Advanced Earthen Construction Technologies, Inc.
11595 Hwy 181 South, San Antonio, TX 78223
Phone: 210-633-3224 Fax: 210-633-3231
E-mail: aectceb@yahoo.com Website: www.aectceb.com

AECT EARTHEN CONSTRUCTION TECHNOLOGY
AN OVERVIEW

What building product is inexpensive, durable (lasting 100-400 years when properly maintained), attractive, energy efficient, effectively reduces noise, produces single story buildings capable of surviving a Richter Scale 7.5 earthquake, provides complete architectural freedom, structurally sound, and readily available throughout most of the world? This product is the AECT compressed earth block using the exclusive, trademarked AECT compressed earth block production machines and AECT earthen construction technology.

In all cases that we have examined so far around the world, the cost of compressed earth block construction using the AECT machines is between 10-30% less expensive than the next closest construction approach that will result in a quality, long-term structure. Some other construction techniques are inexpensive, but the resulting housing is so cheap and flimsy that within a few years the houses must be torn down to avoid creating slum situations. The cheapest solutions are not always the best for the poor or the wealthy.

The AECT compressed earth blocks can be produced and laid in place in the wall for approximately 10 to 15% less than the cost of the next closest construction material (hollow concrete block). While an experienced, skilled mason and helper may lay and level 300-500- concrete blocks per eight-hour day, the same crew could lay 800-1200 compressed earth blocks per day. This results in significant savings to the builder/owner and/or homeowners and creates an opportunity for more inexpensive and energy efficient houses being available for families. Earthen homes result in higher profit margins to developers/builders.

The MC3500 compressed earth block machine produces 450 – 480 blocks per hour from approximately 7 to 8 yards of typical soil. The blocks are variable in thickness and are adjustable from 2 to 4.5 inches thick. Block sizes are typically 10 x 14 x 3.5 (25.4 cm x 35.6 cm x 8.89 cm). Interior wall blocks are typically 7 X 14 X 2 to 4.5 inches (17.8 cm x 35.6 cm x 8.89 cm) but an option of 8 X 14 is also available for an extra charge. Machines can make blocks for walls 7, 10, and 14 inches thick or a combination thereof.

The Impact 2001A compressed earth block machine produces 300 6" x 12" x 3 ½" or can be built to produce a 4 X 4 X 12 inch facer block or a 6 X 12 holey block. Typically the blocks are 6" (15 cm) wide, 12" (30.5 cm) long, by 2 to 4.5" (5-11.5 cm) thick. Depending on soil and block thickness each block weighs between 9-18 pounds (4.1 – 8.1 kg).

With the increasing shortage of quality housing construction materials in the world, the AECT compressed earth block technology provides an appropriate answer to meeting global construction needs while providing maximum utilization of national natural resources (soil) and minimizing requirements for dollars, marks, yen and pounds. All compressed earth block machines can have an adjustable block thickness of 2 to 4.5 inches thick.

AECT compressed earth blocks are structural blocks, easy to lay, and are moisture sealed with latex paints and Lime/Portland cement plasters. Use of the AECT compressed earth block provides opportunities for many different plaster and paint finishing coats with a large variety of textures and types of materials. Soils suitable for making AECT compressed earth blocks are available in most countries. Structural concrete block, steel building construction materials, cement, reinforcing wire, steel rebar, washed sand and aggregate for concrete structures, lumber and fired brick are not accessible to builders for many months during the year and when available they are much too expensive for mass housing and commercial construction activities in most countries. This results in a small amount of housing produced that is expensive and very time consuming.

AECT staff members have reviewed surface soil type maps available from the US Geological Survey. These scientific soil maps in general show that typically 65-70 percent of the soils on the Earth's surface are likely candidates for making compressed earth blocks from local soils. Typically, this includes a wide variety of soils containing clays that are not bentonitic or highly expansive.

AECT offers full soil selection and soil blending/testing training to customers in the AECT training center in San Antonio, Texas and in the dealer countries. AECT offers full operation, maintenance and repair services to national dealers and individual customers customized to meet their individual needs.

AECT manufacturers the AECT mobile, computer automated, completely self-contained, and rugged, industrial/heavy construction compressed earth block machines. The machines are powered by Yanmar diesel engines.

Once made, the blocks are ejected onto conveyor's that take the blocks to the exact location at the construction site where the blocks will either be placed immediately into the wall or stacked on a pallet to be used later. No curing time is required before placement of the blocks into the wall. The blocks, using the thin slurry method, can be laid into the walls from the footing/foundation all the way to the bond beam the first day with no delays.

These blocks typically have 800 psi (56 kg/sq cm) compressive (or better), so they are already above the 300 psi required by most codes and will continue to harden in the wall.

After the block has cured, the compressed earth block bearing capacity is typically over 1100 psi (77 kg/sq cm) Soil-only blocks have been produced in the USA having over 1600 psi (112 kg/sq cm) bearing capacities and over 140 psi (10 kg/sq cm) modulus of rupture.

AECT earthen construction technology systems include the use of highly effective thin layer soil slurry placed between the blocks. Soil is screened and mixed with water in a suitable container (wheelbarrow, mortar mixer, etc.) to produce a milkshake like soil and water solution (thin layer soil slurry). This slurry (very wet compared to concrete block mortar) is then moved by wheelbarrow or slurry pump to the location where the blocks are being placed in the wall. The slurry is placed onto the top of the previous course (about 1/8 inch thick). Then the new block is placed in line with and on top of the

bottom block using a string line for alignment. If the footing/foundation base is properly leveled, it is very unusual to need to individually level each subsequent block course.

If small differences in wall height do occur across an 8-10 foot high wall, they are taken out by adjusting the thickness of the bond beam. A bond beam is concrete beam poured on top of the compressed earth block with two steel rods running horizontally along the length of the bond beam. The bond beam is placed above all the load bearing walls and connects the walls to the roof with roofing joint connectors set into the concrete. A comprehensive bonding takes place between the blocks. The AECT compressed earth block bond is actually block-to-block and not block-to-mortar as in concrete hollow block.

This type of bonding results in a monolithic structure, and a block-to-block strength with very high shearing strength. Within one hour of placing the blocks into slurry contact with one another in the wall, one has difficulty being able to pull them apart by hand.

AECT compressed earth blocks have excellent uniformity and consistent high compressive strengths if the soils are properly selected and blended. Soil only compressed earth block bearing capacities typically range from 1100-1500 psi (77-105 kg/sq cm) with a typical modulus of rupture ranging from 70-140 psi (4-10 kg/sq cm).

AECT cement stabilized compressed earth blocks typically have bearing capacities ranging from 2500-3900 psi (175-274 kg/sq cm) with a modulus of rupture typically ranging from 250-600 psi (10-42 kg/sq cm). Cement stabilized or fly-ash stabilized blocks are only used when the blocks are being placed in environments where the blocks will be submerged in water or high moisture/rain during construction.

AECT compressed earth blocks far exceed (usually by 3-4 times) the building strength of materials standards for non-fired masonry construction in the United States. AECT compressed earth blocks have exceeded in all cases the Uniform Building Code, the Southern Building Code, the HUD standards, the Farmers Home Administration standards, the Veterans Administration standards, the FHA building material and construction standards in all construction projects, and the new "I" code.

UNIFORM BUILDING CODE minimums in the United States of America for single and two story structures require block bearing capacity strengths of 300 psi (21 kg/cm2) and modulus of rupture of 50 psi (3.5 kg/sq cm).

Over 300 structures have been completed (all far exceeding construction strength standards) since 1981 in New Mexico, Nevada, Utah, Arizona, Texas, Colorado and South Dakota.

AECT compressed earth block buildings have been completed under the supervision of registered engineers, registered architects, individual owners, the Farmer's Home Administration, HUD, the Indian Health Service of the US Public Health Service, and many other national, state, municipal and local agencies.

AECT compressed earth blocks, unlike sun dried adobes, can be produced on site, even in freezing weather. The limitation is not in the production of the blocks even at 30°F, but in the ability to keep the thin slurry layer from freezing. In other words, if the soil is not frozen, then the blocks can be produced even if the ambient temperature is freezing. The equipment has been designed to operate over an ambient temperature range of 28°F to 110°F.

AECT compressed earth blocks produced at the construction site and then stacked or placed directly into the walls typically represent a breakage of about 1 block to 600 blocks produced. Sun dried adobe blocks will be broken up in freezing weather because of the much higher moisture contents in the sun dried adobe bricks. Sun dried adobe blocks require 18-35 days of sun curing time before being able to be hand removed and then stacked, stored, loaded, unloaded, placed and then final placement into the walls. Typical sun dried adobe loss due to breakage in this process is in the 10-15 percent range.

AECT compressed earth block construction is always less expensive than wood frame or concrete construction when providing for equivalent energy reduction, seismic protection, maintenance, and noise reduction characteristics. The best way to describe a compressed earth block structure is **solid, quiet and energy efficient.** A person immediately feels the quality of the structure upon stepping into the house or commercial building. Energy savings typically involve 40-60 percent over wood frame or concrete block structures.

AECT compressed earth blocks are **structural blocks, not filler blocks**. Reinforced concrete columns and other structural elements of typical housing construction are not necessary when the AECT compressed earth structural blocks are available to the builder.

From an architectural standpoint, the buildings can be designed to reflect any building style including the latest, contemporary multi-angled or round walls and multi-gabled roofed structures. Window, doors, roof styles and special architectural appointments can be varied as the designer's imagination. AECT recommends use of double pane windows for energy reduction.

AECT also recommends use of steel insulated doors for energy reduction and placing an equivalent R-30 insulation material between the ceiling and roof. Roofs can be made of any type of material locally acceptable. Wall furnishings include texture plaster, gypsum wallboard, wood paneling, brick veneer, cut rock veneer, wallpaper, and natural brick or smooth wall effects using a mud smoothing coat and latex paint coat. Walls can easily be sculptured or rounded to obtain special architectural effects. Freestanding keystone arches can be easily prepared using unskilled labor trained specifically in this technology. These arches have dramatic effects in homes and commercial reception areas at minimal construction costs.

The versatility of the AECT compressed earth block machines enables the builder to produce structural block (not filler block) at the construction site of the customer. The blocks can be palletized for subsequent, installation at the site, or placed directly into the walls. The blocks can be soil-only blocks or cement-stabilized blocks, or both. It takes 45 minutes to modify the machines molds and press plates to produce different (10 x 14 x 3.5 inches or 7 x 14 x 3.5 inches) sized blocks on the 3500 series.

The AECT compressed earth block machines, the block it produces, and our proprietary state-of-the-art earth construction technology offer the US Government, the US Department of Defense and large construction corporations a very cost effective construction system.

The AECT earthen construction techniques allow constructors to rapidly build facilities while maximizing the use of locally occurring building materials and minimizing adverse environmental impact and minimizing foreign currency exchange requirements.

Earthen Construction has stood the test of time. Today, probably 2 billion people around the world rely on earthen construction for their shelters. The US Government Department of Agriculture estimate over 350,000 houses and commercial earthen structures currently exist in the United States. They have been constructed from traditional sun dried adobe, rammed earth, and compressed earth blocks. Many of these structures have proved continuous shelter service over the last 200 years with minimal maintenance. Some of these structures were built in the 1500's and are still used.

AECT compressed earth blocks have the uniformity and strength to provide, modern, low cost, and energy efficient structures for customers. They will carry 2.6 times more loads on the wall than a concrete hollow block of similar dimensions.