BUILD GOOD EARTHBAG WALLS

Earthbag Info Part 3

Patti Stouter (www.BuildSimple.org)

December 2020

With Natural Building Blog friends

PREPARE TO BUILD

Soil test

Plan

Footings

Base wall

Strong soils for strong walls

Quakes can warp earthbag buildings.

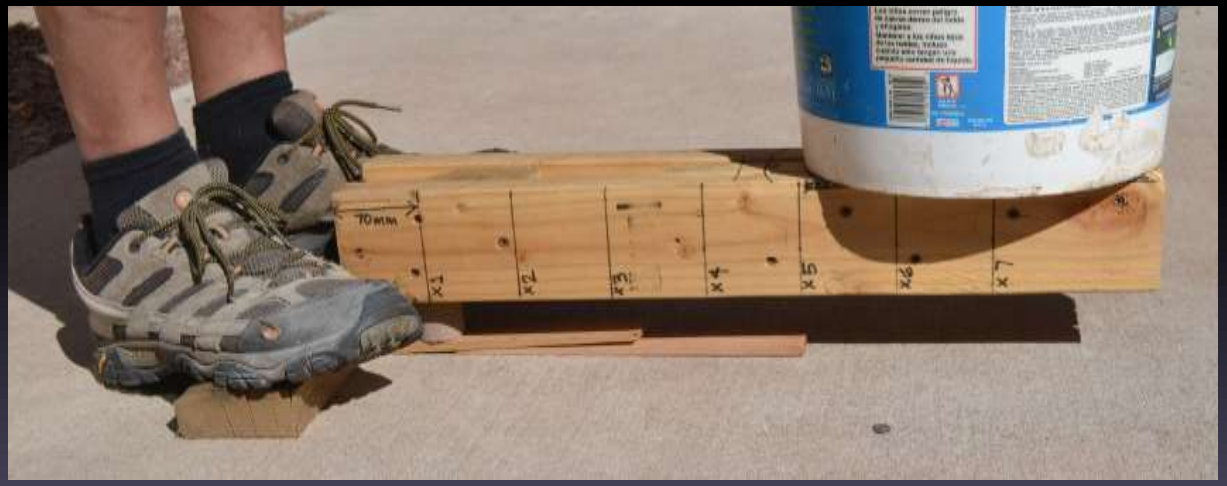
Soil should be 188 psi (1.3 MPa) or more.

300 psi (2.1 MPa) required by some US codes makes stronger walls.

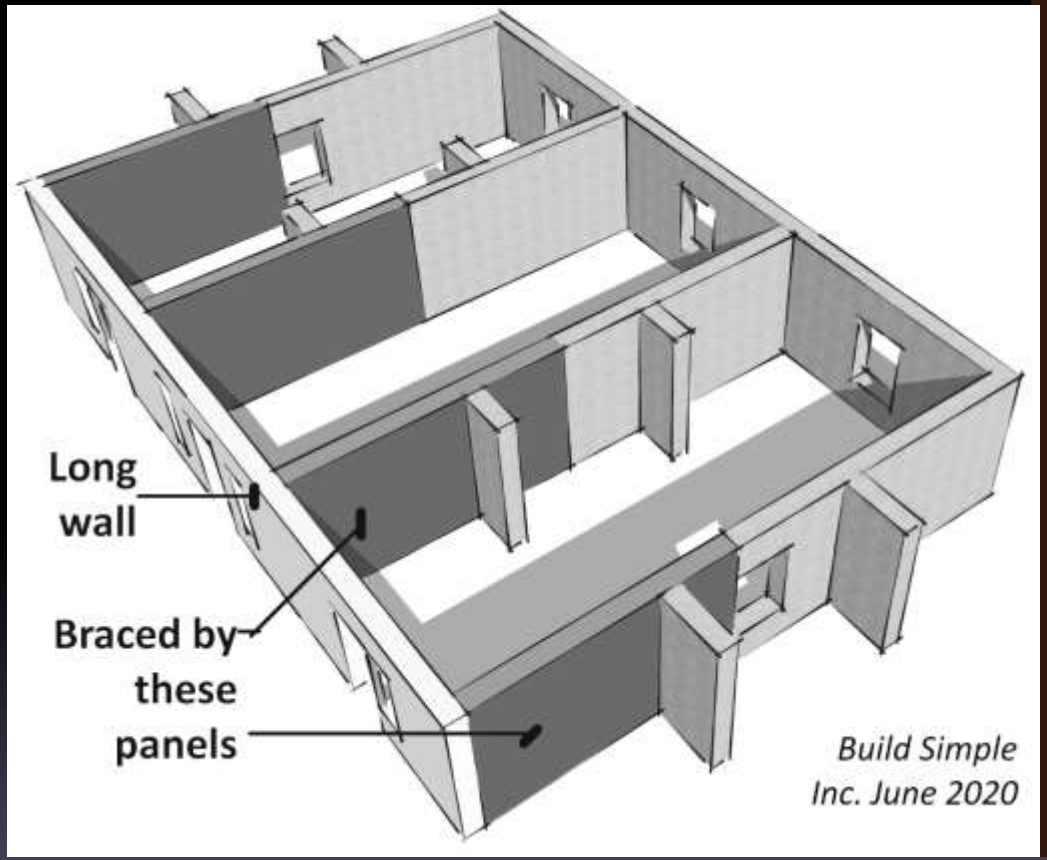
Estimate soil strength

- Make small samples
- Dry 24 hours in an oven
- Test under a small lever

Sample psi x 1.8 for approximate compressive strength. More info:
How Strong is My Building Soil? at BuildSimple.org

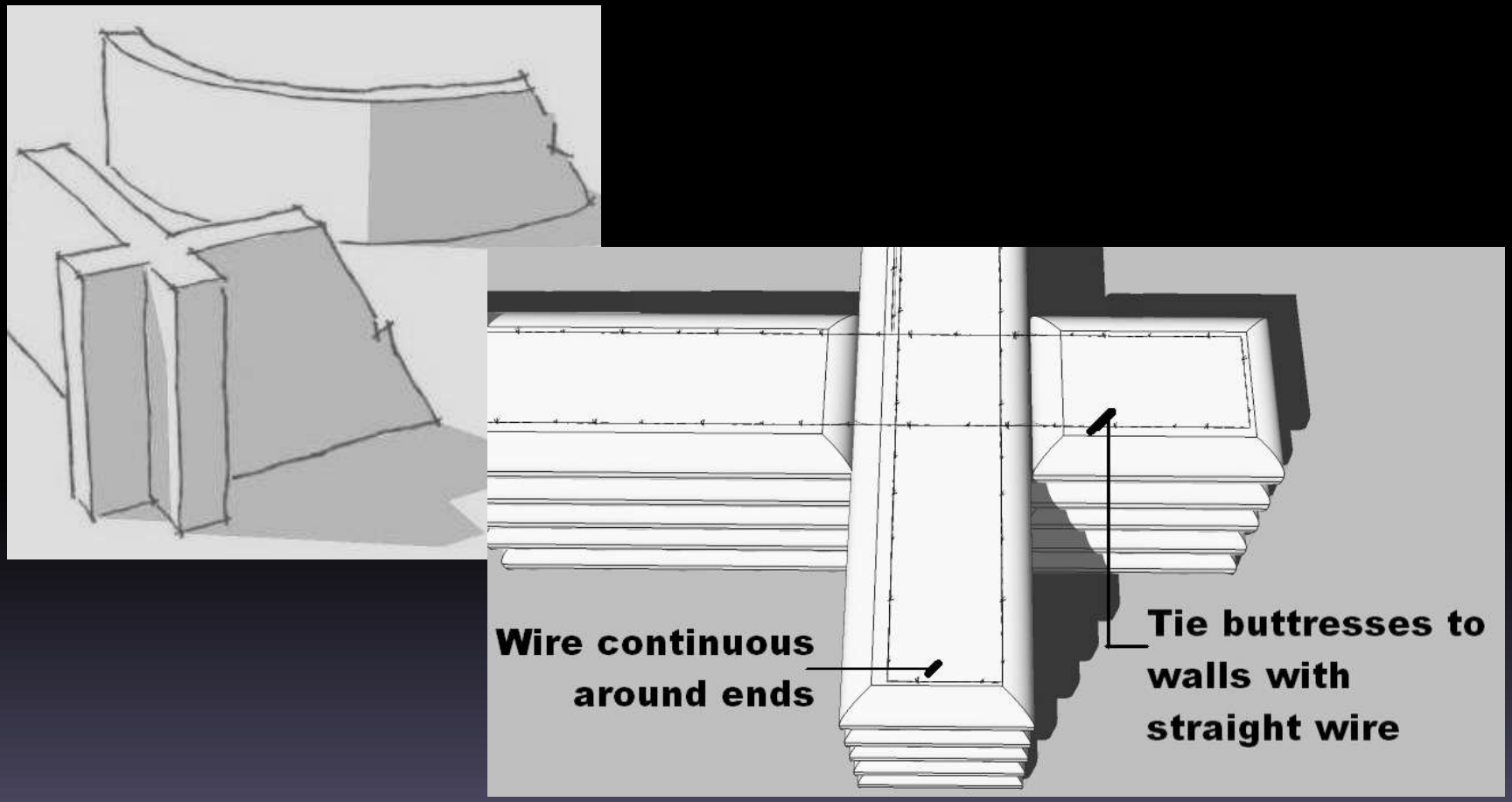


Plan walls to brace each other



- Locate openings away from corners
- Add a buttress if walls are further than 12′ (3.7 m) apart.

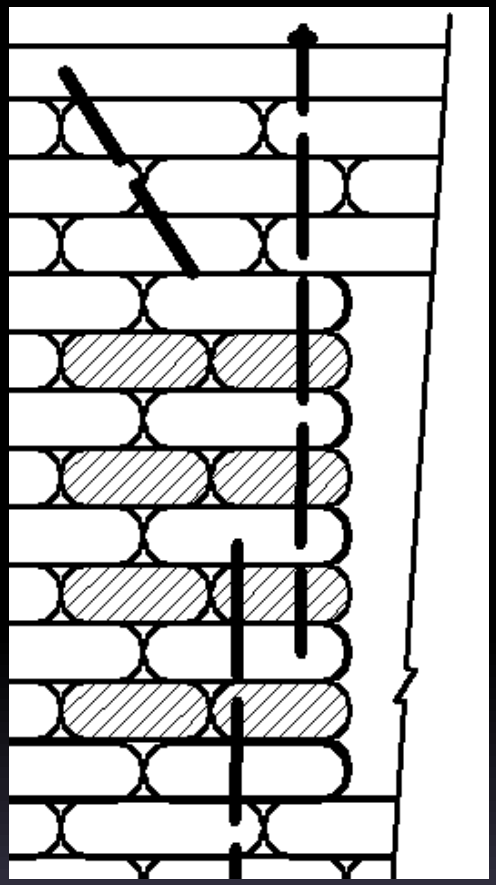
Curved walls and buttresses add strength

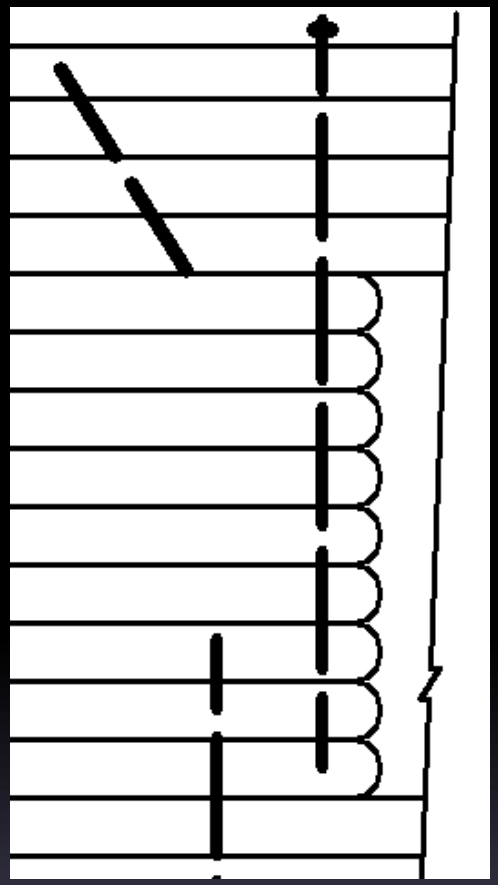


Plan bag lengths carefully

- Overlap bags 6-8″ (16-20 cm)
- Never line ends up

Choose tubes for strength





- Many bags don't connect to rebar
- Tube walls connect better to rebar
- If damaged, tubes resist twisting better than bags

Use thicker walls and more wire for extra strength

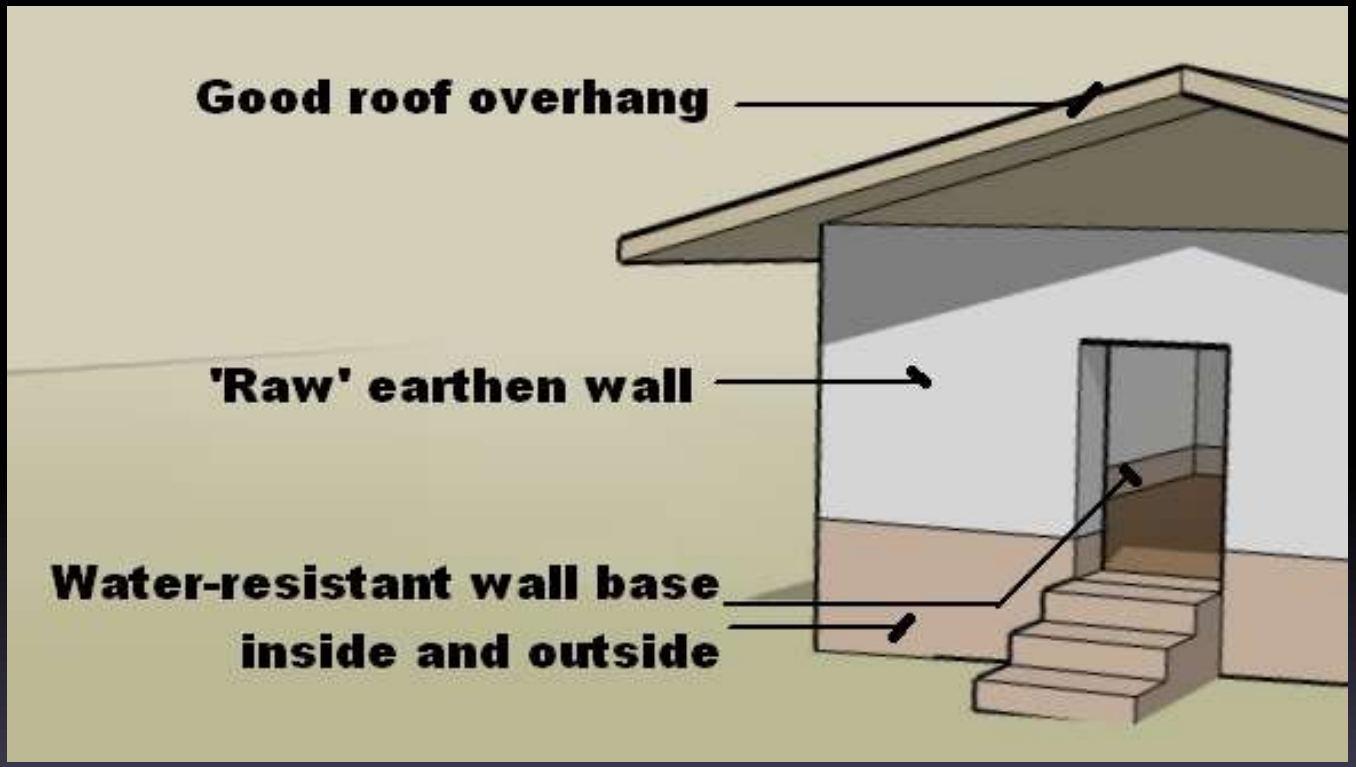
EARTHEN WALLS

Fill

Tamp

Lay wire

Start with water-resistant courses



Needed to survive snow, rain splash, inside leaks

Keep pipes under footings

…away from earth walls

Moist soil fill cures strong

Fill bags the same

Use chute to measure, or count small buckets

Fill the whole tube course the same

- The same person holds the chute for the whole course
- Angle and amount of shaking influence course thickness

Plumb as you tamp

Roll course by hand or foot, then straighten while tamping

Keep people away from barbed wire work

OPENINGS AND MORE

Anchors

Bucks

Lintels

Anchor electric boxes

Hammer pins into bags

Metal anchors

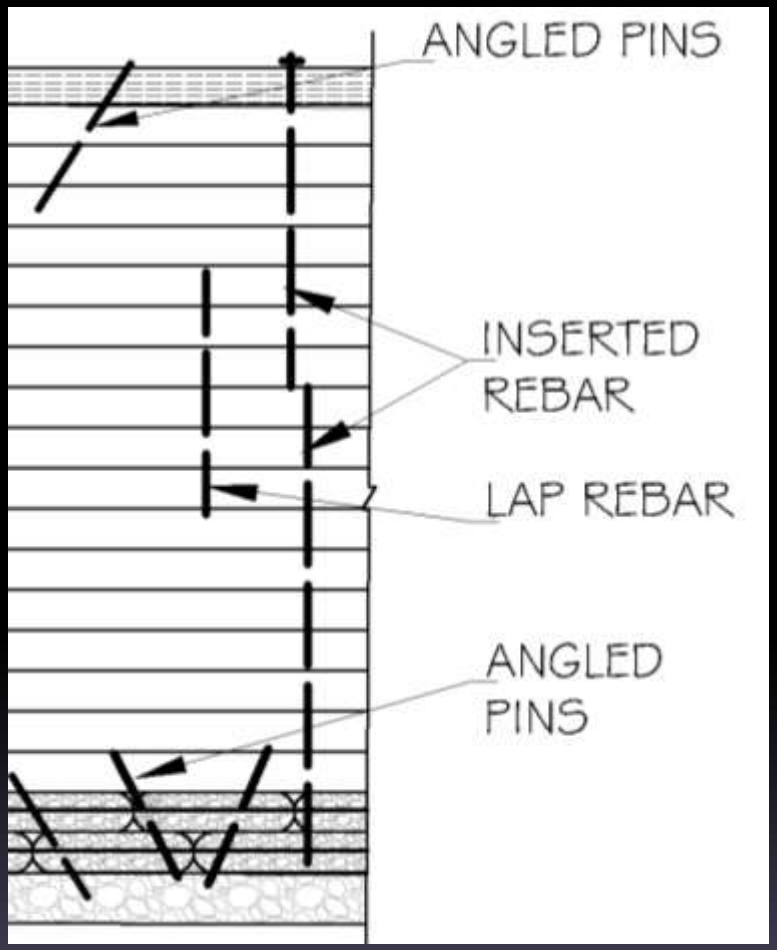
Bucks keep bags level and plumb

Tamping warps unsupported wall ends

Make bucks strong enough

Resist tamping forces- move the pole up as the walls rise

Space inserted rebar out



- Insert lower rebar at half story height
- 3 courses higher insert lap rebar 15-18″ (380- 460 mm) away
- At top insert upper rebar directly above the lower one

Extend lintels into walls

16″ (40 cm) minimum each side

Arches don't need lintels

Make arch forms strong,
thicker than the wall,
smooth outside

Pipes for vent or access

Add extra just in case

TOP IT OFF

Rebar Pins

Bond Beam

Plaster

Roof

Pin reinforced bond beam into walls

- 24″ (600 mm) pins every 24″ (600 mm)
- Insert at alternating angles

Attach rebar to bond beam

To embed 10″ (250 mm) of rebar in a concrete bond beam, bend the top >90° before inserting

For a wood bond beam, weld a bolt on top

Bond beam must be strong

- 10″ (250 mm) minimum on a 15″ (380 mm) wall
- Reinforcing steel continuous at corners

Rafter ties in bond beam

Plaster walls to save bags

Bags keep earth inside walls if stressed by quakes or vehicle damage.

Plaster within 2 weeks in tropics or within 4 weeks where sun is weaker.

Lime plaster on earth

Wall top must be under an overhang

Stucco is ok on earthen walls

Where it never freezes

Stucco on external surfaces only where it freezes.

Use earth or lime plaster inside to let the walls breathe in a very damp climate.

BUILD GOOD EARTHBAG WALLS
EARTHBAG INFO PART 3

This file covers some techniques for building with earthbag in non-hazardous and low risk areas.

Projects built around the world are featured at both the Earthbag Building and Calearth websites. See the other parts of the Earthbag Info series available online to learn more.

Strong buildings of natural materials require care and advice. Before building, purchase a book or video, take a course, and/ or seek advice from experienced builders and architects or engineers.

Before building in areas with seismic risk, check www.BuildSimple.org for the latest structural information. Check online for the latest version of *Best Practices for Quake-resistant Earthbag*.

Thanks for hard work and sharing photos:

Slides:

1- Small World School, Nepal

8, 12, 27 (left), - Residence J. Vallejo, Columbia

10, 19(l.), 25, 26(l.),- O. Geiger,

17- J. Turner/ Homegrown Hideaways, US

20- F. Pacheco, Ecooca, Brazil

22(l.), 28, 34- M. Long/ Haiti Christian Dev. Project, Haiti

22 (right), 37- M. Gunn & R. Lewis/ Children of Hope, Haiti

26(r.), 40- K. Hart

27(r.)- Rasin Foundation Clinic, Leogane, Haiti

30(r.)- D. Watson & A. Gerhart, Residence, San Miguel de Allende

30(l.)- Shine on Sierra Leone, Sierra Leone

32, 36- E. Bellamy, University of Cincinnati, US

All other photos and graphics by Patti Stouter

A public service of www.BuildSimple.org

Volunteers are welcome to translate this series! Please ask for an original file and let us post a copy.