

**MUD-BRICK CONSTRUCTION IN
THE SOUTHWESTERN UNITED STATES PAST AND PRESENT**

Mr. Chairman, Ladies and Gentlemen. I want to thank you for the opportunity of attending this meeting. I am overcome at the magnificent examples of your long tradition. I am afraid that our history covers a much shorter span of time, with fewer surviving examples of monuments and sites. It is gratifying indeed to see the interest expressed by the government of Iran in the preservation of these antiquities. The government of the United States started on such a program many years ago through the Department of the Interior and the National Park Service. Although funds are limited, work has been in progress to preserve sites of historical importance, and to present these to the public in an interesting and accurate manner. Authenticity must prevail, not only for the benefit of the scholar, but for popular enjoyment.

The restoration of private homes has been largely undertaken by private individuals and interested groups, with very limited funds, rather than by the government unless the site was of outstanding historical significance. Perhaps it is a mistake for the government to pass these by, as many valuable monuments and examples of certain periods of our architecture have been destroyed by "progress", and the lack of private funds for their preservation.

It is my hope to be able to provide some small bits and pieces of information, comparing our building remains to yours, from which I have already learned far more than I will be able to contribute.

As a start, I would like to submit the following publications for your information, not all dealing directly with restoration and preservation, but with current technology of mud-brick construction in the United States. The technology of ADOBE (mud-brick) construction, simple as it may seem, is primarily preserved in the more sophisticated fields of engineering and architecture. I will comment briefly on these as introduced.

A Qualitative Comparison of Rammed Earth and Sun Dried Adobe Brick.
R.H. Clough

University of New Mexico Press, Albuquerque, New Mexico 1950.

This work was done as a masters thesis, to make a technical

analysis of materials available and commonly used. A careful study of the structural qualities found, to help determine quality control, and to dispell popular misconceptions in the use of earth as a building material.

Historic Preservation, A Plan for New Mexico
New Mexico State Planning Office 1971

Santa Fe, New Mexico

A preliminary survey of existing buildings and sites of historical importance in New Mexico. It is perhaps the first step in making an inventory of sites which qualify for historical status. This is an aid in enlisting popular support, which is vital to the program.

Adobe Construction Methods Manual # 19 Rev. 1964.
L.W. Neubauer

University of California, Berkeley, California.

A simple construction manual for the construction technology of the use of mud-bricks and an economical building material for vernacular construction.

Adobe or Sun Dried Brick for Farm Buildings - Farmers Bulletin # 1720 Rev. 1964.
FAH Miller

United States Department of Agriculture, Washington, D.C

Technical information on the construction of simple farm buildings with mud-brick.

Hans Sumpf Co.

Fresno, California

A promotional brochure offered by a firm which produces mud-bricks mechanically by mass production methods. Traditionally, adobe bricks have been made by the person using them, on the building site. Many abortive and unsuccessful attempts have been made until the development of machinery by this company.

Erosion and Preservation of Archaeological Sites and Structures, 1971.
Technology Application Center (NASA)

University of New Mexico, Albuquerque, New Mexico

This is a bibliographical abstract collection of approximately 100 pages, listing sources of information. Some references may seem remote, but it is as complete as any bibliography on the subject. Although this document was prepared for the use of United States Firms, I'm sure that copies could be obtained for a moderate cost by writing this agency directly. They perform research services in virtually any field of interest.

Perhaps we should next examine the nature of ADOBE as we call it in the United States. To us the word ADOBE represents the brick, the building, or the mud used for construction. I believe that the word stems from the Arabic, (ADOB) "to mix", or a "mixture". It is a live material, found in abundance all over the world. It lives and breathes, standing proud and strong when cared for, disappearing back into the earth when neglected. It is strong and weak at the same time. To be strong, it must be used in large masses. It is weak by itself, and must be protected from water, its most deadly enemy. Some have tried to use it as an economical substitute for other building materials, but as in the American Folk Saying: ... "You can't make a silk purse out of a sow's ear"... If we try to make it look like something other than what it is, it is not a successful material.

ADOBE is the earliest building material used by man, and is in current, if limited use in many parts of the world today. By its very nature, it is sometimes of forsaken material. A poor man can build shelter for himself with very little cost by using materials at hand on the building site. The rich man can use it as a sculptural art form, to capture the warm and comfortable traditions of the past. Unfortunately, many in the mid-ground between these two extremes forsake its use for its very virtues: low cost and art form. With skillful planning, and an understanding of the nature and limitations of the material it can be favorably compared with more modern building materials.

All nations are faced with problems of growth and progress, not the least of which is provision of housing for an expanding population. Would it not be foolish to ignore past successes for clues to the future? Ecology and the preservation of our national resources is of concern to all nations; we have an unlimited supply, and it re-cycles itself! The magnificent monuments in Iran are living examples of a vigorous people, the art forms representing a catalogue of your most valued art treasures. Valuable lessons from the past must have important applications for the future.

ADOBE construction in the United States is considerably

different than what I have seen here, and at the same time, very similar. Our mud-bricks are larger and heavier (most common size in current use is 10"x4"x14", weight 35 lbs.) than most currently used in Iran, although many of the older examples are larger, like ours. We use mainly a single brick wall construction. Our older surviving examples are larger still, and use multiple brick walls for greater wall thickness. We do not use straw as an additive mix in most cases. Certain geographical areas have used straw traditionally, and still do. Perhaps there is a logical reason for that, based on centuries of trial and error, providing more satisfactory results for that particular area. Dr. Clough's study at the University of New Mexico would indicate that straw adds nothing structurally.

My own observations lead me to the conclusion that it might be logically used where the clay content of the earth is low. It would seem to help in use as a roofing material, to reduce rapid erosion. The main drawback in the use of straw, in the United States and the examples I have seen in Iran would be the deterioration of the organic material, leading to softening and destruction of the surface. We use cement plaster to protect the wall from rain and moisture, reinforced with a galvanized wire netting. A final color coat finishes the surface to resemble the original mud plaster quite accurately. Interior surfaces are restored with gypsum and cement plaster to provide a less fragile surface.

I must compliment Professor Gullini on his fine presentation of the problems encountered in restoring and preserving mud-brick structures. His conclusions are precisely the same ones I have reached, and I shall repeat them for emphasis:

- A The structure must be made structurally sound, and protected from future damage by ground water.
- B Channeling of water from any source must be controlled and directed away from the mud-brick surfaces. The splash of rain run-off to the ground is a particularly damaging effect. This can be overcome by the use of CANALES (rain spouts) or waterproof drains.
- C Capping of wall tops to prevent additional deterioration at the tops of walls, by the use of burned bricks or other waterproof material.
- D Coating of walls with various compounds has been largely ineffective. Penetrating sealers usually spall off in a relatively short period of time, perhaps causing a more

rapid deterioration than if the wall had been left unprotected on the vertical surfaces. Cement plastering for wall protection must be a possible solution, even though it takes liberties with the use of traditional materials.

The most troublesome question arising in the contemplation and planning of a restoration is the determination of the precise point in time that will be selected for restoration, how changes will be represented, and the materials selected for use. All buildings, particularly mud-brick buildings, are changed at relatively short periods, dependent on the whim and desire of the occupant. The selection of the material is perhaps a moral or ethical question. We do not avoid the use of structural steel in sound restorations, and do not require that the wood used, be cut and dressed with a stone axe. Would it not make more sense to use a more durable material for plastering as well, as long as a reasonable facsimile of the original appearance may be maintained.

P.G. MacHENRY, Jr.