



*Rebuilding Haiti*

# *Build Change*

→ 501(c)3 non-profit social enterprise

→ founded in 2004 by Elizabeth Hausler, a brick mason and Ph.D. earthquake engineer from University of California, Berkeley

→ Mission: Greatly reduce deaths, injuries and economic losses caused by housing collapses due to earthquakes in emerging nations

→ Build Earthquake-Resistant Houses

→ Change Construction Practice Permanently

→ Programs in Indonesia, China, and expanding to Haiti







More than **24,000** people living in houses  
that are unlikely to collapse in the next earthquake





More than **4,000** builders, homeowners, students, engineers, government officials trained

# *For Earthquake-Resistant Construction to Become Common*

→ MONEY

→ TECHNOLOGY

→ PEOPLE



# TECHNOLOGY: Within Reach?



Build Earthquake Resistant Houses  
Change Construction Practice Permanently



# *TECHNOLOGY: Yes, Within Reach*



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# TECHNOLOGY: Local Materials, Local Jobs



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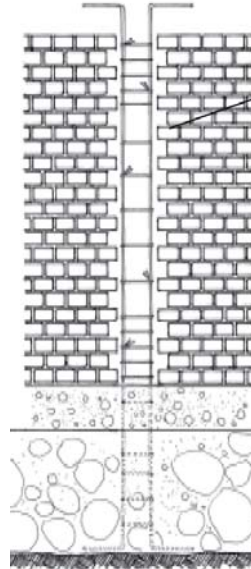
REBUILD YOUR HOME SAFELY AND KEEP YOUR FAMILY SAFE FROM EARTHQUAKES AND HURRICANES!

# QUALITY CONCRETE BLOCK CONFINED MASONRY

IN A CONFINED MASONRY HOUSE THE MASONRY WALLS ARE BUILT BEFORE THE REINFORCED CONCRETE COLUMNS AND RING BEAMS ARE POURED.

**THE MASONRY WALLS CARRY LOAD AND ARE A CRITICAL PART OF THE STRUCTURE. THEY MUST BE MADE WITH GOOD WORKMANSHIP FROM HIGH QUALITY CONCRETE BLOCKS!**

BUILD THE WALL BEFORE POURING THE CONCRETE



**COVER YOUR WALL WITH PLASTER ON BOTH SIDES FOR ADDITIONAL STRENGTH!**

## MIX RATIOS:

### CONCRETE BLOCK

1 PART PORTLAND CEMENT TO 6 PARTS LIMESTONE SAND (AGGREGATE < 3/8")

### MORTAR

1 PART PORTLAND CEMENT TO 4 PARTS SAND

DON'T USE TOO MUCH WATER!

## MAX WALL HEIGHT:

FOR 8" BLOCKS (RECOMMENDED), MAX WALL HEIGHT IS 12FT

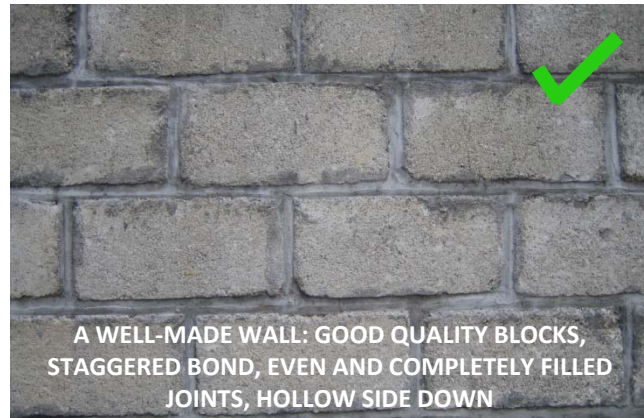
FOR 6" BLOCKS (ONLY FOR SINGLE STORY BUILDING), MAX WALL HEIGHT IS 9FT



TOOTH THE MASONRY WALL OR USE BED JOINT REINFORCEMENT EVERY 3 LAYERS TO TIE THE MASONRY WALL TO THE COLUMN SO THEY CANNOT SEPARATE.



DO NOT USE WEATHERED OR CRUMBLING BLOCKS! DO NOT REUSE OLD BLOCKS!



A WELL-MADE WALL: GOOD QUALITY BLOCKS, STAGGERED BOND, EVEN AND COMPLETELY FILLED JOINTS, HOLLOW SIDE DOWN



DO NOT ALIGN HEAD JOINTS! USE STAGGERED BOND.



DO NOT USE BROKEN, OLD OR MISSHAPEN CONCRETE BLOCKS!



DO NOT LEAVE JOINTS UNFILLED! FILL THEM ENTIRELY WITH MORTAR.



DO NOT MAKE MORTAR JOINTS TOO BIG! AVERAGE THICKNESS IS 1/2"



# TECHNOLOGY: Building Codes and Guides

地震中保护你家园的安全! You can keep your family safe from earthquakes!

## 混凝土 Concrete

C10 混凝土用于基础垫层 C10 Concrete for foundation base layer

基础垫层  
Foundation base layer

1 50kg 水泥  
50kg cement

+ 2.5 小推车砂  
wheelbarrows sand

+ 3.5 小推车石子  
wheelbarrows gravel

C20 混凝土用于地梁和构造柱 C20 Concrete for plinth beam and tie columns

构造柱  
Tie column

地梁  
Plinth beam

1 50kg 水泥  
50kg cement

+ 1.5 小推车砂  
wheelbarrows sand

+ 2.5 小推车石子  
wheelbarrows gravel

C25 混凝土用于圈梁和屋面板 C25 Concrete for ring beam and roof

圈梁和屋面板  
Ring beam and roof

1 50kg 水泥  
50kg cement

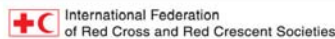
+ 1 小推车砂  
wheelbarrows sand

+ 2 小推车石子  
wheelbarrows gravel

小心, 别加太多的水!  
Caution! Do not use too much water!



混凝土浇筑  
Concrete Pouring



# ANDA BISA!!! MENJAGA KELUARGA ANDA AMAN DARI GEMPA

Ikuti petunjuk penting berikut untuk membangun rumah permanen yang aman gempa!

Mengapa beberapa rumah runtuh saat terjadi gempa, sedangkan yang lainnya tidak? Ikuti petunjuk 3K:  
Konfigurasi (Bentuk): bentuknya sederhana, sama sisi (simetris), persegi lebih baik.  
Koneksi (Sambungan): sambungan balok atas dengan tiang kolom, dan gunakan besi stik untuk menyambungkannya.  
Kualitas Konstruksi: belilah bahan-bahan dengan kualitas yang baik dan ikuti petunjuk-petunjuk teknis penting.

## MASALAH Buruk SOLUSI Bagus

	Masalah: Tidak pakai kolom dan balok	Solusi: Gunakan kolom dan balok atas untuk mengikat dinding secara bersamaan. Cor kolom dan ring balok setelah anda selesai membangun dinding	
	Masalah: Tidak ada sambungan	Solusi: Buat keoneksi yang kuat antara elemen yang terikat dengan besi yang dilubuhkan 40cm	
	Masalah: Tombak layar atau dinding an yang rubuh	Solusi: Jangan menggunakan tombak layar atau dinding an dari bata, karena berat, mudah bergeser dan rubuh, pakai kayu atau buat model atap bungkus nasi	
	Masalah: Dinding dengan jendela yang besar dan pintu akan mudah rubuh	Solusi: Untuk semua dinding dengan jendela dan pintu, gunakan balok pinggang atau penguatan dengan besi melintang, diikatkan ke kolom	
	Masalah: Batu bata yang dipasang kering, spesi tidak diisi penuh dengan mortar	Solusi: Bangun dinding yang kuat dengan menanam bata dalam air sebelum dipasang dan diisi spesi secara penuh dan padat dengan mortar	
	Masalah: Tidak ada sambungan antara dinding dengan kolom	Solusi: Untuk semua dinding tanpa bukaan gunakan besi stik atau potongan besi untuk mengikat dinding dengan kolom	



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Change Construction Practice Permanently





# TECHNOLOGY: Local Testing Capacity



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# TECHNOLOGY: Building Materials

Opportunities for US Businesses?  
Should be locally sustainable  
(USAID T-Shelter)

- (1) Lightweight roofing structural elements (timber, lightweight steel)
- (2) Wall reinforcement, connectors
- (3) Reforestation

## GEMPA BUMI TIDAK MEMBUNUH MANUSIA

SAMBUNGAN YANG BAGUS DAPAT MENYELAMATKAN MANUSIA



**Bagus**  
Sambungan pembedan yang kuat akan menyelamatkan nyawa dan keluarga kita



Genggaman yang kuat akan menahan guncangan atau tarikan dan tidak mudah terlepas



**Buruk**  
Sambungan pembedan yang tidak kuat akan membahayakan nyawa dan keluarga kita



Genggaman yang lemah tidak akan menahan guncangan atau tarikan dan mudah terlepas



### KONSTRUKSI YANG BURUK DAPAT MEMBUNUH MANUSIA

Untuk informasi lebih lanjut silahkan kontak Build Change di [info@buildchange.org](mailto:info@buildchange.org) atau kunjungi [www.buildchange.org](http://www.buildchange.org) dan kantor kami:

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**build change**

**DRAPER RICHARDS FOUNDATION**



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# *For Earthquake-Resistant Construction to Become Common*

→ MONEY

→ TECHNOLOGY

→ PEOPLE

# PEOPLE: Build Local Capacity



1. Builders and Technicians
2. Building Materials Producers
3. Engineers and Architects, **Gov't**
4. Relief Agency Staff

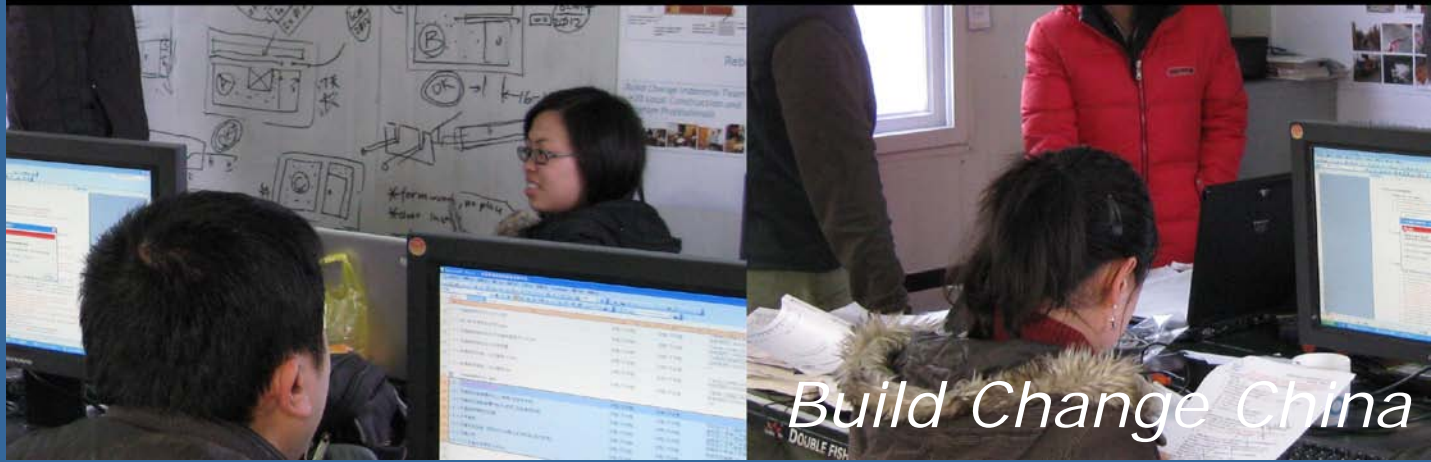


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# PEOPLE: Construction Professionals



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# PEOPLE: Construction Professionals



*Build Change Indonesia*

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# PEOPLE: Builders and Tradespeople



→ Builder Training



→ Vocational Training



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# PEOPLE: Government Officials



→China: Providing Inspection Services for Government

→Indonesia: Government Now Uses Build Change Model



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# PEOPLE: Homeowners and Builders



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# PEOPLE: Relief Agencies

- CARE International Indonesia
- Catholic Relief Services
- CHF International
- International Federation of the Red Cross and Red Crescent Societies
- International Org for Migration
- Mercy Corps
- Oxfam International GB
- Save the Children



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# ***MONEY → Inefficient Use***

When Donors Make the Decisions...



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# *MONEY → Efficient Use*



*Xing Dayan (China)*



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# MONEY → Efficient Use



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## ***Recommendations – Invest in***

1. Research on locally appropriate, earthquake-resistant building technologies
2. Laboratories, trade and engineering schools
3. Training courses and hands-on technical assistance
4. Incentive bonuses for safe construction



# *Thank You - Contact Us*

Dr. Elizabeth Hausler, Founder and CEO

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