# Some facts and guidelines for the Use of Asphalt emulsion to stabilize Adobe materials in the Southwestern Region

## History

Asphaltic emulsions were first used for Adobe manufacture in California in the mid to late 1930's. They were first designed for dirt road stabilization, so their use to do the same in adobe materials was a logical extension. Since then, thousands of Adobe structures have been constructed around the Southwest using these emulsions. Today, about half of all semi and fully stabilized Adobes produced in the Southwest use them. They are also used in some other "Adobe" countries, such as Perú.

## Manufacture

The emulsions used for Adobe are derived from the "leftovers" of the oil refining process. The volatile substances, as used in fuels, have already been extracted from the asphalt, leaving biodegradable, organic substances. A type of soap is added which acts as an emulsifier, allowing the oil-based material to become a water-based emulsion. As the adobe cures in the hot sun, the water evaporates out, and the emulsion forms a shield around the clay/sand 'globules' that make up a typical Adobe mix. The clay is the unstable element in the Adobe mix that must be stabilized (since sand is just small rocks, the sand in the Adobe mix is already stabilized). When fully stabilized to code, the resulting Adobe is vapor-permeable, but does not allow water, like rainfall, to penetrate. The emulsions constitute up to 5.5% of the weight of an adobe block. Most adobe soils in the Southwest can reach full stabilization by code at somewhere between 3.5 to 5.5% by weight. If a soil cannot reach the code requirement for stabilization much beyond 5.5%, then caution is advised. Too much emulsion in a mix can cause a condition known as a "lubricated soil", which will weaken the Adobe rather than strengthen it. When the amount of emulsion in the mix approaches 6% by weight, a lubricated soil is likely to occur. Generally, if your mix is too high in clay, it will require an excess amount of emulsion to stabilize it, and this is one trap the novice may innocently wander into. For best strength, Adobe only requires as much clay in the mix as is necessary to bind the sand particles together. Thus, avoid excess clay in the mix which will cost you less in emulsion and give you stronger Adobes.

You should acquaint yourself with the New Mexico Earthbuilding Code. Adobes, whether stabilized or not stabilized must attain strengths of 300 p.s.i. in compression (minimum) and 50 p.s.i. in modulus of rupture (minimum). If you need a copy of the NM Earthbuilding Code, email *Southwest Solaradobe School* at adobebuilder@juno.com and they will email you the code as a Word attachment. Their web site is www.adobebuilder.com

Keep in mind that even if you buy all of your adobes, you are still responsible for the quality of the mud mortar the Adobes are laid in. This mud mortar has to meet the same strength requirement minimums as in the above paragraph. It does not have to be from the same soil the adobes were made of as long as it meets those strength requirements. This means you should make test adobes from the soil you hope to use as your mud mortar source to see if blocks (or mortar) made from it meet the minimum strength requirements. This is something you need to do long before you go for your permit or start building walls. Any soils engineering lab in most large Southwestern cities can do the compression and modulus of rupture tests at reasonable cost.