

EARTH BAG

BUILDING BASICS

EARTH BAG INFO PART 2



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with Natural building blog friends

EARTHBAG BUILDING BASICS

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Projects built around the world are featured at both the Earthbag Building and Calearth websites. This file introduces the concepts of building with contained earth earthbag.

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 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*.

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PREPARE



Soil
Supplies
Plans

Tamping firms moist cohesive soil in a bag



Soil masses that break when lifted 24 hours after tamping are weak soil

Weak or dry soil is loose

Breaks apart when dropped

Loose after tamping



Drop balls from 5' (1.5 m)

Test for moisture level- most good soil breaks in 2- 3 pieces



Too wet: leaving a wet spot, cracking

How strong is your soil?

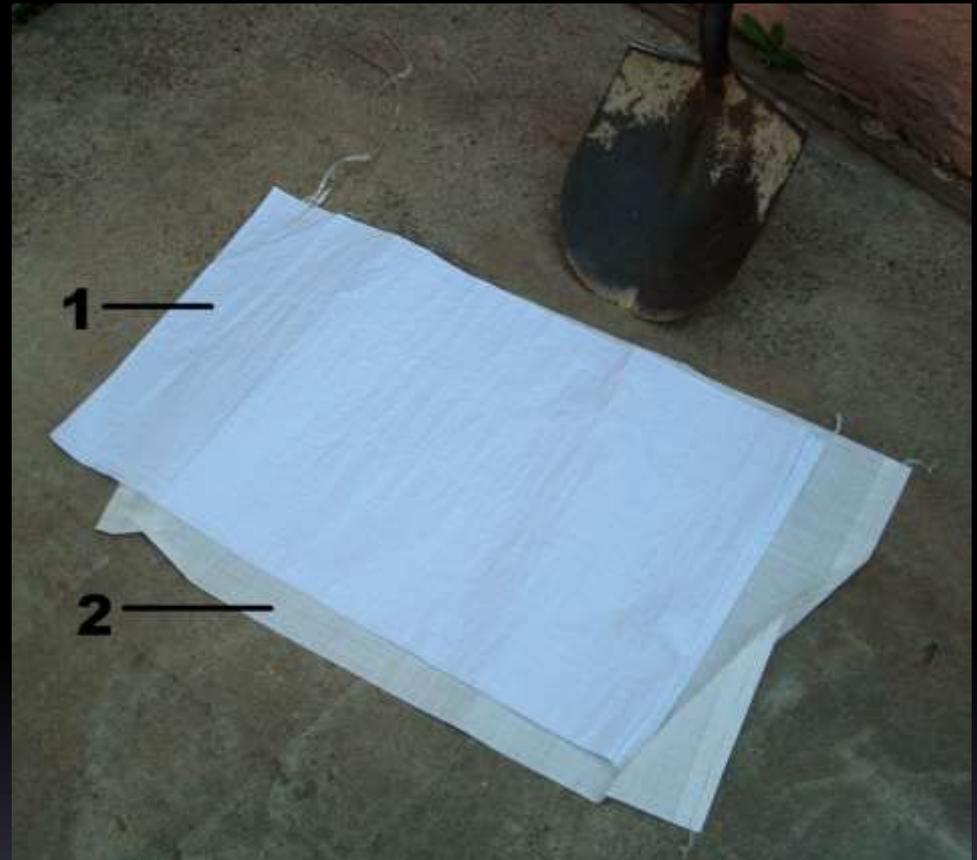


- Sticks to fingers
- Gritty when wet
- Dry ten 30 mm balls
- Most balls should hold up 130 lbs (59 kg) under a soft shoe for strength of ± 200 psi (1.4 MPa)

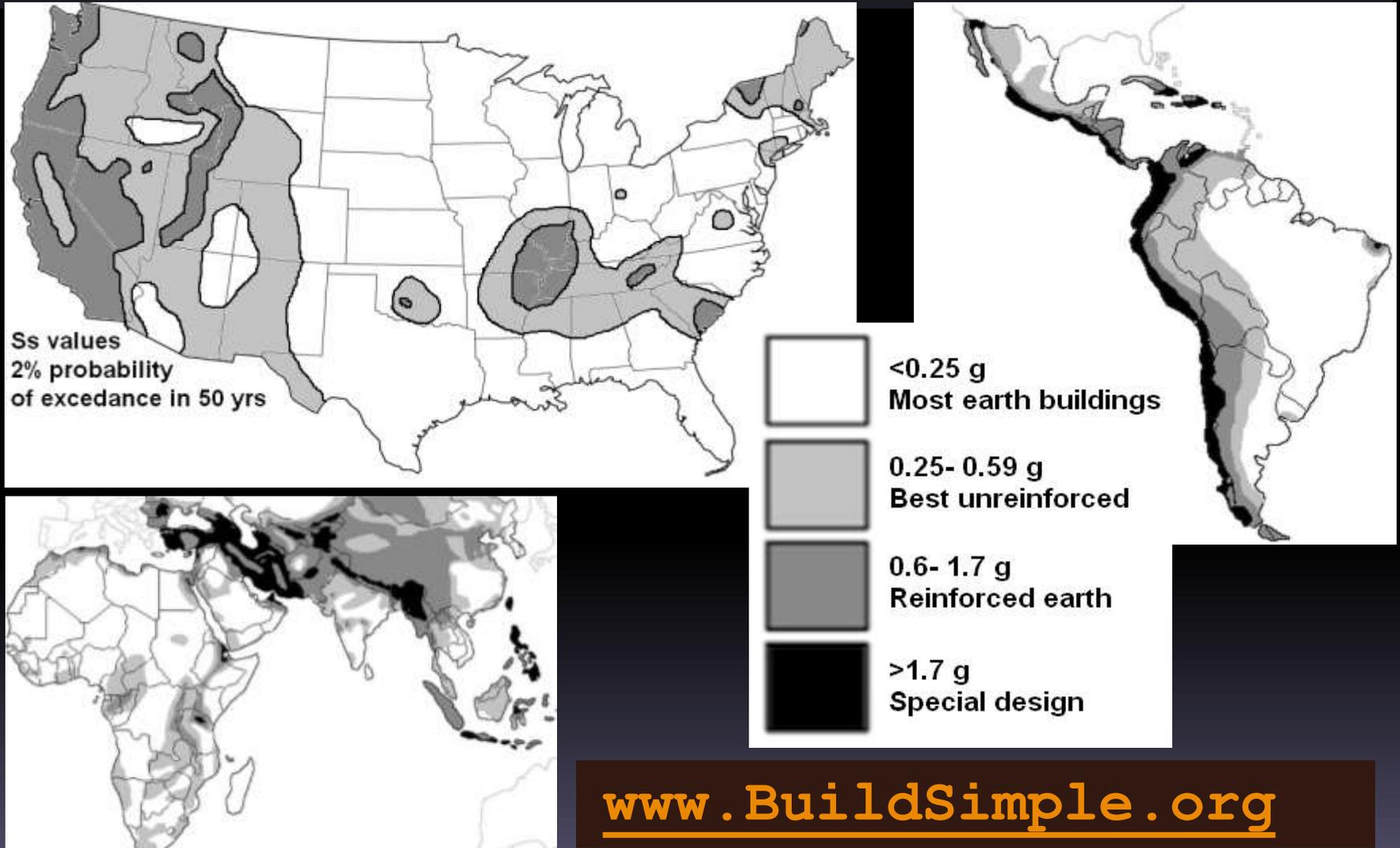
Size bags for wall height

1: 15" (38 cm) wide for site wall

2: 17- 18" (43- 46 cm) wide for building wall

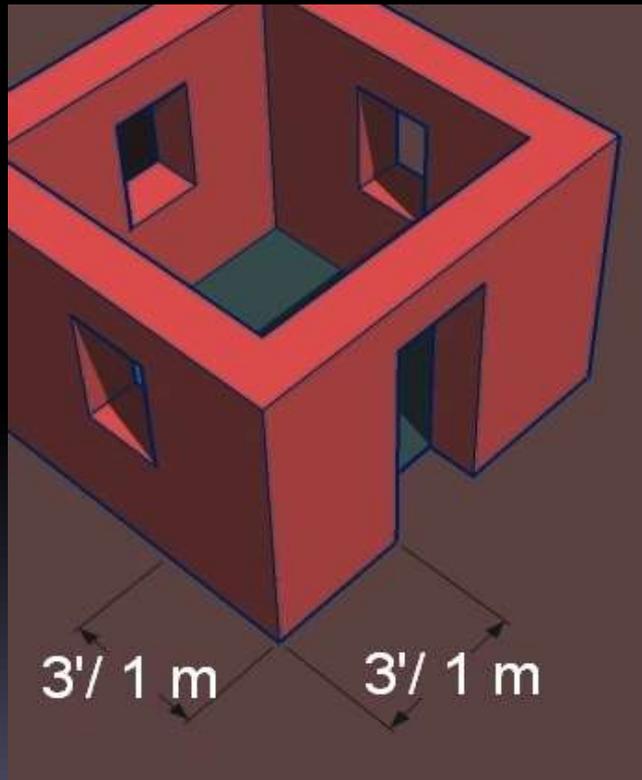


Choose plans for risk

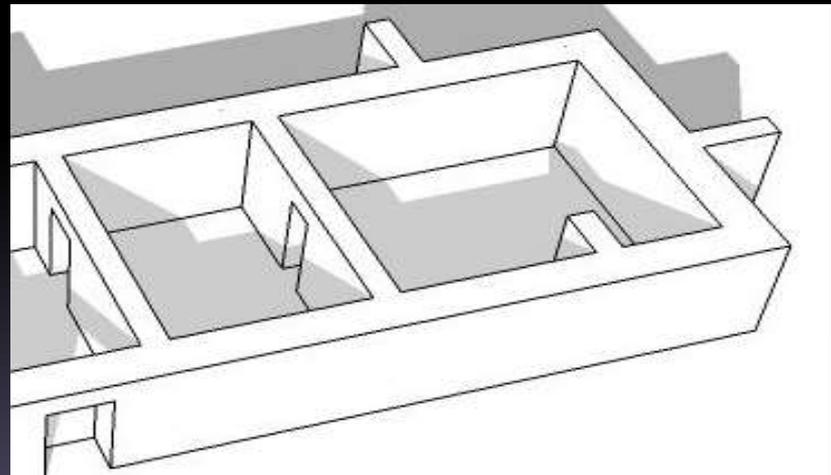


Strong plans

Strong corners.



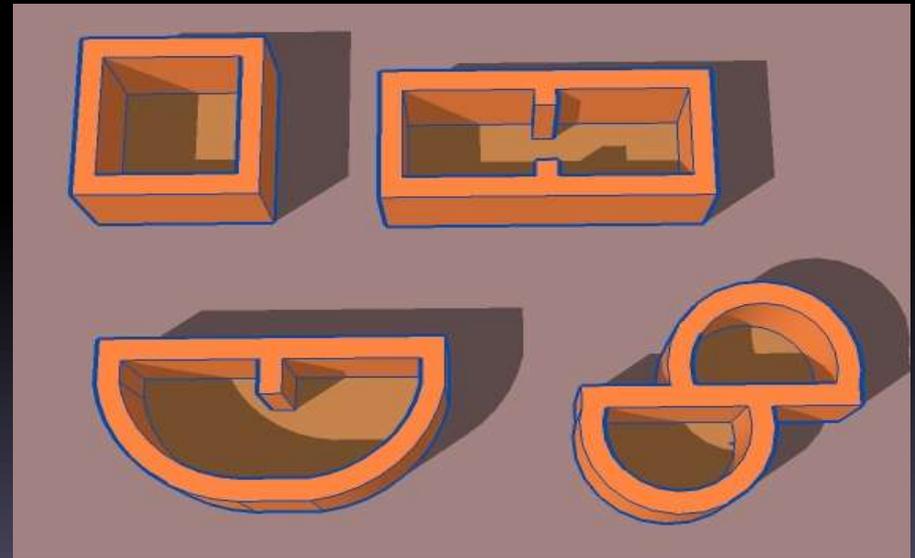
Walls or 2-
3' (600- 900 mm)
buttresses every
12' (3.7 m)



Strong plans

More wall
than
openings

Connect ends of
walls- stubs 4'
(1.2 m) max.



START BUILDING



Footings
Base wall

Dig to firm ground



Add stone, rubble or gravel



Water-resistant gravel bags first



Use gravel to
above finish
floor level



Gravel full but not bulging

Double bags

Pin closed



Tilt down into place

Offset ends
of bags like
bricks

Foot tamp,
then tamp
gently with
tool



Barbed wire on each course

**Straight
lines**

**Continuous
around
corners**



EARTH WALLS



Earthbags

Tamp

Lay wire

Attachments

Moisture barrier

Gravel bags
block moisture
and salt

On stabilized
earth use
plastic or tar
to stop damp
rising



Turn bags inside-out



Put soil in
single bags



Tuck corners
in so bags
end up
rounded

Check moisture often

Damp enough?
Well mixed?



Drop balls to
check- see slide 5

Fill on the wall



Carry small buckets to heavy bags or tubes



Tamp earth smooth and hard



Course height reduced 20%



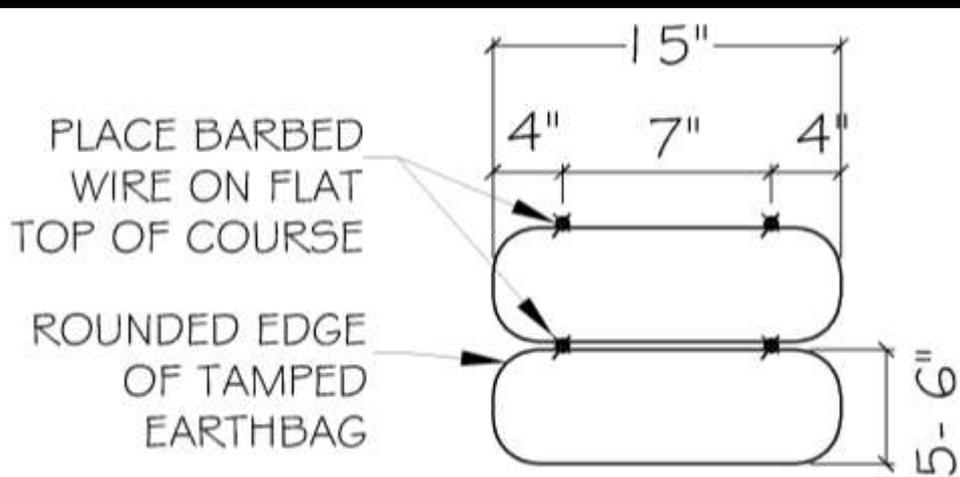
Check level as you tamp



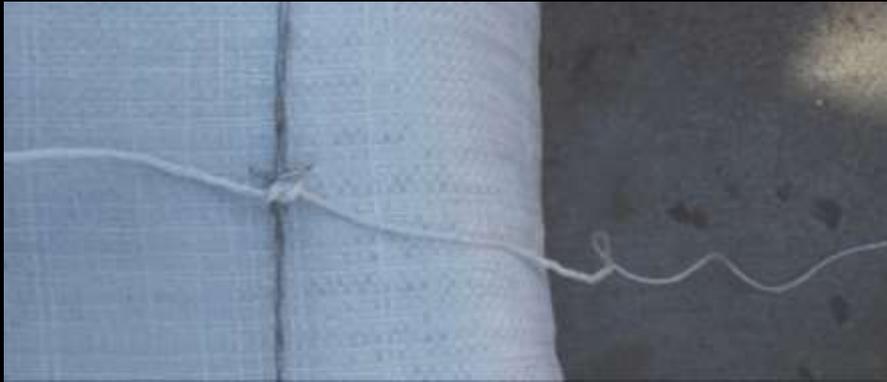
Barbed wire every course

Continuous around corners

Leave room in the middle to insert rebar



Tie cords to barbed wire



Every 24" (600 mm) along the wall, every 4th course



Hang cords out both sides to attach plaster mesh

Anchor door frames

Wood or metal Velcro plates
nailed to bags above and below



FINISH



Plaster
Rebar
Lintels
Bond Beam
Roof

First plaster levels the wall



- Stabilized earth plaster under stucco
- Earth plaster under lime plaster
- Rough surface and cords out

Mesh unites walls



- Tie mesh with cords from barbed wire and attach to footing and bond beam



- Plastic mesh lasts longer than chicken wire in earth or lime plaster

Protect bags for best strength



Tropical/
high
altitude sun
can damage
in 2 weeks



Add rebar near openings

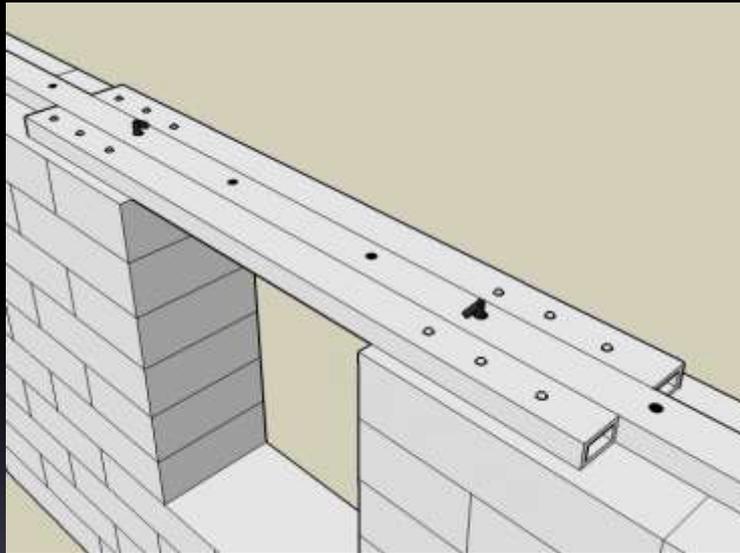


Hammer 5- 6'
(1.5- 1.8 m)
lengths into
damp walls

Overlap but
Space 12" (300
mm) apart
horizontally

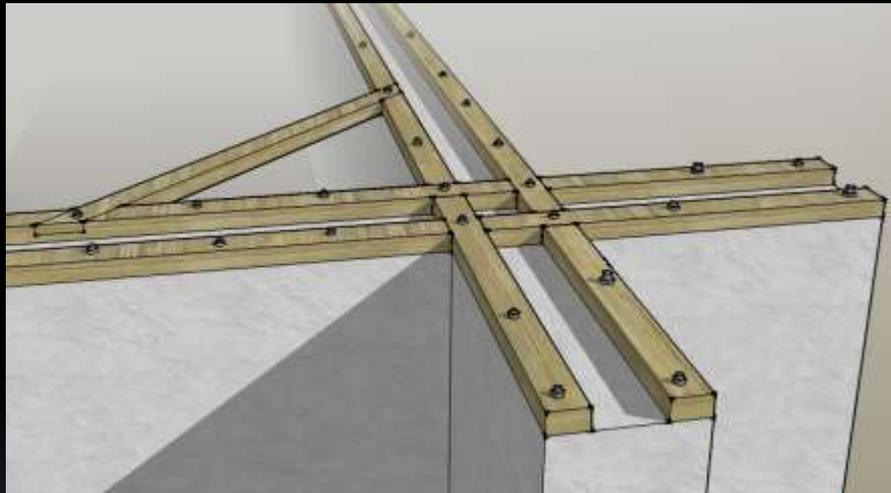
Lintels over openings

Extend 12- 16"
(30- 40 cm)
into walls



Strong bond beam needed

Reinforced cement or
lap-jointed wood



Rebar pins attach bond beam

Hammer in
while wall is
damp

24" (600 mm)
long

Alternating
45° angles



Add a roof



Use collar-ties or trusses so weight doesn't push wall tops outward



Thanks for hard work and sharing photos:

Slides:

1- Small World School, Phuleli, Nepal

11(left)- Utah, US

13, 14(right)- P. Dubois

14(l.), 25(l.), 37(l.)- M. Gunn & R. Lewis/ Children of Hope, Haiti

15(l.), 17, 25(r.)- O. Geiger

20- J. Vallejo, Colombia

24(r.)- Barber/ EMI, Free Burma Rangers Clinic, Thailand

27(bottom), 33- E. Bellamy, University of Cincinnati prototype for Haiti, Kentucky, US

14(l.), 28, 34(r.), 35(r.)- M. Long/ Haiti Christian Dev. Project, Haiti

37(r.)- Aman Setu School, India

All other photos and graphics by Patti Stouter

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Volunteers are welcome to translate this series! Please email BSI at simple_earth@yahoo.com. Ask for an original file and let us post a copy.