

A ADOBE O D D E

Building a Nubian Vault in West Texas
with Simone Swan

TEXT AND PHOTOS BY SHANNON STONEY





Two service buildings contain the storage tank of well water and batteries that store power from a solar collector and windmill.



LEFT: Simone Swan's house is composed of four nubian vaults connected by a flat-roofed hall.

ABOVE: A stack of adobes.

BELOW: Simone Swan talks to Thomas Colbert. The width of the rooms under the vaults is only ten feet, but the soaring ceilings make the rooms feel much bigger.



ABOVE LEFT : A Greek architect and an American architect collaborated in the setting of the first keystone adobe.

LEFT: Swan House detail.



FOR FOUR DAYS THE TWO SIDES OF THE NUBIAN VAULT had curved up slowly from the thick adobe walls. The critical time had come to cut the first keystone to fit the space between the two arcs. We hacked away at the adobe with our machetes, trying again and again to cut off the right amount at the corners, but our mangled bits of dried clay wouldn't fit. Finally, Efren, a master mason from Ojinaga, Mexico, came over to see how we were coming along.

He eyeballed the arch from 30 feet away, picked up an adobe, whacked it a couple of times with a trowel, and without a word handed it to Eugenia, a young architect from Boston. She held it up to the odd-shaped hole and it slid in with an almost audible click. In celebration Eugenia and Gina, her Greek colleague, crossed their machetes in front of the first completed course of the emerging vault for the Adobe Alliance's new office space.

The mission of the alliance is to teach people in the U.S. Southwest and Mexico to build their own homes with almost no cash, using just the soil, sand, straw, manure, and cactus juice that can be found literally in their own backyards.

During the ten-day workshop, we learned the many skills needed to build vaulted roofs without using one piece of wood, tin, or bought material.

The story behind the workshop begins, as do those of many of this region's arts institutions, with a cadre of artists, scholars, and curators nurtured by Dominique and John de Menil. In 1964 Simone Swan began working with Dominique de Menil, who was then serving as Acting Director of the University of St. Thomas Art Department. Swan joined the de Menils in developing their Menil Foundation project, and she was soon editing the foundation's publications and hiring its staff. She worked closely with the de Menils until 1977. At this point Swan's career took a radically different direction: she began studying architecture with Hassan Fathy, the Egyptian architect who reintroduced the ancient Nubian vault to modern Egypt. She worked with him until his death in 1989.

After Fathy died, Swan decided to carry on his project of housing the rural poor, but she focused her efforts in North America on the border between Texas and Mexico, where she saw a need for low-cost, sustainable, and owner-built housing. She chose the desert Southwest of the United States because it

Swan has blended aspects of modernist architecture with the best of desert vernacular building. She favors a modernist austerity, an "exalting frugality" as she calls it, and there is little ornamentation on the building.



Jesusita Jimenez teaches for the Adobe Alliance workshops.

still has a thriving adobe tradition, and she hoped to find people there with the skills and interest to build in adobe. She also sought to meet the area's growing need for new, affordable, energy-efficient housing.

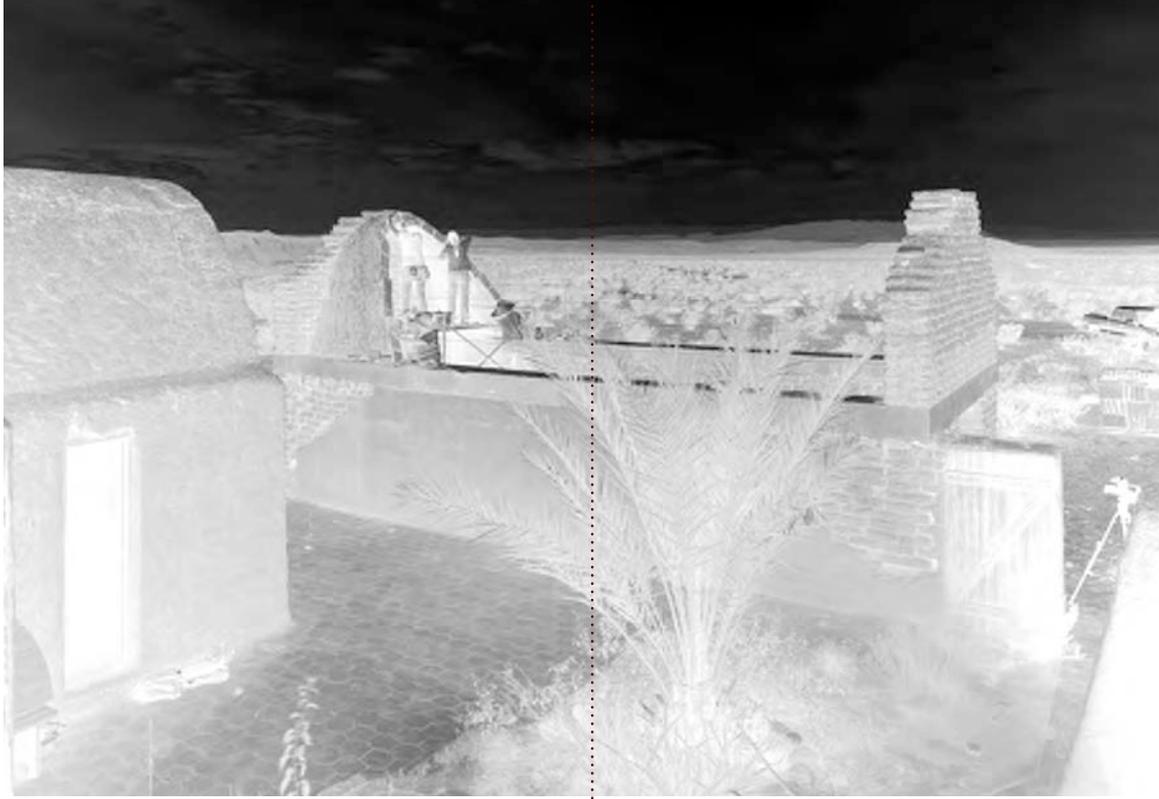
Swan bought her 500 acres in the Chihuahuan Desert in 1994, which was around the time she founded the Adobe Alliance, an international group of adobe enthusiasts. She built her own vaulted adobe house in 1998. As a prototype, the 1,600-square-foot house is irresistibly beautiful and serene. The H-shaped plan features four vaults forming the two long sides of the H and a central flat-roofed hall joining them. A small, perfect-domed outbuilding that was initially used as a tool shed is now a guesthouse. Two smaller vaulted outbuildings house the batteries that store power from the solar collectors and a cistern for well water.

The thick adobe walls create a deep silence, shade, and coolness inside the house, making it a welcome refuge from the hot desert days. Although enough light comes in the windows to keep the interior from seeming too dark, the windows are mostly small—some are tiny, only one foot square. A few large windows, however, open onto a shaded area on the south side under a ramada, and French doors open onto the two courtyards. All the rooms in the house and the domed outbuilding are ten feet across for harmony throughout.

The great hall that connects the two vaulted ends serves as an office for the Adobe Alliance. The ceiling is high but flat, as in traditional adobe houses, with *vigas* (wooden beams) running across to support the roof. The roof is not a traditional earthen adobe roof, however, but is built of Styrofoam panels under plywood with an Elastomeric sealant on them to keep out the rain. You can walk, stargaze, or sleep on this roof: a stairway in the west courtyard takes you up.

Swan has blended aspects of modernist architecture with the best of desert vernacular building. She favors a modernist austerity, an "exalting frugality" as she calls it, and there is little ornamentation on the building. A parapet of angled adobe blocks edges the roof deck, facilitating airflow to cool the deck at night, and in the master bedroom workers added some subtle ornamentation during the plastering. (Swan says, "I appreciate their creativity and initiative.") In addition to Fathy, Swan's architectural influences include Louis Kahn, who offered to design a beach house for her right before he died, and Rick Joy, an American architect known for building rammed earth houses in the desert. But there is something new about how all these influences come together in her home. As Dennis Dollens wrote in *Simone Swan: Adobe Building*, a short book about Swan's work, the buildings are "little architectural revolutions in adobe and mud plasters."

Her intent was not, however, primarily aesthetic: "Beauty is a bonus," Swan says. She didn't seek to copy Egyptian traditional forms, but wanted to design something that people with little money could copy and build by hand with locally available materials. She had originally dreamed of constructing



The Swan house functions well in a difficult climate. There is no air-conditioning, but the house is surprisingly cool and comfortable on hot days.

a whole village of vaulted and domed adobe buildings somewhere in the Southwest, similar to Fathy's New Gourna in Egypt. But it proved difficult for many reasons. On this side of the border, the U.S. Department of Housing and Urban Development has many rules and regulations that are difficult to comply with using ancient construction methods. Also, people in Mexico and the U.S. Southwest who grew up in adobe houses sometimes want newer, more modern houses, even if they are not as elegant or energy-efficient as a vaulted adobe house. And it is hard to find local workers interested in learning new ways with ancient adobes.

Neither Fathy's work nor Swan's adobe project developed bottom-up dynamism. Nonetheless, she has persisted in teaching the building method to whoever is interested. During the recent Adobe Alliance workshop, we focused not on utopias, but on the demanding physical undertaking and the construction process. And we began by watching the process of adobe-making at a traditional adobe yard in Ojinaga, Mexico.

The basic unit from which these "little architectural revolutions" are built is the adobe block, an amazingly simple combination of clay, manure,

sand, and straw that is molded wet and dried in the sun. While it is soft enough to cut and shape with very simple tools, its compressive strength is impressive at 300 psi. This strength comes from the sand, while its tensile strength comes from the fiber in the manure and straw. Sand, manure, and clay are mixed together, and then straw is added. This wet mixture is punched into a wooden mold that makes four blocks at a time; each block is scored with a finger diagonally before the mold is lifted off. The adobes are turned regularly as they dry. The walls of the Swan house are made from adobes that are 18 x 12 x 3 inches, but the special smaller adobes made for the vault construction are 10 x 7 x 2 inches and considerably lighter.

Our first task as student builders was to trace a catenary curve onto a piece of cardboard and cut a template that would serve as our guide in building the vault over the new office walls. We draped a chain from the tops of the two long side walls of the new office until its curved midpoint almost touched the ground. Then we used a marker to trace this upside-down arch shape onto cardboard, cut out the U shape, and flipped it up onto the end walls of the room, which rose higher than the side walls. Finally, we traced the U-shaped curve into the adobe of the end walls with a carpenter's nail. This line marked the inner edge of the vault.

For a Nubian vault, the adobes are laid at an angle, with their short ends on the wall, and the long ends extending inward at about seventy degrees to the wall. They are laid leaning against the end wall at first. As the first course rises, mortar is called upon to hold each adobe tight against the end wall in defiance of gravity, while still wet, and it does. The mortar recipe is even simpler than the mix for the adobes: equal parts clay and sand, mixed with water. The builders scoop it up with their hands and place it onto the top of the wall or the previous course of adobes; then they fit each new adobe into the wet mortar. The bond created by the hydrophilic forces in the adobes is amazingly tight within minutes.

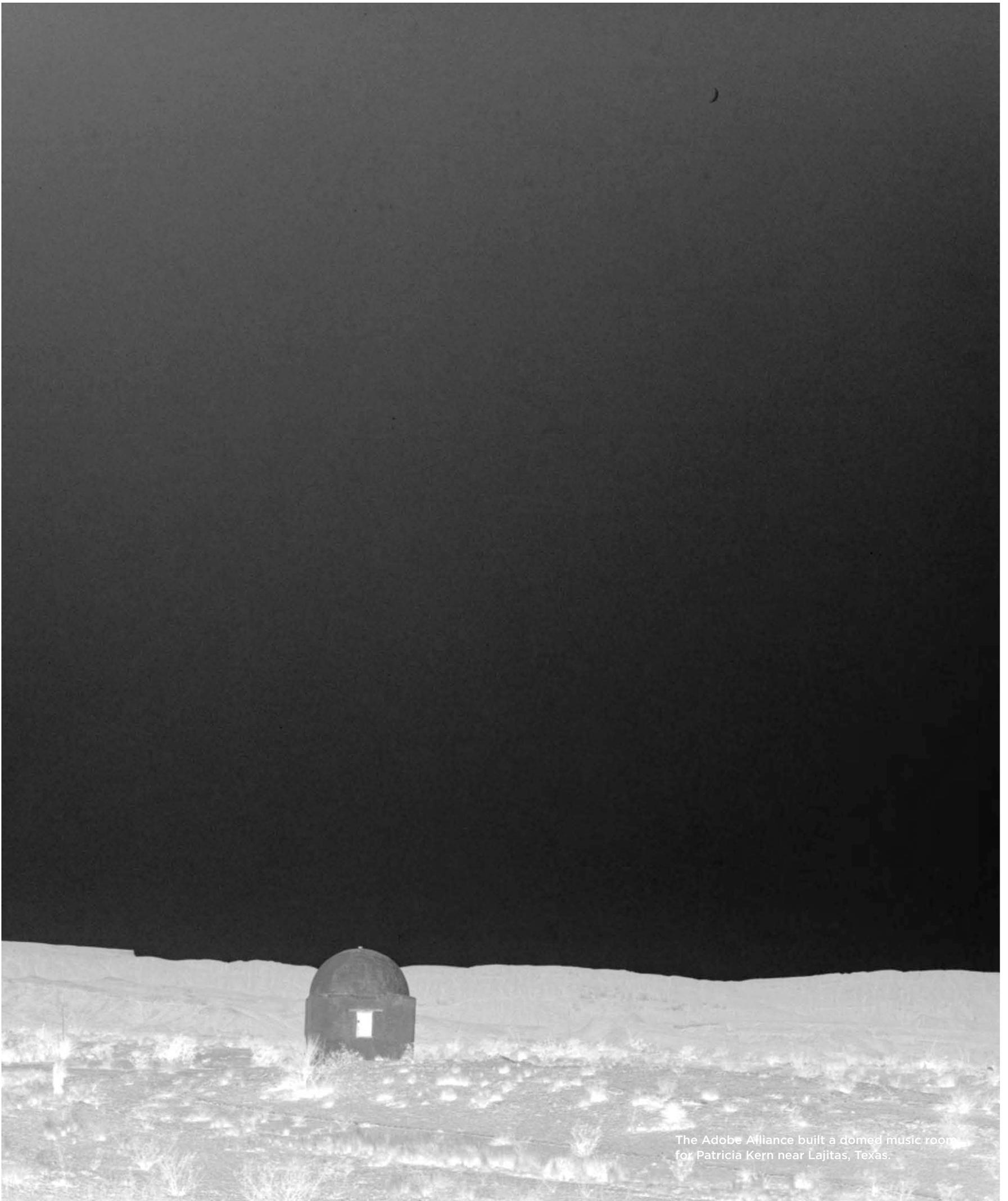
.....
 This room will serve as the new office for the Adobe Alliance. Strings stretched from one end wall to the other guide the builders as they raise the vault. The Nubian vault is laid at an oblique angle to the side and end walls.

Our bare human hands did most of the work, with simple trowels and machetes to do the occasionally needed shaping. Sometimes we used a trowel handle to bang the adobe into the mortar, but our hands worked as well or better: too much banging can fracture the sun-dried bricks. As Swan says, "The great thing about adobe is that it's so forgiving." Mistakes were pretty easily fixed. Our crew of inexperienced women quickly became adept adobe vault builders, and Swan says that making the dome is even easier.

The Swan house functions well in a difficult climate. There is no air-conditioning, but the house is surprisingly cool and comfortable on hot days. Solar panels power batteries that have an inverter for producing regular alternating current, while some direct current flows to a small refrigerator and a swamp cooler. A small windmill adds to the energy-production mix. A pump powered by the batteries draws water from a historic well that has been deepened down the hill from the house. An on-demand water heater provides hot water for an outdoor shower and an indoor tub. The entire house is off the grid except for the phone and internet connection.

The Adobe Alliance, headed by Swan, has contributed to other projects in the region. It built its first vaulted and domed house in 1994 in Mexico for Daniel Camacho Rodriguez. Jesusita Jimenez, one of Swan's first and most talented students, taught the method to Rodriguez, and together they built the house, which sadly no longer exists. On the American side, a large house with three domes and five vaults was built close to Swan's house with Swan as the designer and consultant. Its distinguishing feature is a dramatic loggia with eight adobe arches at the west end of the house. A beautiful, little domed music room outside Lajitas, Texas, was the product of an Adobe Alliance workshop, part of a complex of cob buildings built by Patricia Kern. The alliance built a similar domed office in Alpine. Finally, it built two domes and three vaults over a new house in Ojinaga, Mexico, but Swan was not involved in this design.

Though Swan's dream of building a whole village has not materialized, and the Adobe Alliance has not spurred a movement among low-income people in the Southwest, earth building is exploding internationally. Organizations such as La Voûte Nubienne teach adobe vault building in sub-Saharan Africa, and people have come to Presidio, Texas, from as far away as Nepal to learn the technique. Swan's goal is still, after the original title of Fathy's book, "construire avec le peuple." **c**



The Adobe Alliance built a domed music room for Patricia Kern near Lajitas, Texas.