurance map for **Grass Valley City**[3], mention that the tie

Figure 2 *: Calico Chinatown (CA), built in the 1880s.*

3 *City of Grass Valley - 2020 General plan*, chap. 13 « Cultural Resources », 1998.

beams were covered with red silk, a symbol of good luck in China, itself covered with about a foot of dirt. In case of fire, the silk burned and dirt felt on the floor, smoothering the fire. In addition, small windows were outfitted with heavy sheet-iron shutters and doors, that also could confine the volume in case of fire. In **Fiddletown** for instance, the Chew Kee store-house, built in 1850 by Chinese Herb Doctor Yee, as been recently restored by David Easton, and possesses a fine system of sheet metal sun-breakers on its main facade.

In the present state of scientific knowledge, Californian Chinese earthen heritage seems to be limited to only four sites. Two others were mentionned in 1949 in Virginiatown[4] but local population now seem to have last memory about it, and a local farmer told me that « a mud house » had been destroyed decades ago by its owner, since he couldn't repair it. This loss of memory may be caused by two historical factors. The first is the lack of recognition towards Asian communities in general, since the tensions made by the Chinese dumping during the end of 19th century. This phenomenon reached its peak between 1882 (*Chinese Exclusion Act*) and 1965 (*Immigration and Nationality Act*) : Chinese immigration was at that time higtly restricted and Asian culture in general was ignored. On that point, the ruined state of the Calico Chinatown speaks for itself, knowing that entire city was restored in 1950-70s, except for this Chinese quarter. Today, after decades of high rates of Chinese migration to America, an important pedagogical work must be undertaken, mostly on the touristic sites. What about a cultural claim by the Chinese-American minority itself ? The *Hansen Law*, described by historian M.L. Hansen in 1938, points out that there is a progressive change that usually takes place in the sentiments of immigrants : the first generation keeps in mind the tradition but is in a « survival » dynamic, whereas their children deny their own culture in order to be integrated in the land of welcome, and their grandchildren, already integrated, are « allowed » to claim their original culture. If true, this process would take 60 years. For the first Chinese immigrants wave arrived in 1850s, the cultural claim would have been arrived in 1910s, during the Asian repression. However, since that didn't take place, perhaps the 1970s second wave will wish to reclaim its identity about 2030...

Adobe Experiments During President Roosevelt's New Deal (1930s)

Earth construction, until the Great Depression, remained an individual practice based upon programs with single-use and modest scales. The New Deal launched by President Roosevelt (1933-1938) gave a

4 JENKINS (O.P.), « 1840s Through about the 1860s - Building Material & Stone Usage in the Mother Lode Region of California », in *Geologic Guidebook Along Hgwy 49 Sierran Gold Belt,* 141, San Francisco, 1949.

new life to this type of architecture through large projects such as public buildings, archaeological excavations, HABS inquiries and public improvements in living conditions.

Pueblo Grande de Nevada is one such project which was launched in 1935 by the Civilian Conservation Corps (CCC), one of the agencies that applied the policies of the New Deal. The project objective was to centralize the archaeological artifacts found on the site of the future Hoover dam site before flooding. A young team of CCC workers, managed by Fay Perkins, rebuilt a cluster of Puebloan houses excavated on this site by archaeologist M.R. Harrington. They reproduced the original shape used by the Native Americans, and built a new adobe museum inspired from Pueblo architecture. Also named Last City, this is one of the westernmost Pueblo sites in the United States.

Figure 4 : *Pueblo Grande de Nevada museum under construction by the C.C.C. (circa 1935). Courtesy of University of Nevada, Las Vegas Library.*

Roosevelt's projects also included the Subsistence Homestead Program that consisted of dividing farmlands and rehousing urban families in smaller plots, making a kind of cooperative. Forty-three of these housing estates are still standing. The **Phoenix Homestead Historic District** in Arizona is one such, built in adobe between 1935-37 by architect Robert T. Evans, in the Pueblo-Revival style. Sixty houses were built for middle-class families, who were required to prove their knowledge of agriculture and irrigation. The Jack Mott House, built by a banana farmer from Honduras, is one of the best preserved and it can stand as an example of this architecture. The Pueblo-Revival style is expressed in the general volume which includes a prominent chimney, irregular ground plan creating varied shadows, flat or low-pitched roofs, and also in the material used outside like adobe, vigas, ocre-brown cement plaster with tools prints visibles, schist slabs on the roof, ... Inside, the Pueblo identity is more sublte with adobe plastered with cement on a diamond grid, walls in wood and cement on lath, green cement slabs for flooring and typical Pueblo-style chimneys. One of these houses is in ruin and a shake test was possible, showing that the adobe contained 40% silt, 20% black sand, 30% clay and 10% natural fibres and hair. No trace of stabilizer was found, in spite of the fact that asphalt-emulsions were tested at that time to improve durability of adobes.

Indeed in this context, the soil engineering research supported by Roosevelt to complete large-scale projects (asphalt landing strips and railroads, cement for dams…) was of benefit to earth architecture. In

the early 1930s, the *American Bitumuls Company* created an emulsified adobe made with millimetric pieces of asphalt. In the end, even after the New Deal, this technique, commercialized under product names such as *Caladobe* and *Bituadobe*, encouraged adobe building and several private housing estates were built with this kind of product. One such estate is **Adobe Village**, built in Sacramento after 1946 by Lester Noel Meinzer[5]. This engineer, inventor and adobe maker, was fond of Mexican culture and he designed and realized Spanish-revival houses using the post-adobe technique : a post-and-beam redwood framework filled with stabilized *Caladobe*. But his most unusual project was a model for nuclear shelters, in early 1960s, during the Cold War. Double-walls, made with two 8" stabilized adobe bricks, were filled with 14" of compacted gravel or sand, and held in place with metal ties. Although the government was interested in the plan to mitigate atomic bomb radiation sickness, the shelters never caught on with the public and Meinzer finally proposed them as store rooms for food.

Conclusion and Future Directions

These three case studies show how earth construction if often chosen as an economical material, in a context of settlement and domestication of a new territory right after a migration wave, or during an economic recovery. The cases also prove that the keleidoscope of earth techniques historically used in the United States results from the meeting of Native practices and European know-how imported by the settlers, who often settle in familiar environments. The interaction of these separate traditions, modified by environmental pressures such as available building material, climate and geology, became the foundation of American earthen architecture.

Other case studies involving crisscrossing cultural influences have been documented within this research. Among them we can cite earthen-mounds in the Ohio and Mississipi valleys, in relation with Southern and Central America platforms ; African influence in earthen plantations through slavery in the South-East ; German rammed-earth and adobe constructions in California ; German-Russian sod houses in the Great Plains ; and earth fortifications of the Civil War battlefields.

The final report, planned for mid-2014, will include thematic maps of the United States allowing separate or superimposed readings of the range of various earth architecture techniques assembled by family (wattle-and-daub / jackal / bousillage, adobe / post-adobe, rammed-earth / puddled mud / tabby, cob…). The maps will also include climate conditions, raw material availability ; Native American pre- and post-contact technologies ; ethnic migrations in time and space, showing original countries (England, France, Germany, Irland, Italy, China, Africa, Mexico, …), earth construction practices brought by the migrants, and places where they massively set up and built their own earthen houses. This informative tool would

5 See the Meinzer family private archives, compiled in the unpublished book *Lester Noel Meinzer. Life and Work*.

reveal the diversity of American earthen heritage (more than 20 techniques identified), throughout the U.S. and not only in the South. It will propose the framework of what could be an American inventory of earthen architecture, inspired by the *Terra Europae* study realized in Europe in 2011, with cartography and technical sketches that make easier the international comparison. Finally, it would highlight the fragility of this valuable heritage by presenting ten or so endangered earthen sites with suggestions to encourage future protection and preservation that might be used on a local level for public support and funding.

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