

Retrofitting for Resilience – Lessons from the Yogyakarta Earthquake 2006

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17th May 2006



Magnitude 6.2 M_w

Aftershocks 4.8 & 4.6

17-33 km depth

Casualties and Losses

Yogyakarta 17/05/2006

$M_W = 6.2$

5,782 dead

36,000+ injured

135,000 houses collapsed or damaged

1.5 million homeless

Aid pledged US\$15 per victim

Great Hanshin 15/01/1995

$M_W = 6.8$

6,434 dead

34,900 injured

200,000 houses collapsed or damaged

240,000 homeless

Damage bill US\$ 200 billion
– 2.5% Japan's GDP

Aid pledged per victim of disaster

Bangladesh floods 2003	\$3
Tsunami 2004	\$7,300
Yogyakarta earthquake 2006	\$15

STIE College, Yogyakarta

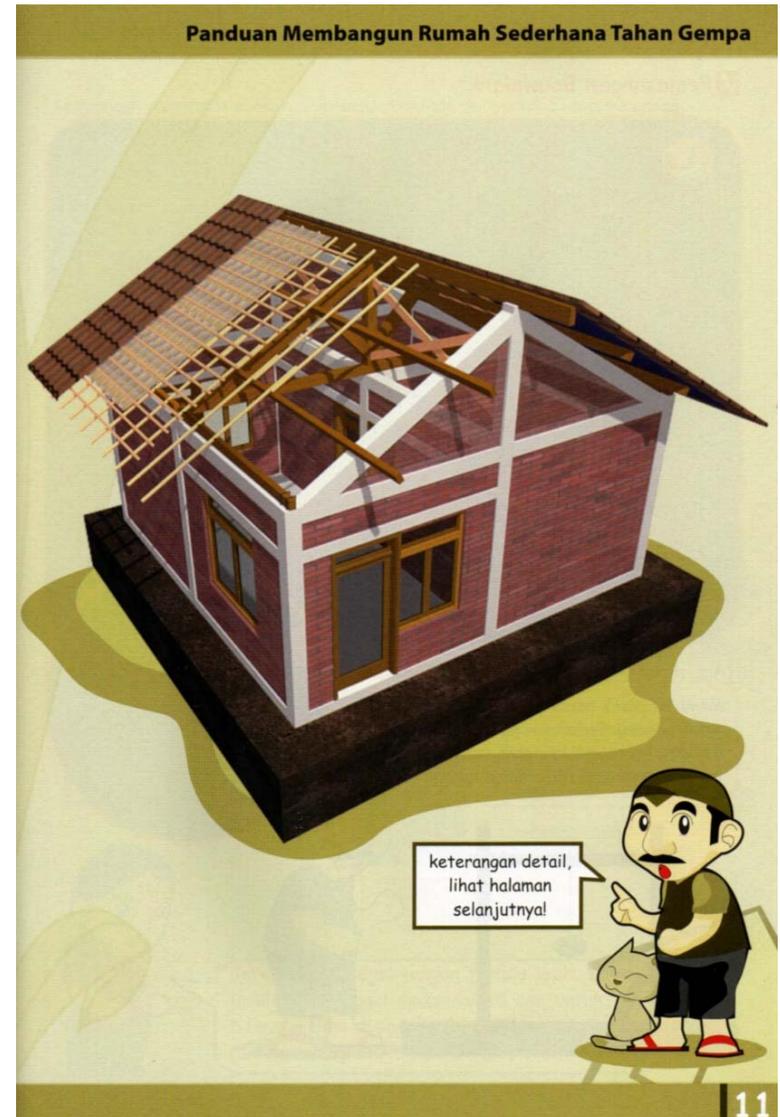
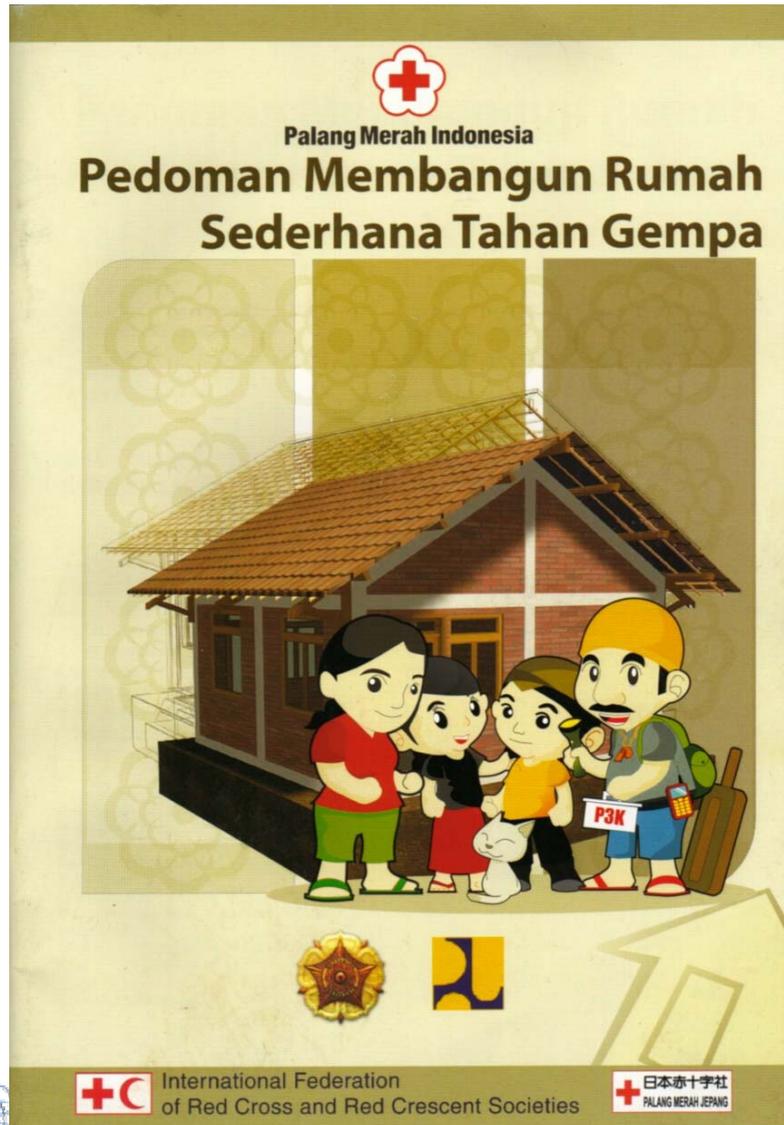


Liquefaction?

Damage to houses



Reconstruction of houses



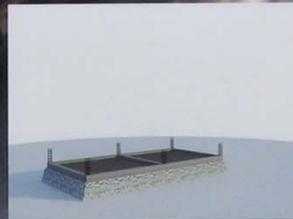
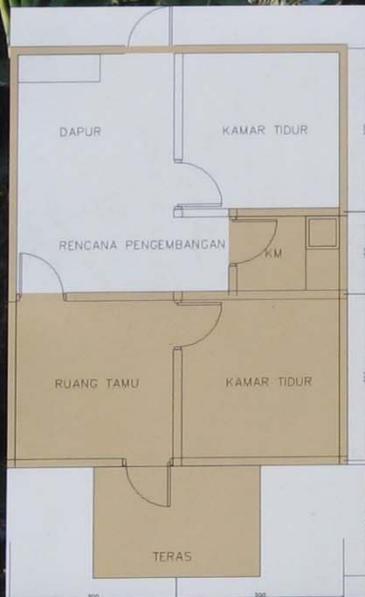
Reconstruction of houses

Some concrete framed masonry houses had been built prior to the earthquake.

They survived this and previous earthquakes.

The Core House

"CORE HOUSE" Alternative House Design for Yogyakarta Reconstruction



Design & Concept by: Ir. Ikaputra M.Eng., Ph.D

The Core House

See presentation later this week.

Ikaputra, Gadjah Mada University, Indonesia

CORE HOUSE: An Extensive Life Support
Post Disaster, Case Study of Yogyakarta
Post-Earthquake 2006

Strela/Rinerhorn, 1400-1530. Thursday, 28th
August

House construction



House construction



~20 courses of bricks laid with ties with embedded ties; then adjacent columns concreted.



Poor concrete compaction compromises structural effectiveness.

House construction



Bamboo frame and grass matting walls

Community buildings



Restoration of heritage



The Joglo house - Kotagede

Restoration of heritage



Joglo house restored after the earthquake

Conclusions - 1

Good reconstruction in place, with community engagement, but even now there is much still to be done.

Conclusions - 2

Viabile methods of reconstruction appropriate to the skills of local communities in place, thanks to academic centres of engineering and architecture .

Conclusions - 3

Engaging local communities in reconstruction is a key factor, helped by experts living in the region.

Conclusions - 4

Lack of expertise in construction methods is a problem. This might be overcome by some basic training and community investment in equipment .

Conclusions - 5

The bigger challenge for disaster risk reduction is

1. to devise a method of retrofitting existing houses to secure disaster resistance, and
2. to find ways of engaging communities in the risk reduction process.

The toughest question

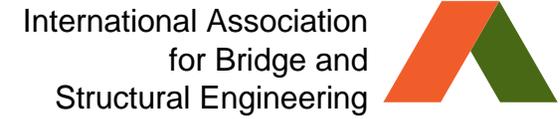
How to engage all those communities which have not experienced a recent disaster in disaster risk reduction?

The toughest question

How to engage all those communities which have not experienced a recent disaster in disaster risk reduction?

Thank you





The Joint Working Commission for Disaster Reduction on Coasts

Aims:

- to produce a *Guide to Disaster Reduction on Coasts* for use by local, regional and national groups
- To work with government and NGOs in implementation of the *Guide*

Guide for disaster reduction on coasts

- Launched at IABSE conference, New Delhi, 20-22/2/05
- Three tiers of application
 - Local, regional and professional groups
- Based on risk assessment
- Community chooses on risk acceptance and/or reduction options
- A challenge to implement