

EARTHBAG

BUILDING BASICS

B2: EARTHBAG INFO PART 2



Patti Stouter (www.BuildSimple.org)

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with Natural building blog friends

EARTHBAG BUILDING BASICS

B2: EARTHBAG INFO PART 2

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/Resources for the latest structural information, including the latest version of files *B100- 103* about *Resilient CE*.

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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?

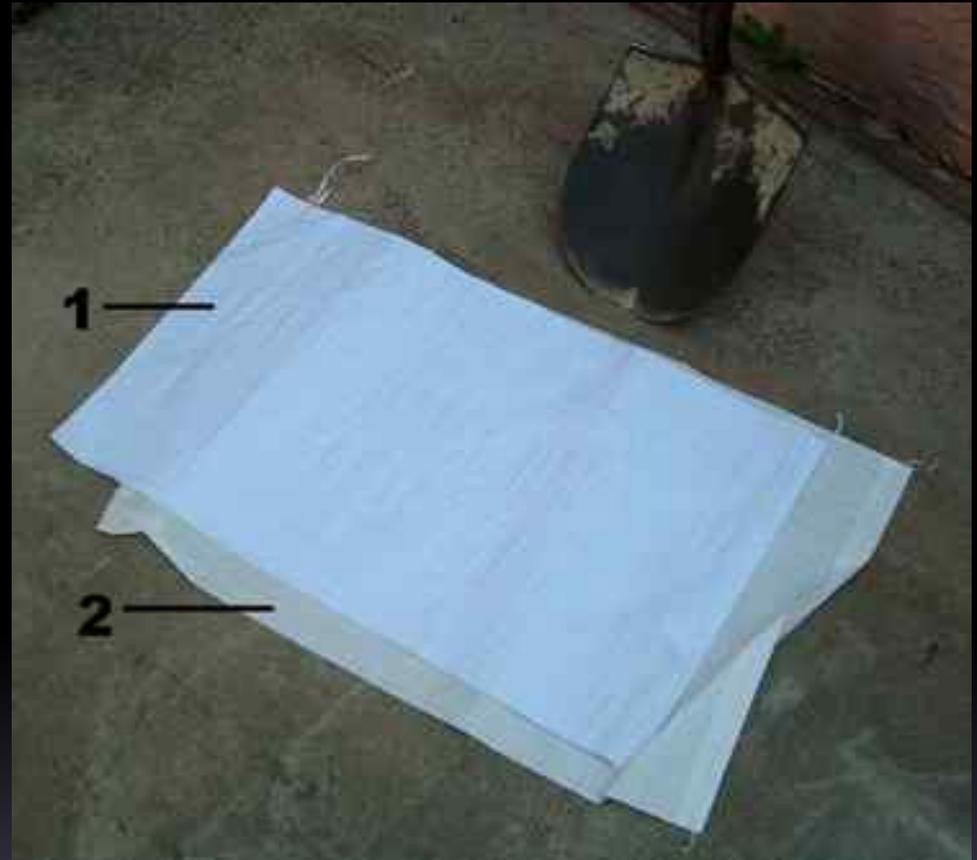


- Sticks to fingers
- Gritty when wet
- Dry ten 30 mm balls
- Most balls should hold up 130 lbs (59 kg) under a soft shoe for strength of ± 200 psi (1.4 MPa)

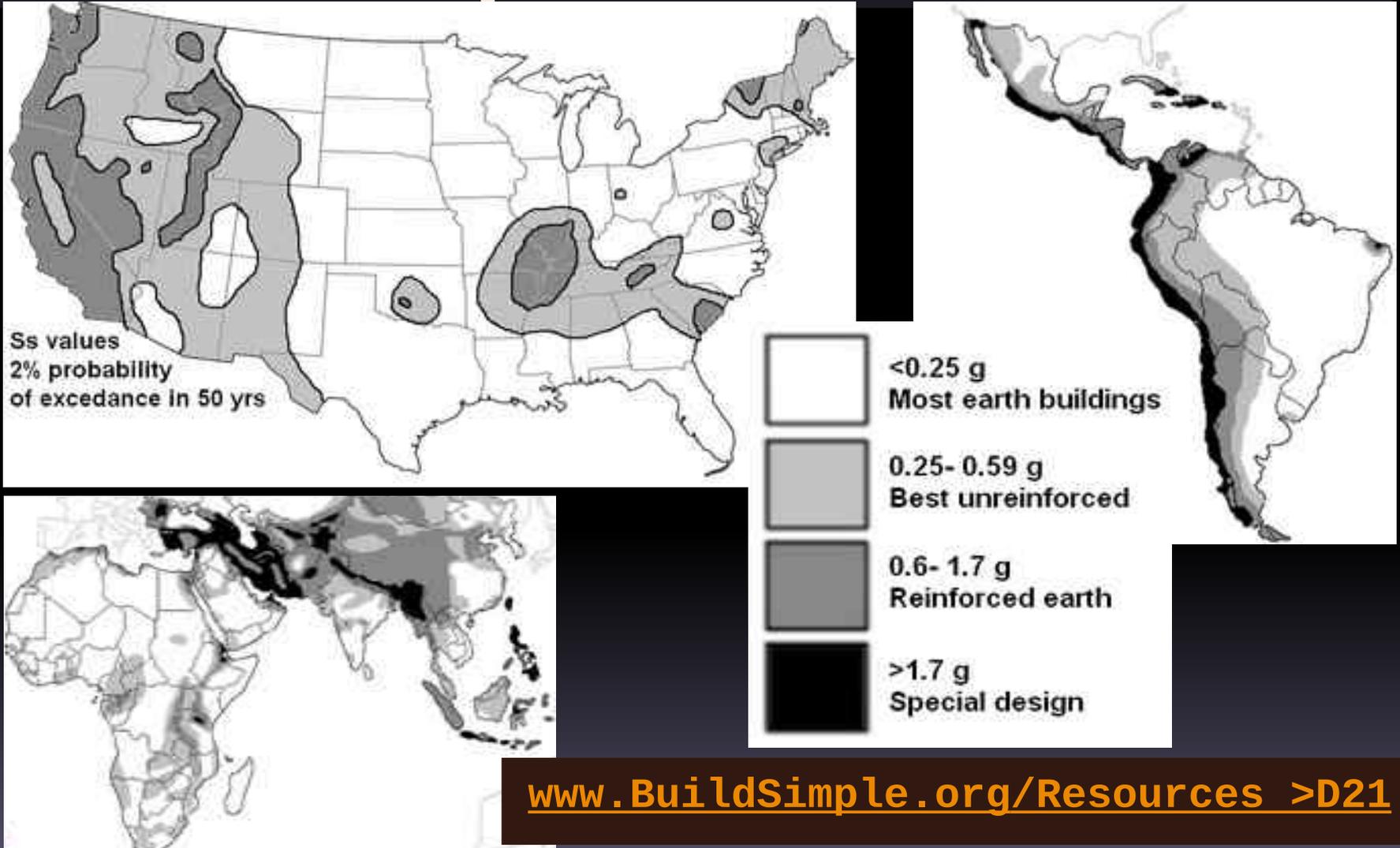
Size bags for wall height

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

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

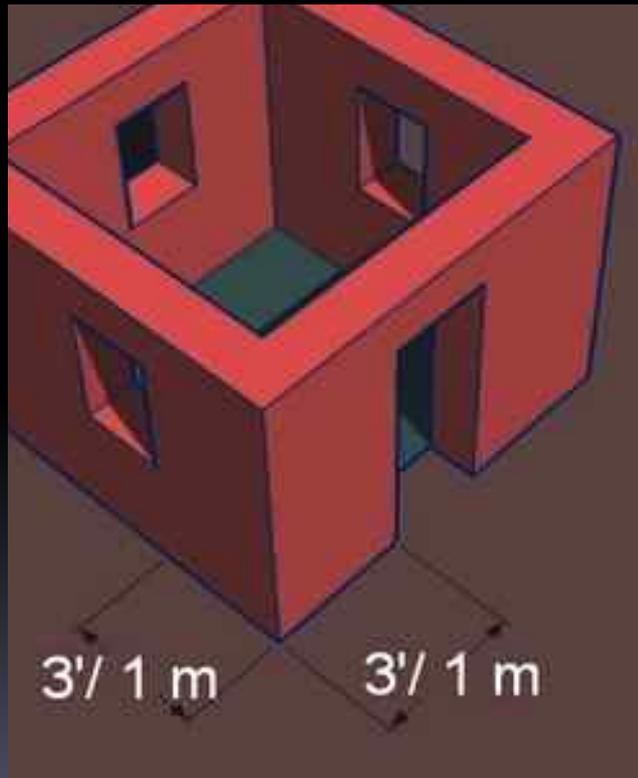


Choose plans for risk

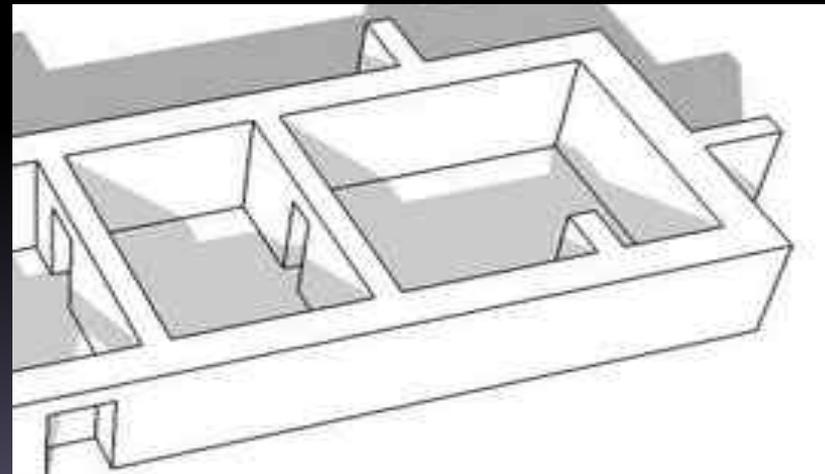


Strong plans

Strong corners.



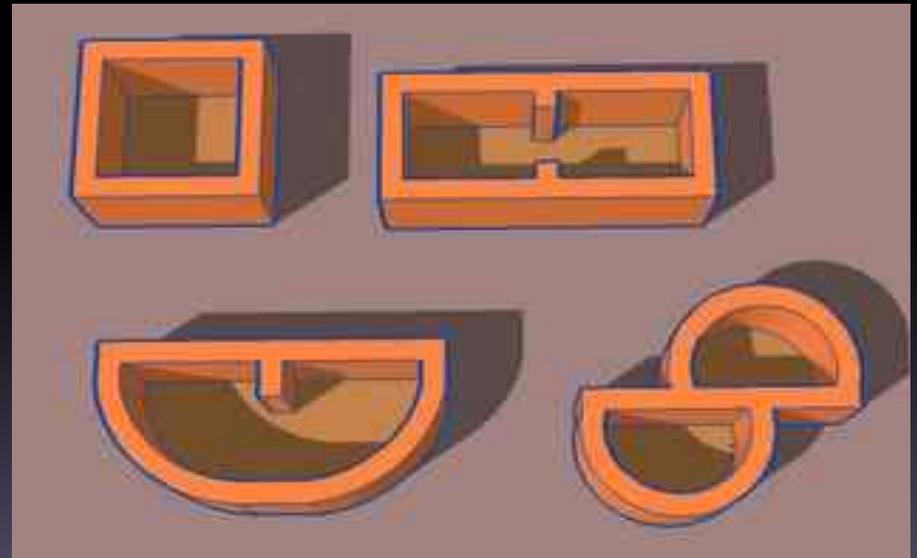
Walls or 2- 3' (600- 900 mm) buttresses every 12' (3.7 m)



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%



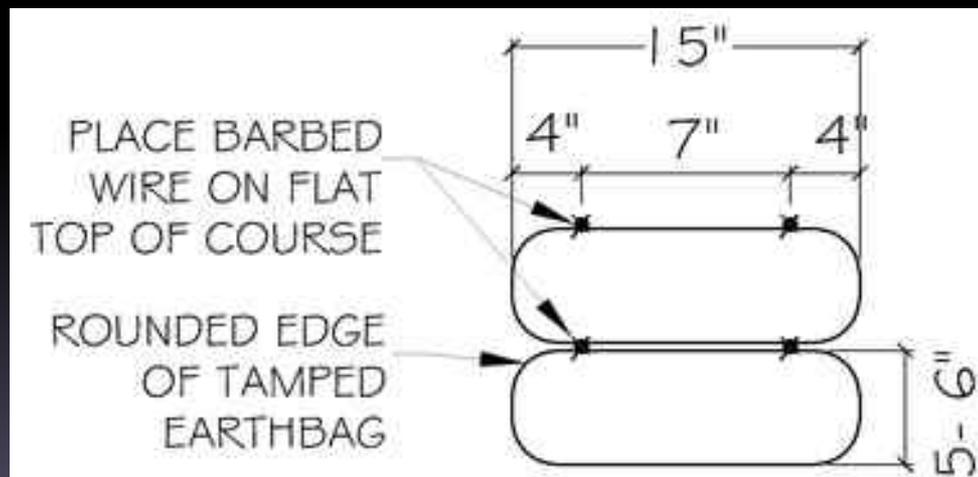
Check level as you tamp



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

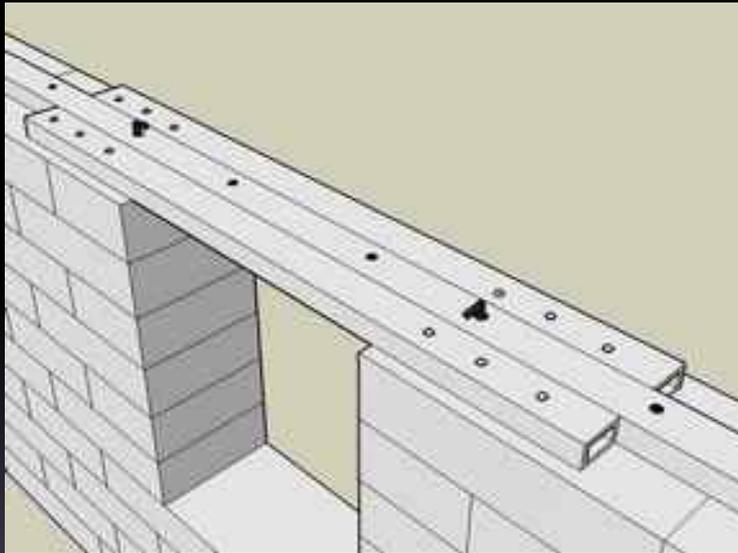


**Hammer 5- 6' (1.5-
1.8 m) lengths
into damp walls**

**Overlap but
Space 12" (300
mm) apart
horizontally**

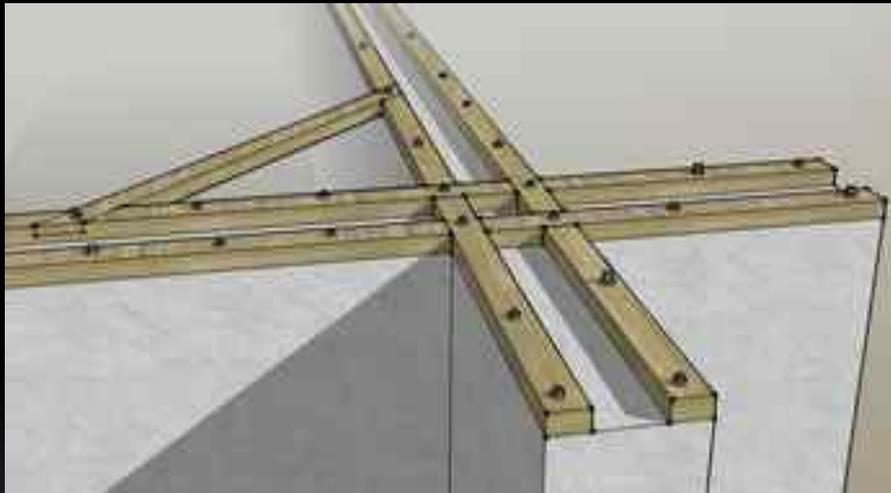
Lintels over openings

**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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simple_earth@yahoo.com. Ask for an original file and let us post a copy.