

# Test on

## Tsukuba NIED Shaking Table Outline

One Horizontal Direction

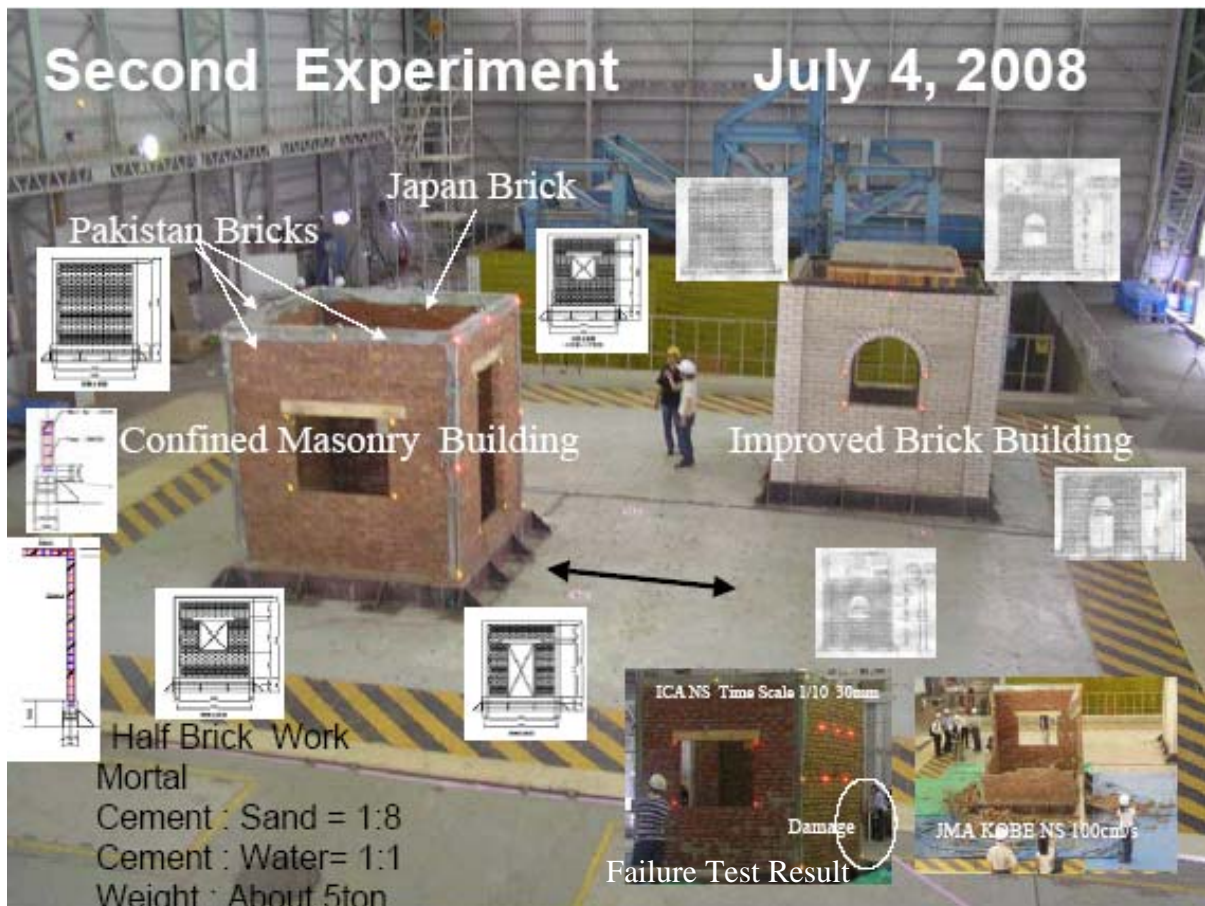
Table Dimension 14.5m x 15m

Max Acceleration 2G

(Table Moving Mass 190tonf, Piston Area 2000 cm<sup>2</sup>, Supply Hydraulic pressure 3000psi)

110cm/s 3000psi pressure down

Stroke 45cm



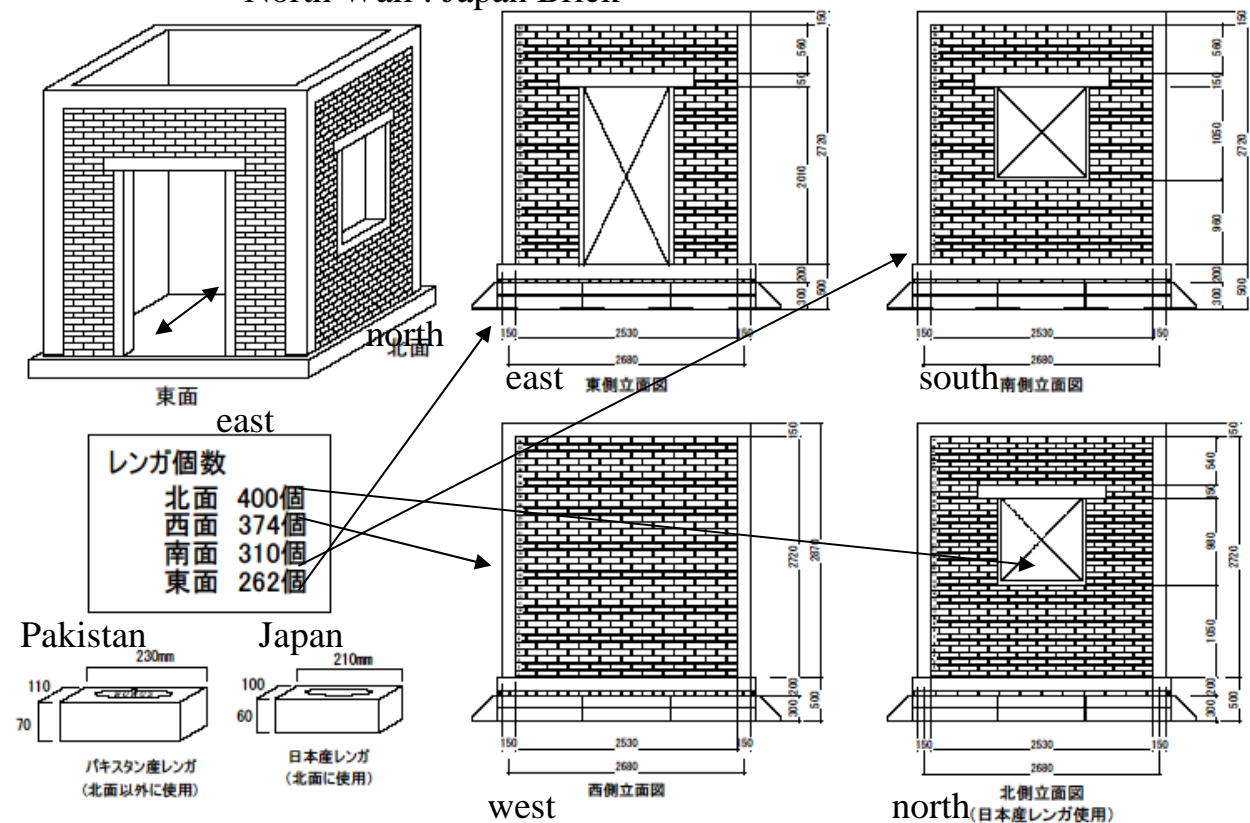
## Confined Masonry Shaking Table Test

National research Institute for Earth Science and Disaster Prevention (NIED), and MIE University conducted the dynamic failure test of confined masonry models by the use of NIED Tsukuba Shaking Table, in cooperation with Building Research Institute, Mitsubishi Fire Brick Co. Ltd and Tokyo Denki University on July 1<sup>st</sup> and 4<sup>th</sup>, 2008.

Purpose: : In order to conduct dynamic tests in Peru Catolica University, simulating Catolica University shaking table performance, displacement 15cm, velocity 60cm/s, 2G, and checking masonry test building damage levels.

### Test Structures :

- Confined Masonry with wall thickness of 12cm
- Cement-sand ratio cement: sand =1:8
- Dimension 3m in length, 3m in width, 3m in height without roof,
- Simple Frame 120mm by 120mm with Steel bars D10 x 4 @150mm
- Weight : 5ton
- West , East, South walls: Pakistan Brick
- North Wall : Japan Brick



Confined Masonry Model

- Improved Brick Masonry with wall thickness of 24cm  
Dimension 3m in length, 3m in width, 3m in height  
With the roof weight of 2.6ton,  
Simple Frame 370mm by 370mm with H Steel column and beam  
100mm x 100mm  
Weight : 10ton

Measurement :

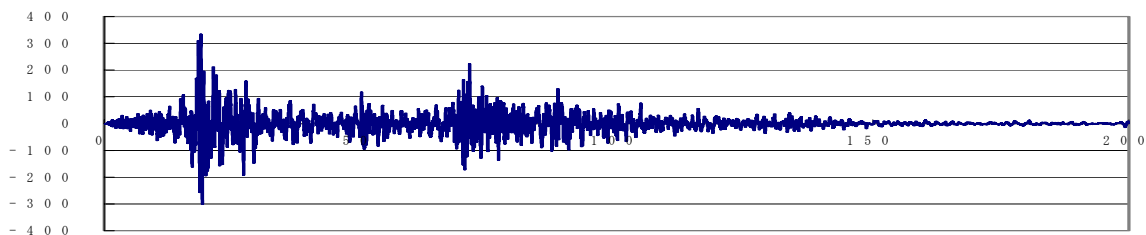
- Acceleration 12points
- Video Graphic Measurement
- Video recordings



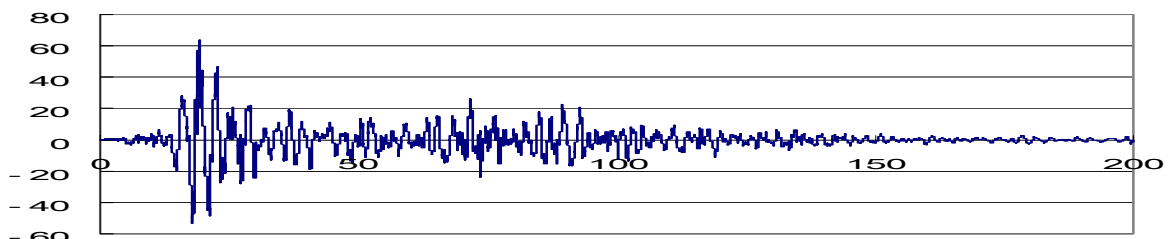
Input:

1995 JMA KOBE NS

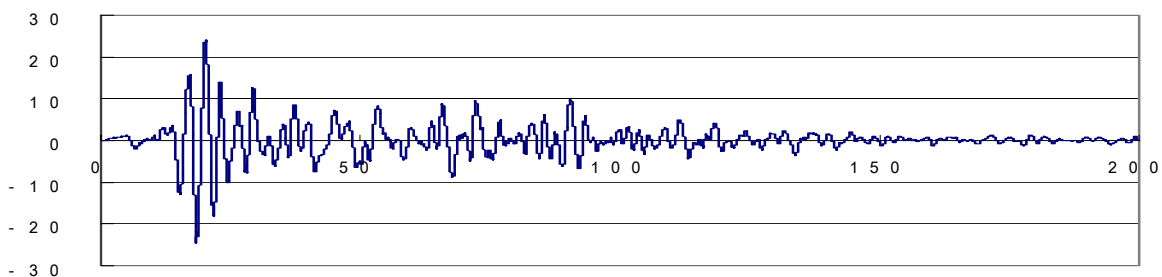
2007 August Peru Pisco Earthquake ICA strong motion NS by Dr. Abe



Acceleration 330cm/s/s



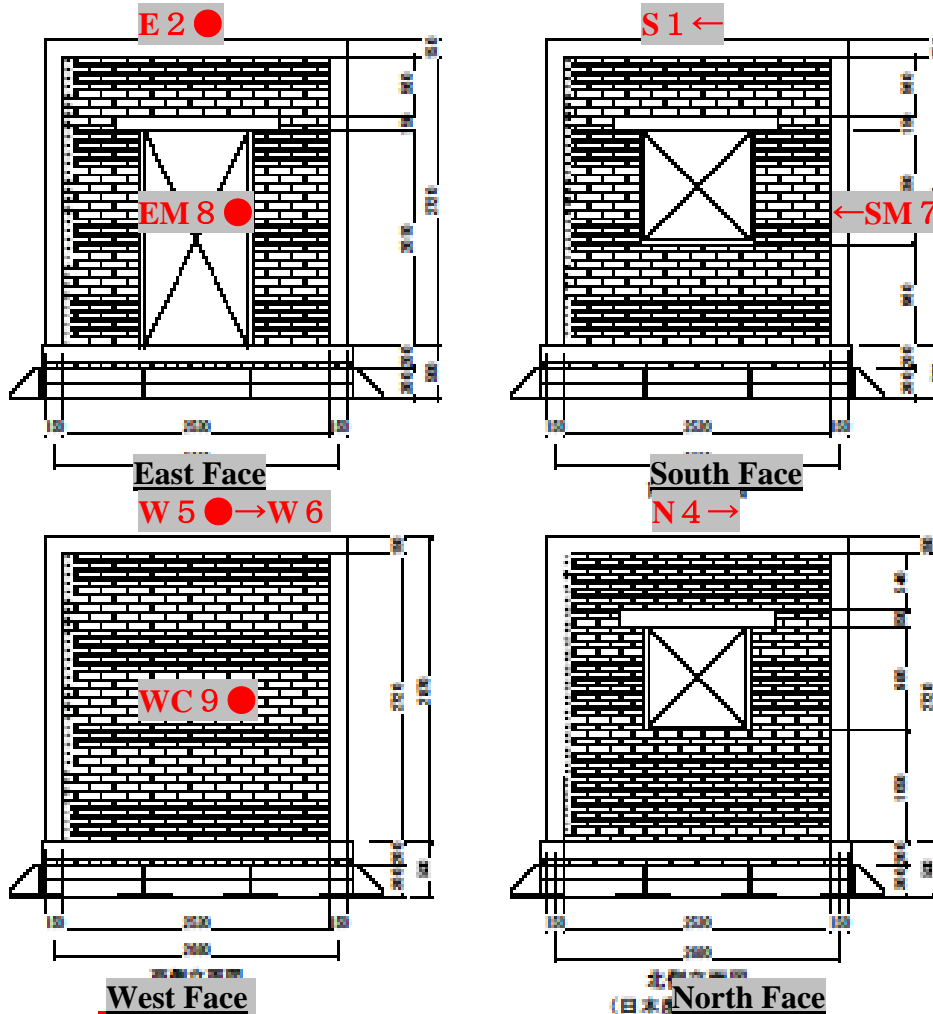
Velocity cm/s 62cm/s



Displacement cm 24cm

## Sensor Distribution and Inputs of Brick model Test on July, 2008

### Accelerometer Distribution



- Out-Plane Measure : Exciting Direction sensors : sensor cable side to west  
Perpendicular to Exciting Direction: sensor cable side south

One accelerometer at centre of platform in exciting direction.

One Exciting Direction Accelerometer on the roof of Improved Brick Model.

One Perpendicular Direction Accelerometer on the roof of Improved Brick Model.

Total: Confined Masonry 7 Accelerometer in Exciting Direction,

2 Accelerometer in Perpendicular Direction 1 – 9

Improved Brick 1 Accelerometer in Exciting Direction

1 Accelerometer in Perpendicular Direction 10 – 11

Platform 1 Accelerometer in Exciting Direction 12

### Inputs

July 4th

- 1) Velocity Pulse
- 2) ICA TS=0.1 10mm,
- 3) ICA TS=0.1 15mm,
- 4) ICA TS=0.1 30mm 'Crack and Column Failure'

- 5) Velocity Pulse,
- 6) ICA Time Scale 0.59 560mG 62cm/s 14cm ,
- 7) JMA KOBE NS 100cm/s 'Collapse'

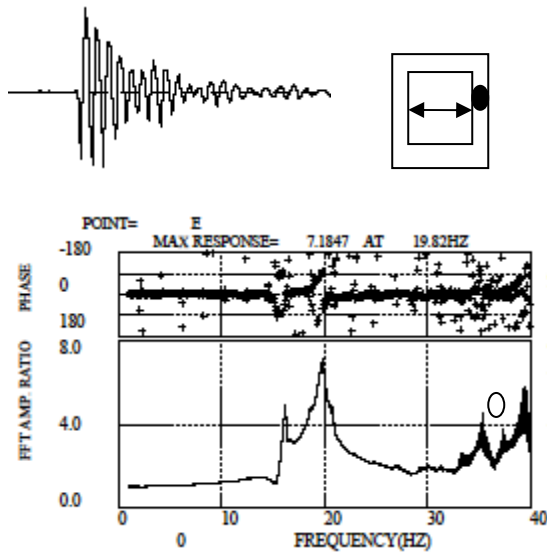
Confine Masonry Dominant Frequency

- In-plane deformation wall :
  - Initial about 20Hz Crack and Column Failure → 5.5Hz
- Out-plane deformation wall:
  - Initial about 16Hz Crack and Column Failure → 2.5Hz

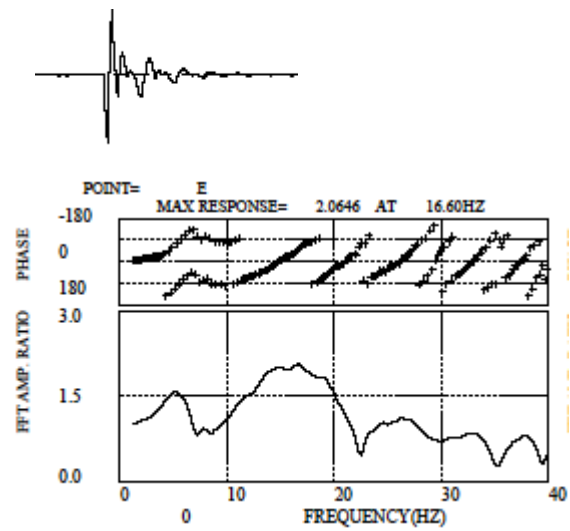
Improved Masonry Dominant Frequency More than 30Hz

- Confined Masonry

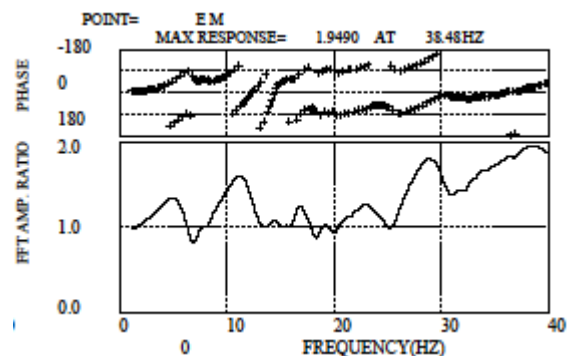
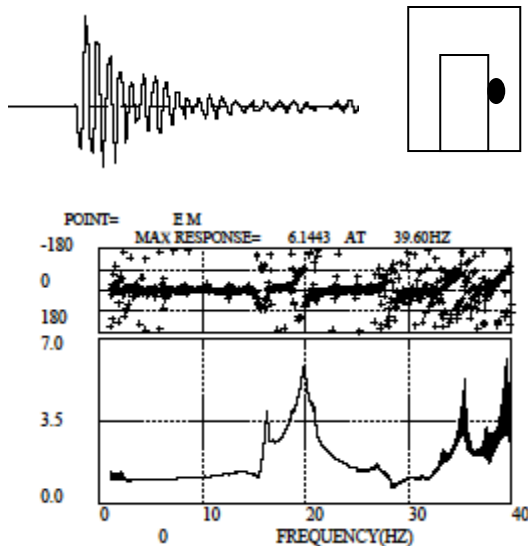
input 1) Before failure



input 5) After failure



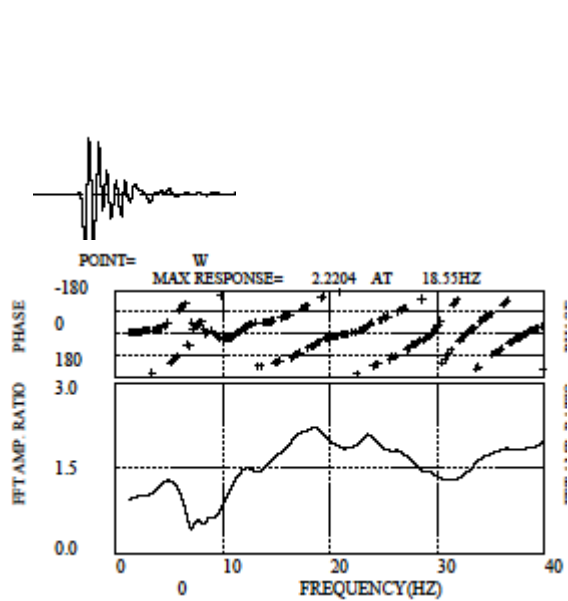
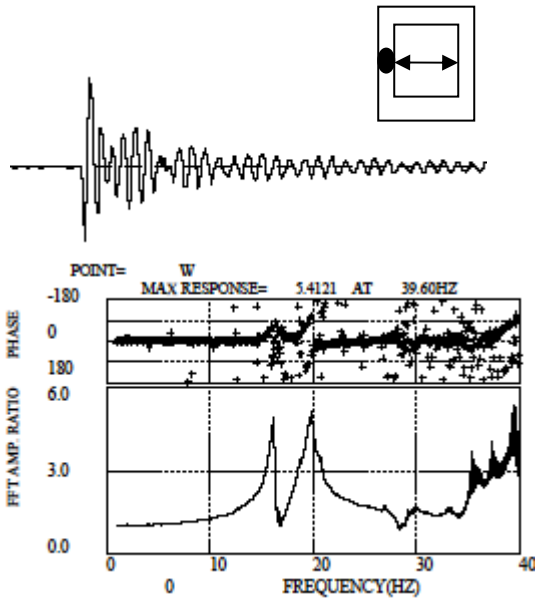
East Wall Out-Plane top



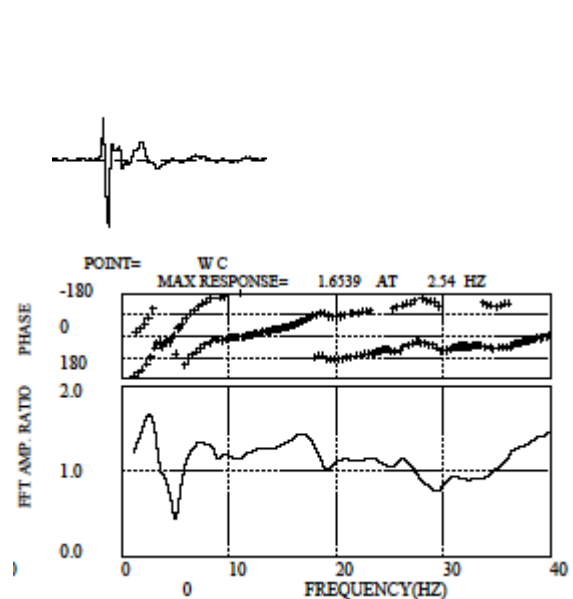
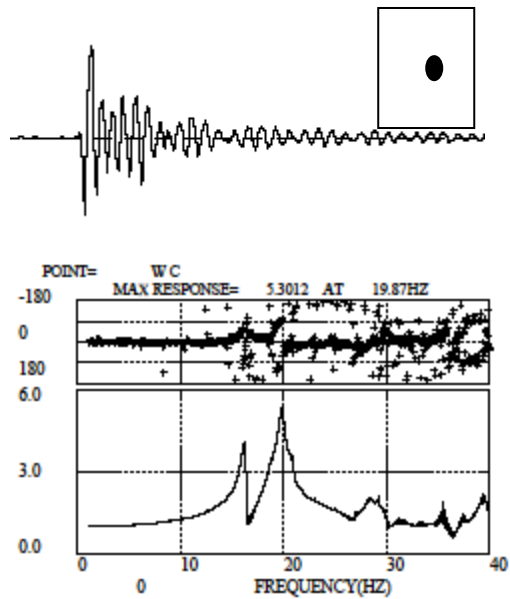
# East Wall Out-Plane middle height

Before failure

After failure

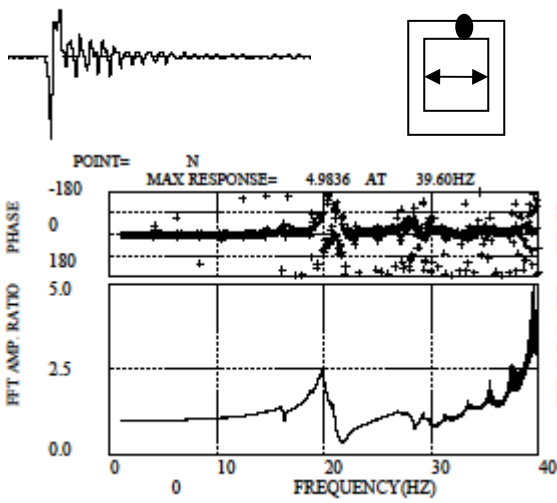


# West Wall Out-Plane top

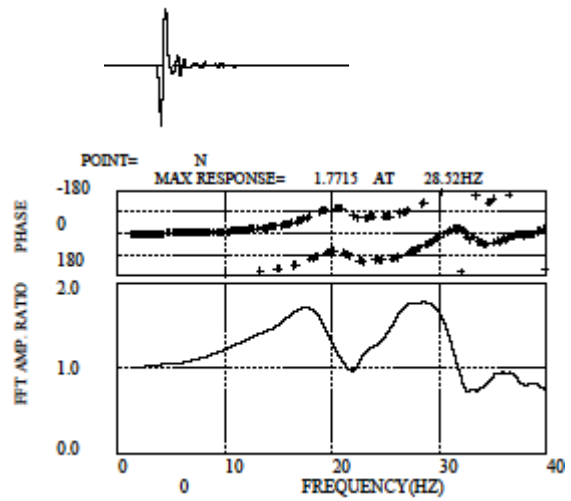


## West Wall Out-Plane , centre of wall

Before Failure

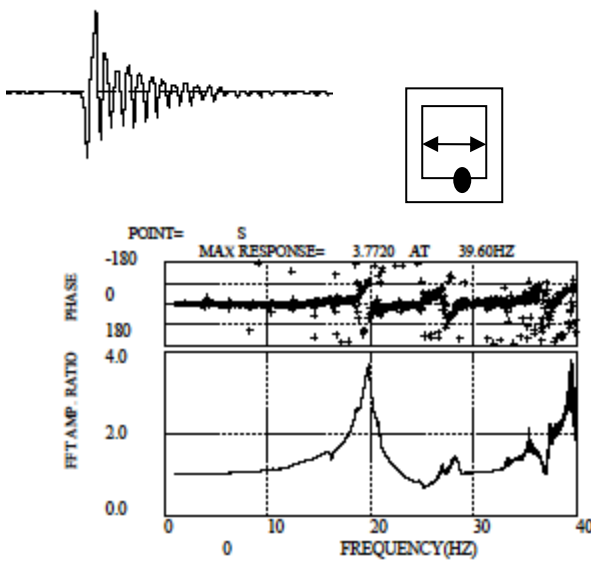


After failure

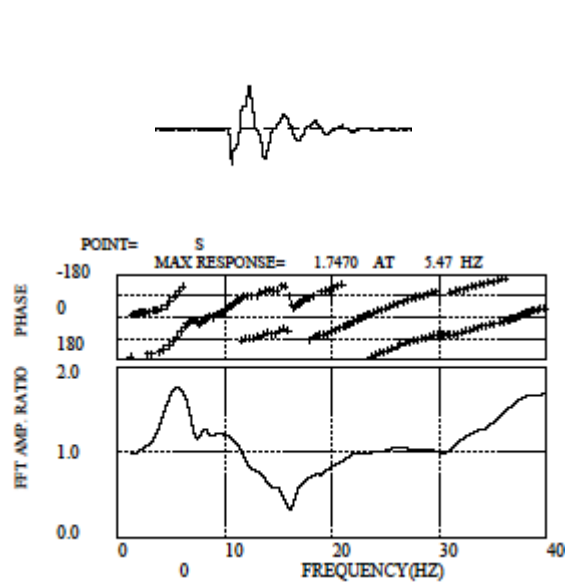


## North Wall In-Plane top (Japanese Brick)

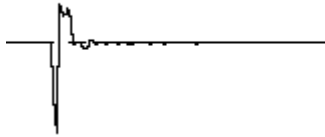
Before Failure



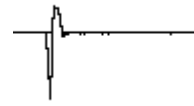
After failure



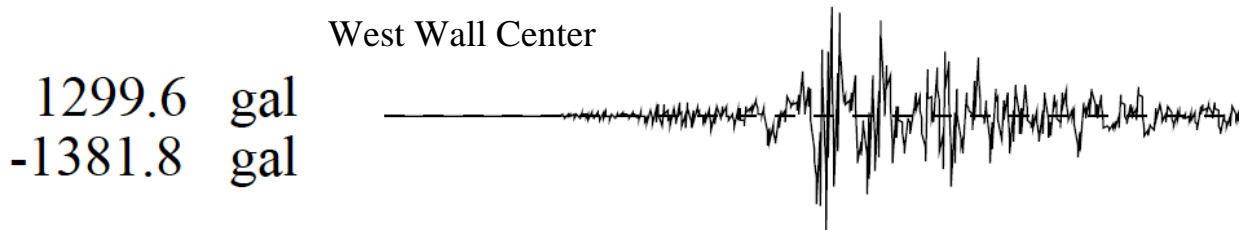
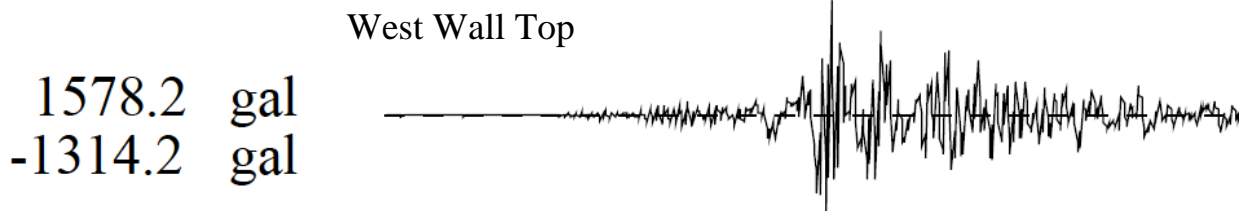
## South wall In-Plane Top (Pakistan)



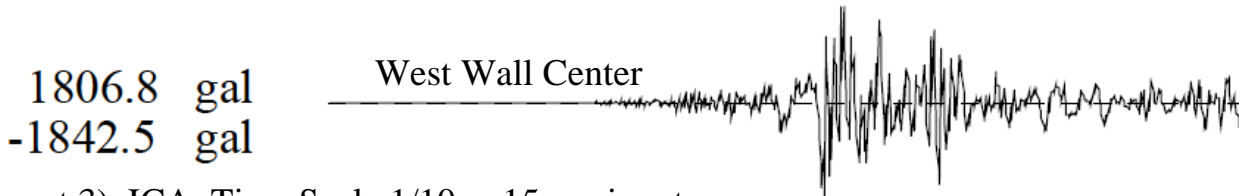
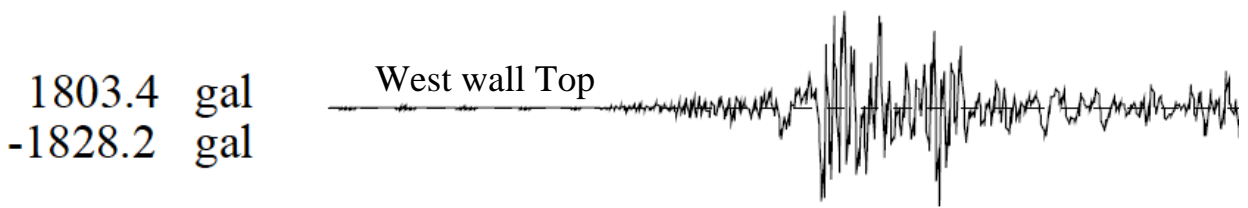
input 1) Before failure, pulse input



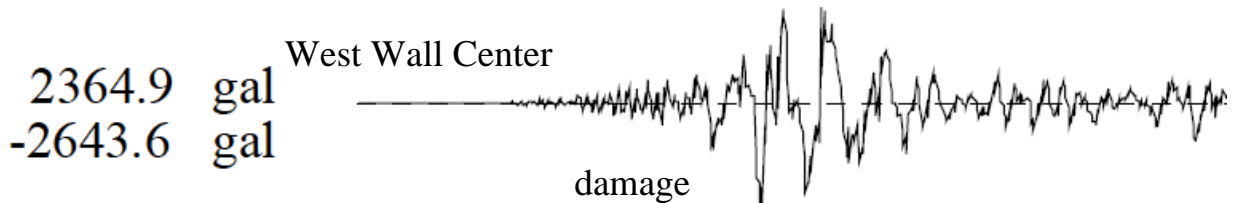
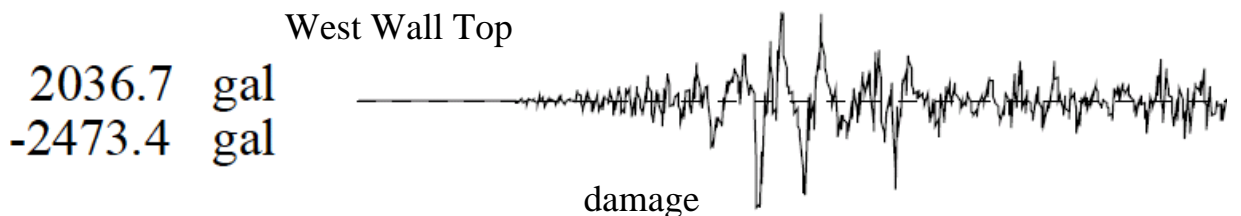
input 5) After failure, pulse input



input 2) ICA Time Scale 1/10 10mm input



input 3) ICA Time Scale 1/10 15mm input



input 4) ICA Time Scale 1/10 30mm input