



Introduction to Earthbag Building

We were perplexed. The headline in our local newspaper read, “Creating Affordable Housing Biggest Problem This Decade.” To us, this was a mysterious statement. Until the last century, affordable housing had been created with little or no problem in our area for over a thousand years. The Four Corners region of the Southwestern U.S. was more populous 800 to 1,000 years ago than it is today. Ancient builders provided housing using the materials on hand. Stone, sticks, clay, sand, fiber, and some timbers were all they used to build modest-sized, comfortable dwellings for all the inhabitants. With modern methods and materials, why is it so difficult to provide enough housing for less people today?

Unfortunately for all of us, the answer lies within the question. Current laws require the use of manufactured materials, extracted as natural resources miles away, processed in yet another location, and then transported great distances to us. Naturally, this drives the price of building a home beyond the reach of most people.

At the time we met we had yet to become acquainted with earthbag architecture. From our many walks in the desert we discovered a lot of common interests: acting, a love of nature, storytelling and food, parallel spiritual philosophies, rafting, Native American architecture, and the joy of building. We visited ancient Indian ruins, fantasizing about the way they lived. Inspired by the enduring beauty of their building techniques, we began to explore how we too could build simple structures with natural earth for

ourselves. We considered various forms of earthen building: adobe block, rammed earth, coursed adobe, poured adobe, cob, sod, etc. It seemed peculiar that in such a dry climate there is not a single adobe brickyard in our area. Yet adobe structures built around the turn of the 1900’s still stood within the city limits.

While we could see the value of using regionally available indigenous material, not everyone shares our view. We all have different tastes and styles of expression. So our challenge was to combine the naturally abundant materials all around us with manufactured materials that are created in excess, and would have appeal to a more conventional mindset.

A friend turned us on to a now out of print earthen architectural trade magazine called *The Adobe Journal*. That’s when we discovered the work of Nader Khalili. Nader was building monolithic dome-shaped structures with arches out of grain bags and tubes filled with dirt; any kind of dirt, even dry sand. He called it Sandbag/Superadobe/Superblock and he was working with the local building department conducting extensive tests concerning the building’s ability to withstand load and wind shear, and resist earthquakes. Since then he has acquired permits for building residential and commercial structures, including a nature and science museum in one of the highest earthquake zones in the United States.

We signed up for a one-day workshop. Nader personally taught us how to build an arch using bricks

and dry sand, and then using sandbags. We were invited to spend the night in one of the prototype domes under construction. We were hooked. We came home and started building walls.

We tried flopping bags every which way, stomping on them, banging them with various tamping devices. We experimented with varying the moisture contents, making makeshift bag stands, and different kinds of bags, tubes, soils, and techniques. Our project attracted a lot of attention and we found ourselves helping others to build privacy walls, benches, planters, and even a small dome. But all the while our focus seemed to be directed toward technique. The process became our priority. How could we neaten up the bags, take the slack out of them, tighten their derriere, and simplify the job overall? It soon became our mission to “turn a bag of dirt into a precision wall-building system.” Hence, the Flexible-Form Rammed Earth technique evolved.

The Flexible-Form Rammed Earth technique is our contribution to earthbag building. We practice a particular brand of earthbag building that prioritizes ease of construction coupled with structural integrity inspired by FQSS principles. What is FQSS? We made a list of what fosters a productive yet playful work environment. The process has to be *Fun*. What helps make the job fun is that it flows *Quickly*, as long as we keep it *Simple*, and the results are *Solid*. So we adopted the FQSS stamp of approval: Fun, Quick, Simple, and Solid. The Flexible-Form Rammed Earth

technique has and continues to be developed according to this FQSS criterion. When the work becomes in any way awkward or sloppy, FQSS deteriorates into fqss: frustrating, quarrelsome, slow, and stupid. This prompts us to re-evaluate our tactics, or blow the whole thing off and have lunch. Returning refreshed often restores FQSS approval spontaneously. By demonstrating guidelines that effectively enhance the quality of earthbag construction, we hope to encourage a standard that aids the mainstream acceptance of this unique contemporary form of earthen architecture.

Throughout this work we often use synonymous terms to describe the same thing. For example, we intermix the use of the words earth, soil, dirt, and fill. They are all used to describe the magical mix of naturally occurring sand and clay, sometimes with the addition of fiber, and almost always in conjunction with some amount of water. Our intent is to inform, educate, and inspire earthbag construction in playful layman terms using written text and step-by-step, how-to illustrations.

The focus of this book is on sharing our repertoire of tools, tricks, and techniques that we have learned through trial and error, from friends, workshop participants, curious onlookers, ancient Indian nature spirits, and smartass apprentices who have all helped us turn a bag of dirt into a precision wall-building system that alerts the novice and experienced builder alike to the creative potential within themselves and the very earth beneath their feet.