

2.12. Proposal on Feasible and Effective Design and Construction Works of Confined Masonry
 (Hiroshi IMAI)

枠組み組積造の工法改善提案（今井弘）

International Workshop 2008 on Safer Housing in Indonesia and Peru

“Proposal on Feasible and Effective Design and Construction Works of Confined Masonry”

The approach to safer housing from construction field



Hiroshi IMAI /
 Building Research Institute (BRI)

March 12 (Wed), 2008 JICA, Tokyo

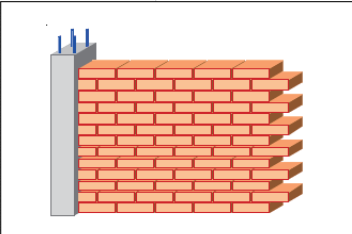




Research and Development
“Bridge between Engineering and Construction Works”

■ **Activities**

1. Monitoring of construction works in actual construction sites by Ms. Matsuzaki and Ms. Sakota
2. Series of experiments on materials and components by Dr. Iman UGM
3. Elaboration of proposals on structure designs which are feasible and acceptable for construction workers with available materials, tools
4. Elaboration of proposals on simple and easy evaluation method to estimate seismic strength.

Confined masonry Case study : Indonesia type

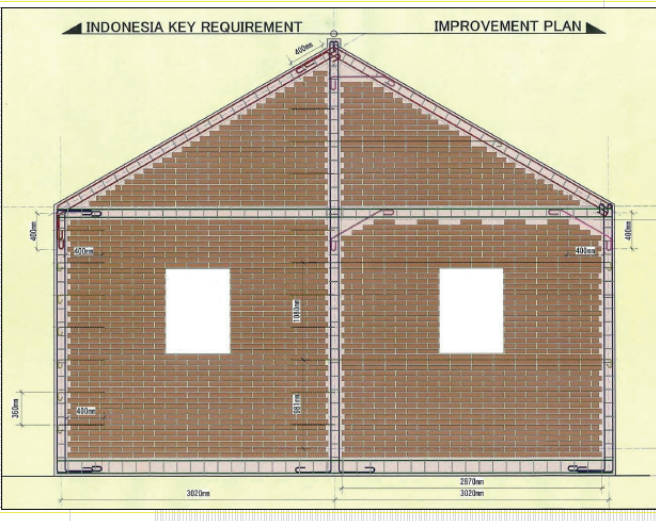
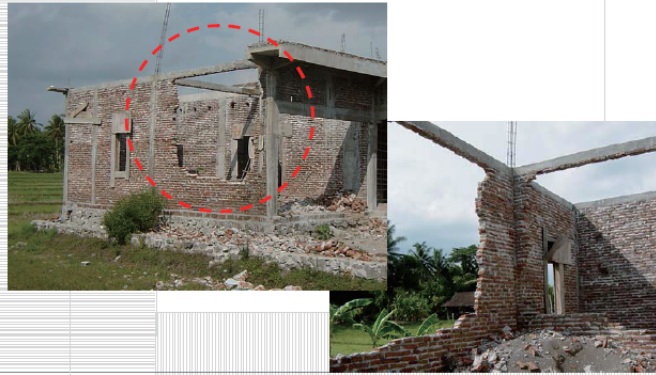




RC frame (Column): 150*150 / 120*120 / 100*100 Wall thickness: 100mm

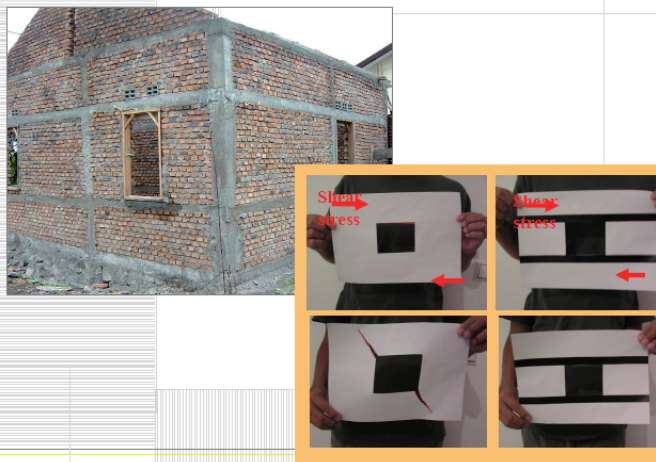
This brick masonry type seen a lot in Indonesia.
 Half brick wall (100mm thickness wall: Header length) + RC Frame.
 →RC confined frame with thin load bearing wall

Failure pattern of confined masonry

Out of plane



Strengthening of Openings : Sill Band / Lintel Band



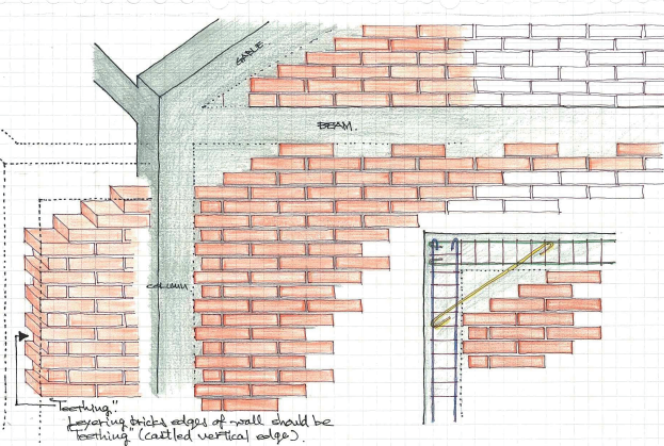
Anchoring / Connection between Column and Brick wall



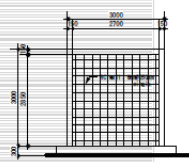
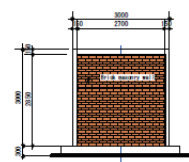
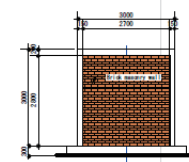
Jacketing



sketch



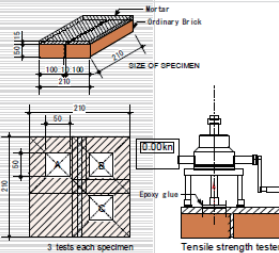
PROPOSED LABORATORY TEST OF CONFINED MASONRY
 BY POSYANIS, DEPARTMENT OF CIVIL ENGINEERING AND ENVIRONMENTAL, GADAJAHMADA UNIVERSITY, YOGYAKARTA, INDONESIA

Specimen No'1		Specimen No'2		Specimen No'3	
					
Reinforced concrete wall		Brick masonry wall 1		Brick masonry wall 2	
Column	SIZE: 100mm x 100mm Main bar: 4"8mm, Hoop: 6mm@150	Column	SIZE: 150mm x 150mm Main bar: 4"10mm, Hoop: 8mm@150	Column	SIZE: 150mm x 150mm Main bar: 4"12mm, Hoop: 8mm@150
Ring Beam	SIZE: 100mm x 100mm Main bar: 4"8mm, Stirrup: 6mm@150	Ring Beam	SIZE: 120mm x 150mm Main bar: 4"10mm, Stirrup: 8mm@150	Ring Beam	SIZE: 120mm x 200mm Main bar: 4"12mm, Stirrup: 8mm@150
Concrete	1 cement : 2 sand : 3 aggregate	Concrete	1 cement : 2 sand : 3 aggregate	Concrete	1 cement : 2 sand : 3 aggregate
Mortal	Nbn	Mortal	1 cement : 4 sand	Mortal	1 cement : 4 sand
Brick	Nbn	Brick	Ordinary Brick	Brick	Ordinary Brick
* Reinforcement of the wall is single layer 6mm@250 Thickness 100mm?		* Brick masonry wall is anchored to the column		* Brick masonry wall is anchored to the column	

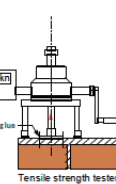
Un-uniformity of Brick wall



LABORATORY TEST OF TYPICAL BRICK MASONRY TENSILE STRENGTH BETWEEN BRICK TO MORTAR



3 tests each specimen



Tensile strength tester

EXPERIMENT

BRICK	DRY	MORTAR	1 cement : 6 sand
	SOAKED		1 cement : 4 sand

* Appropriate CW ratio 60%
 * E.V.A : Ethylene Vinyl Acetate

	Specimen No'1	Specimen No'2	Specimen No'3	Specimen No'4	Specimen No'5	Specimen No'6	Specimen No'7	Specimen No'8	Specimen No'9
Brick	DRY	DRY	DRY	DRY	SOAKED	SOAKED	SOAKED	SOAKED	SOAKED
Mortar	1 : 6	1 : 4	1 : 4	1 : 4	1 : 4	1 : 4	1 : 4	1 : 6	1 : 6
CW ratio	Appropriate	Appropriate	Not appropriate	Appropriate	Appropriate	Not appropriate	Appropriate	Appropriate	Not appropriate
E.V.A	-	-	-	with EVA	-	-	with EVA	-	-