

# Cob, Leichtlembau, Lightweight STRAW/CLAY

Gary W. Zuker, October 1996

## History of Cob

Old, since at least Medieval times. Written records date from the year 1212 a.d. Old recipe of "Mix a mule load clay to a cartload of straw". Shaped by hand, without forms. Walls were often load-bearing.

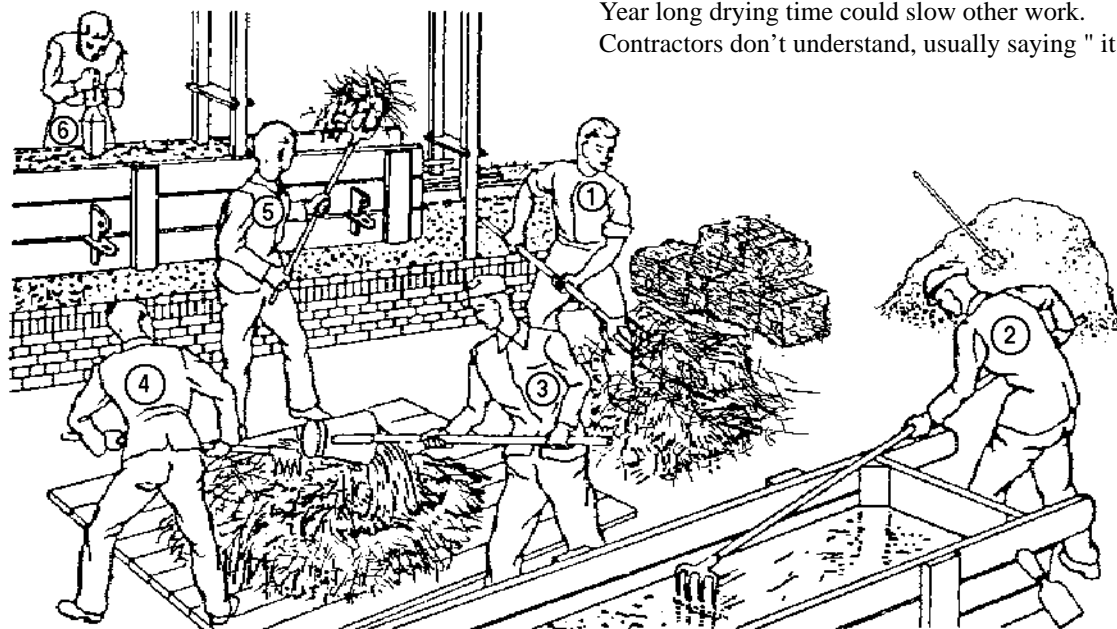
**Leichtlembau**, or light straw/clay, is a modern variation. Lighter in weight than cob, with better insulating properties. Packed into wall forms as infill and usually not load bearing.

## Sustainable Materials

Uses only low cost materials, available locally. Contains no steel, no concrete, and no cement.

## Thermally Efficient

Walls are typically 18-24 inches thick. Leichtlembau has half the weight of earthen materials like rammed earth or adobe because of a much higher straw content. Monolithic walls have no gaps or seams, minimizing air infiltration.



Drawing adapted from the book Leichtlembau

## References:

- "Leichtlembau -Old Building Material, New Technique" in German, by Franz Volhard (1983).
- "Cottage Building in Cob, Pise', Chalk and Clay" by Clough Williams-Ellis (1883).
- "The Pattern of English Building" by Alec Clifton-Taylor (1972)
- "The English Cottage" by Harry Batesford (1950)
- "Fine Homebuilding Magazine", September 1993, page 88-89 (issue #83)

## Proven Reliable

Enjoys many centuries of use in Europe and around the world. 500 year old Cob houses are not uncommon in England. Receives the German DIN-4102 fireproof rating. Insured as a masonry structure by a local insurance company.

## Low Technology

Utterly simple. Easily learned skills, requiring no expensive tools or machinery. Easily cut and shaped with simple hand saws. Door and window openings can be added after wall construction. A bucket, a shovel, a hand-saw, and a pitchfork are the only tools required.

## Aesthetic Appeal

Thick walls, and soft rounded corners, a natural by-product of this method, offer a charm difficult to achieve with modern materials. Architectural styles range from Medieval cottage, Mediterranean villa, Santa Fe adobe, to an ordinary contemporary look.

## Low Cost Materials

Example: Owner-built 900 sq-ft straw-clay cottage, built in 1990.

- 250 bales of Straw. \$1.50/bale from Taylor area farmers
- 6 cu. yds. Blue Clay. \$25/truckload, from Manor area pit.
- 60 tons Limestone boulders. \$2/ton from Cedar Park quarry.
- 50 planed pine timbers. 70¢/board-foot Loblolly Pine from Bastrop sawmill.

## Other Considerations

Labor intensive. 3-man crew can build about 12 bales/day (80 cu. ft.)  
Year long drying time could slow other work.  
Contractors don't understand, usually saying "it can't be done".

- 1) Break apart straw bales.
- 2) Mix clay and water.
- 3) Pour slurry on straw.
- 4) Mix thoroughly
- 5) Pack between forms.
- 6) Compress by hand.
- 7) Done ! Remove forms.

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# Materials & Construction

### Straw/Clay Assembly

**Straw:** Oat or wheat straw. DON'T use hay or grass. Bales cut open and wires removed. Compressed straw thoroughly broken apart and "fluffed".

**Clay Mud Slurry:** 75 shovels clay + 200 gallons water. Mixed at least 24 hours ahead of time. Consistency like a milkshake. Slump test: 4 fl. oz. forms a 6 inch diameter pancake on a level surface.

**Mixing:** 1 bale straw + 15 gallons slurry. Enough to thoroughly coat straw (like tossing a salad). Mixed on the ground, using pitchforks, usually below where wall is being put up.

**Filling forms:** Lightweight "casual built" using 2x planks or plywood w/2x supports. Cob will not "ooze" out, even from large gaps in forms. Forms are nailed, wired, clamped, staked to ground, etc. Mixture is stuffed into forms and hand packed using a board. Forms are removed immediately. NO hardening time required.

**Drying:** Dries to a strong, dense mass, 25-40 Lb/cu.ft. Takes a full year before completely dry enough to apply plaster. Walls shrink some while drying, which must be taken into consideration, especially at the top-plate.

### Rest of the House

An old saying goes, "Give Cob a good HAT and a good pair BOOTS, and it'll LAST FOREVER"

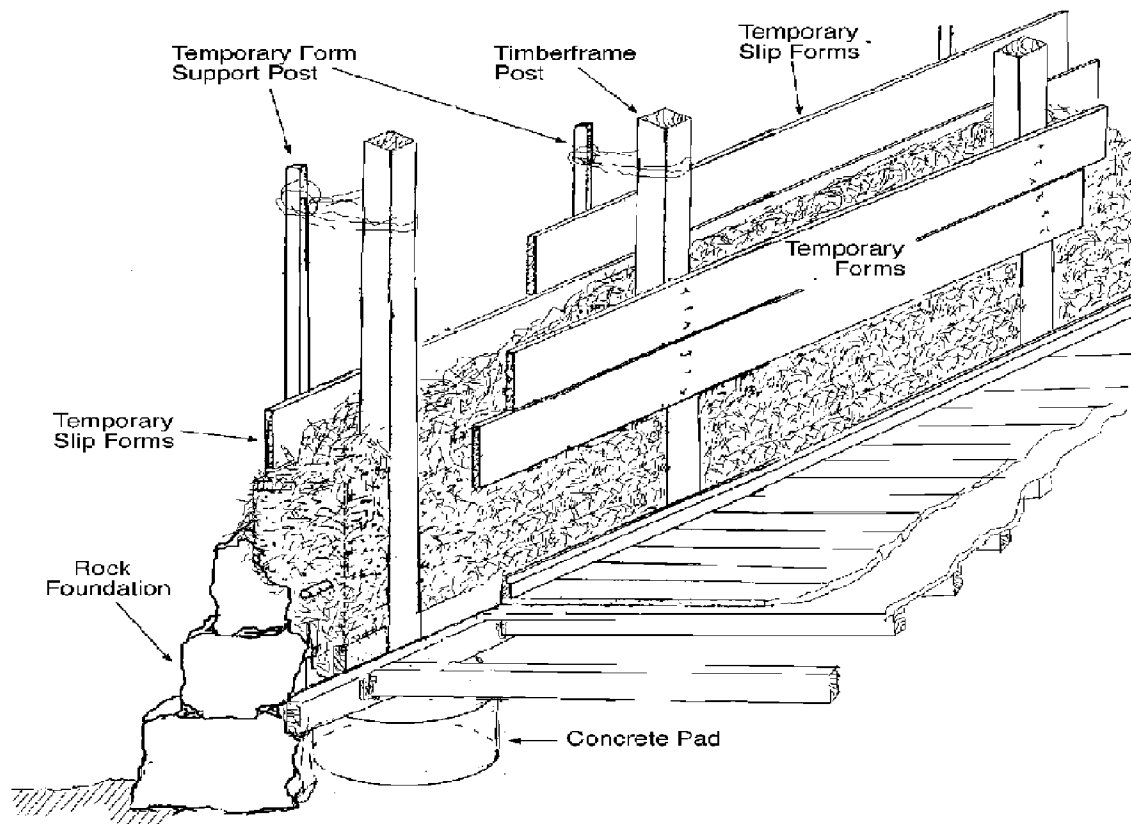
**Foundation:** Usually rock or brick. Broad enough to support the 18"-24" inch thick walls. High enough to keep walls dry and protected from rising damp & rain splash.

**Framing:** Wood, embedded in Cob, survives forever because of the dryness. Often timber Post&Beam frame, but 2x stud frames are possible.

**Doors & Windows:** Frames are placed either during construction, or into holes, cut out afterwards. Irregular openings (stone arches, log frames) are easily accommodated, and can have rounded or splayed corners. Reveals, corners, and arches are cut to proper shape with handsaws.

**Finishing Plaster:** Must allow Cob to breathe NO CEMENT or Stucco. Applied directly to walls, no lathing or "chicken-wire".

**Exterior:** 2 coats White lime & Sand, with fibers, then whitewash (white lime, water, rocksalt, alum). **Interior:** 2-coats Gypsum Plaster.



Form design used on Zuker cottage in Austin