

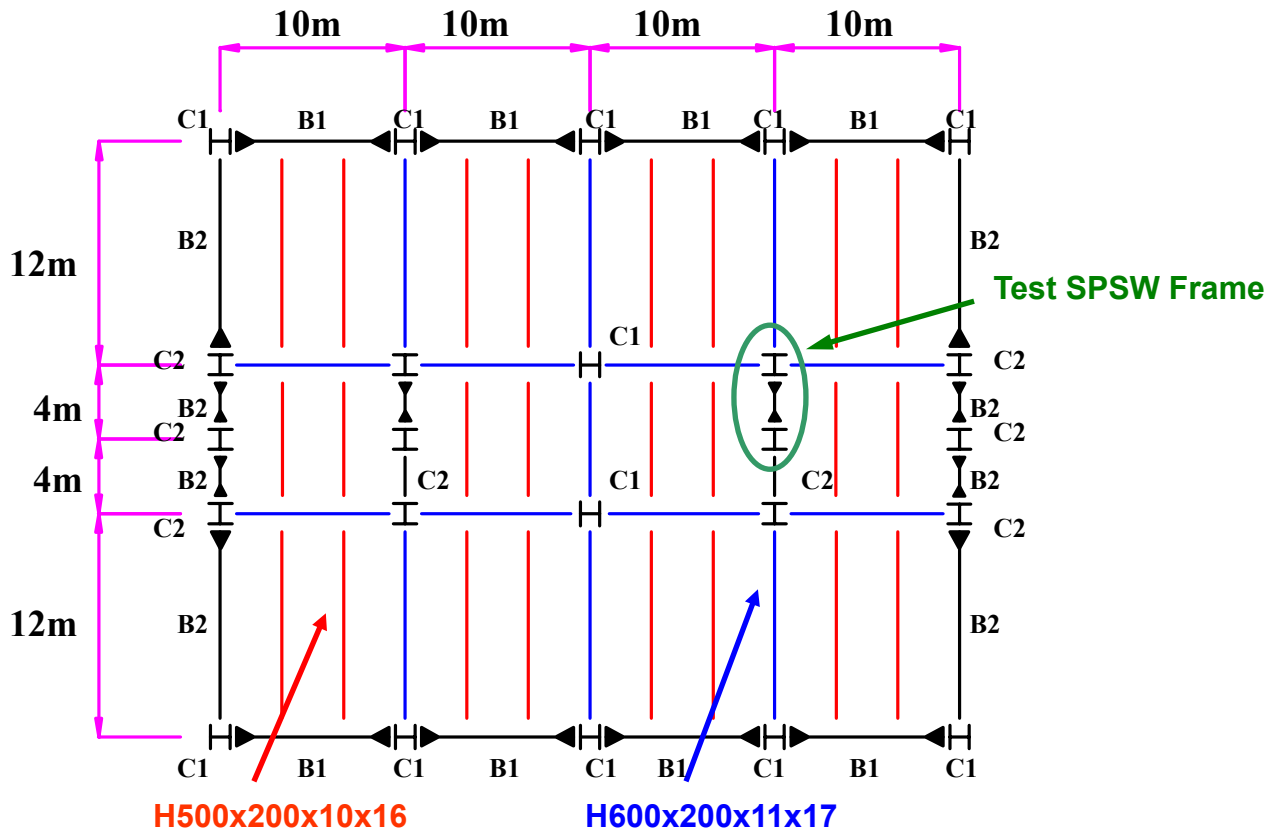
Substructure Pseudo-Dynamic Tests of A Two-Story Steel Plate Shear Wall Frame



Objective of Test

1. Investigate the seismic performance of two story steel panel shear wall structures
2. Investigate the effectiveness and seismic design of the lateral restrainers for the SPSW
3. Incorporating the PISA3D into the substructure pseudo-dynamic testing in ISEE
4. Investigate the seismic performance of the RBS connections in the SPSW specimen
5. Investigate the effect of the concrete slab in preventing the buckling of the girder when large inter-story drifts and severe buckling of the SPSW occurred
6. Validate the 2D and 3D analytical model constructed by PISA3D
7. Verify the effectiveness of the capacity design of the 2nd floor girder
8. Investigate the performance of the column base details
9. Observe the behavior of the SPSW frame under the in-plane earthquake forces

Floor Framing Plan



B1	H600x200x16x26
B2	H600x200x12x20
C1	H400x400x20x35
C2	H400x300x18x26

Beam and Column material: A572 GR50

Dead Load: 700 kgf/m²

Slab and finishin: 300 kgf/m²

Steel Frame: 100 kgf/m²

Partition: 100 kgf/m²

Window Wall, Ceiling and HVAC: 200 kgf/m²

Live Load: 250 kgf/m²

$$W_{1F} = 700 \times 40 \times 32 = 896000 \text{ kgf} = 896 \text{ ton}$$

$$W_{2F} = W_{1F} = 896 \text{ ton}$$

$$\text{Total weight } W = 1792 \text{ ton}$$

Use $V = \frac{S_{ad}IW}{1.4\alpha_y F_u}$ to calculate Earthquake Force

Taiwan Seismic Zone : East District , Chiayi City

MRF (Longitudinal)

$$T = 0.817 \text{ sec}$$

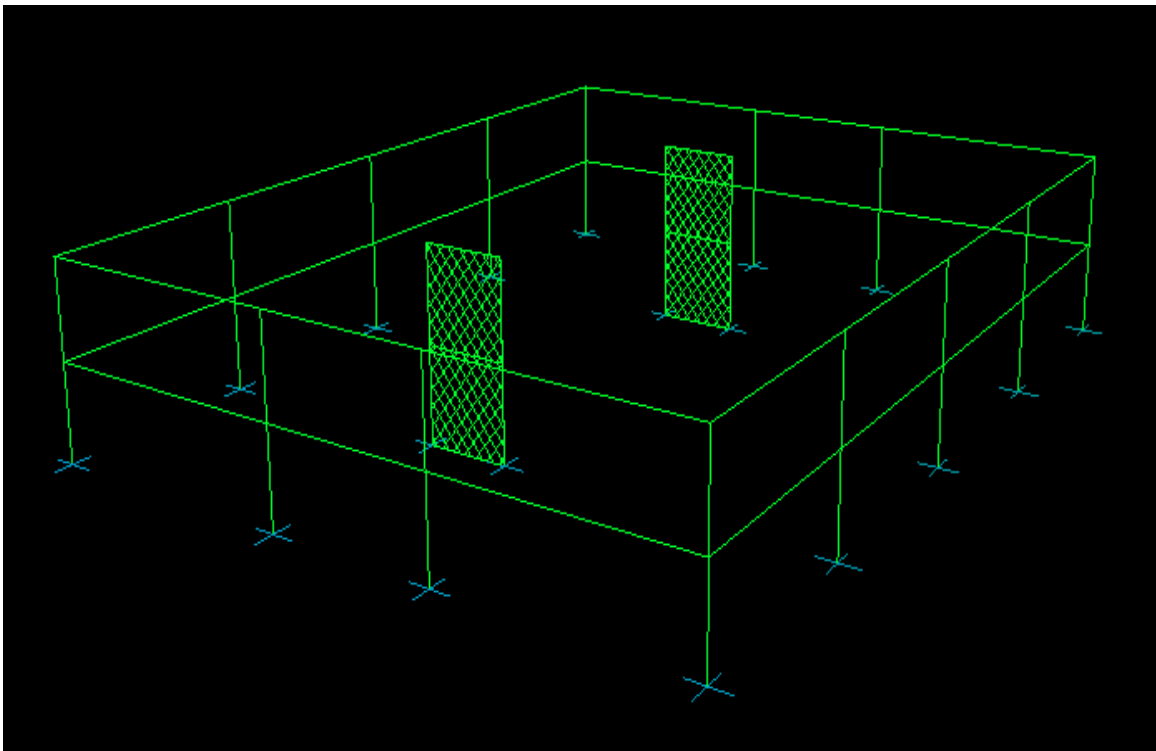
$$V_{\text{base}} = 0.19W = 340 \text{ ton} = 3335 \text{ kN}$$

SPSW+MRF (Transverse)

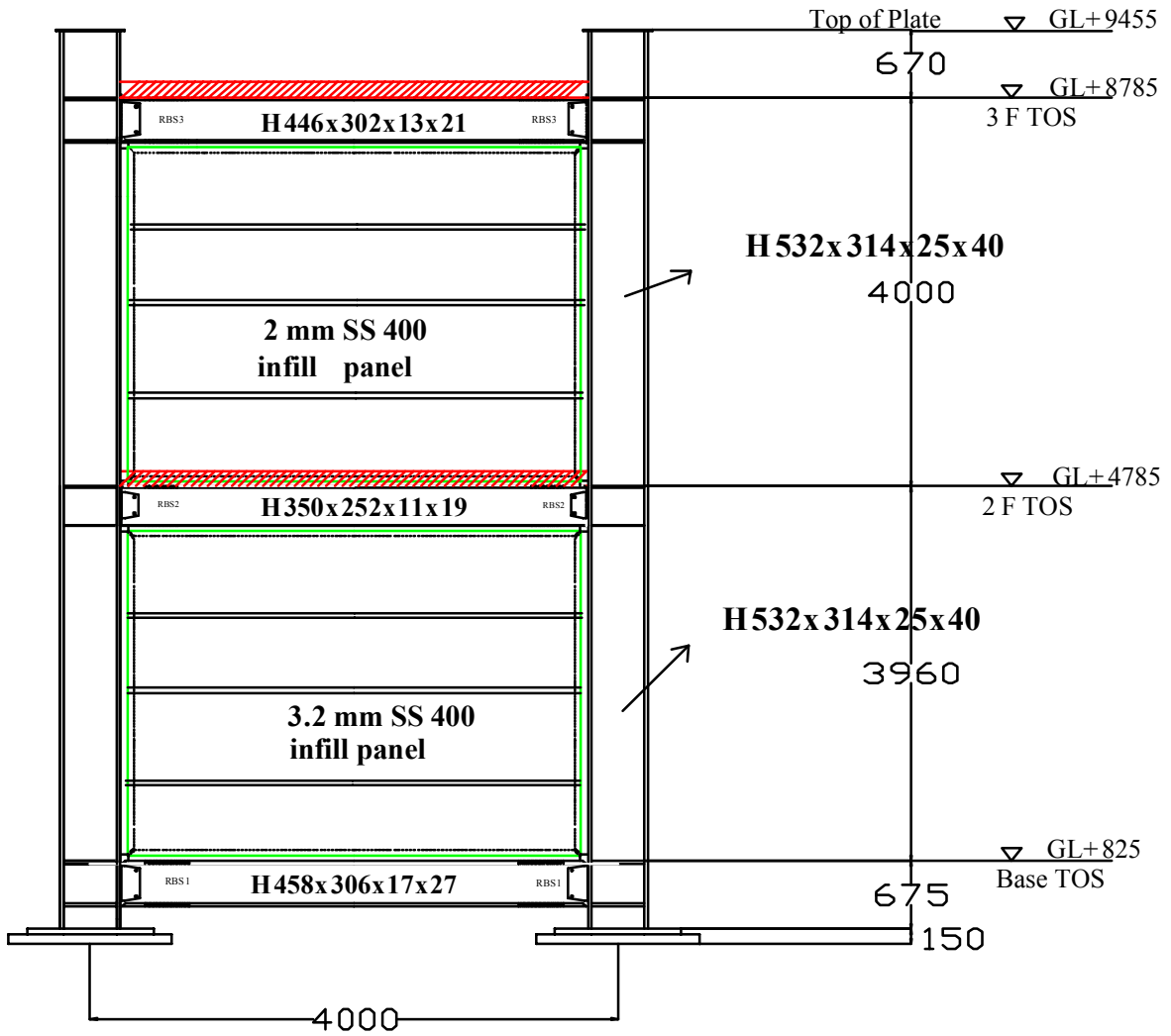
$$T = 0.532 \text{ sec}$$

$$V_{\text{base}} = 0.229W = 410 \text{ ton} = 4022 \text{ kN}$$

PISA3D Model



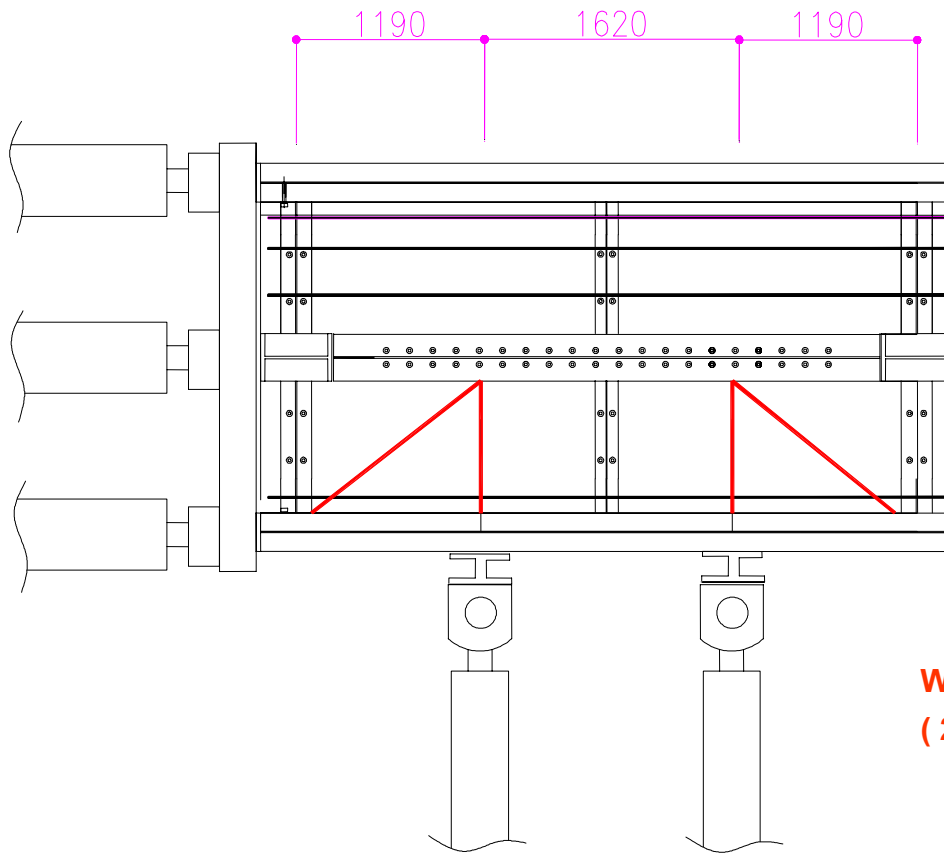
SPSW Frame Section



Boundary frame material: A572 GR50

Steel panel shear material: SS400

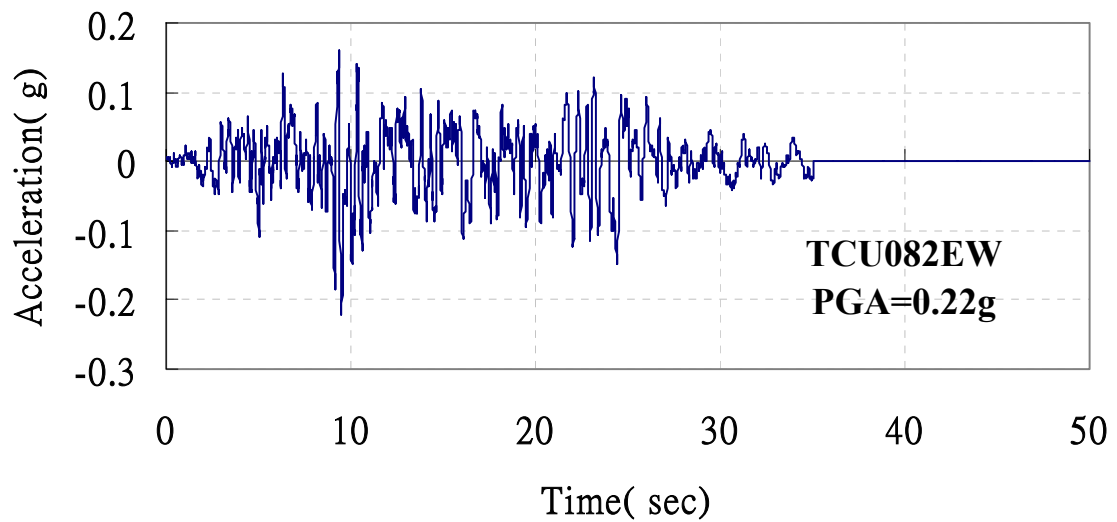
Experimental Setup



**WT section
(200x100x8x12)**

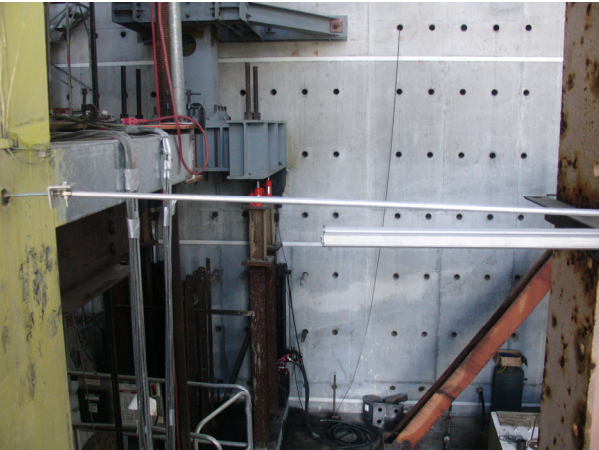
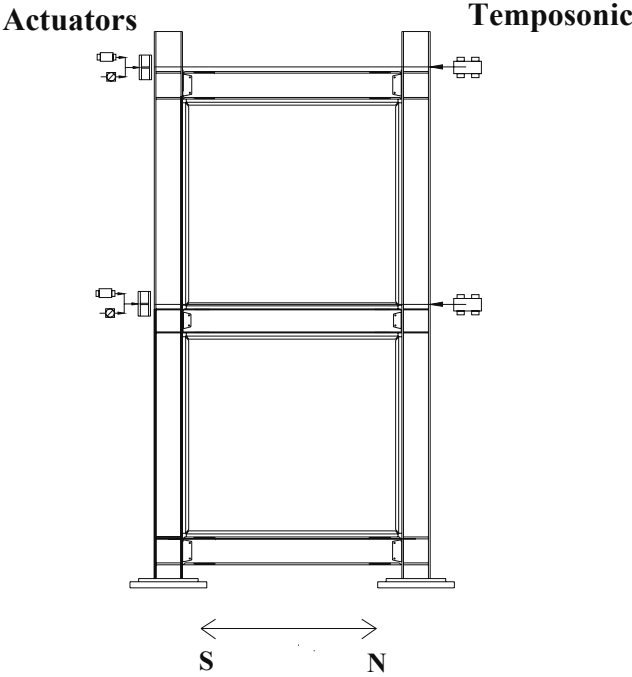
Test Schedule and Excitation

Date	Starting Time	Excitation	Hazard Level
Feb 8, 2006	10:00am	Chi-Chi (TCU082EW)	2% in 50 Years (PGA=0.67g)
Feb 9, 2006	9:00am	Chi-Chi (TCU082EW)	10% in 50 Years (PGA=0.53g)
Feb 10, 2006	9:00am	Chi-Chi (TCU082EW)	50% in 50 Years (PGA=0.22g)

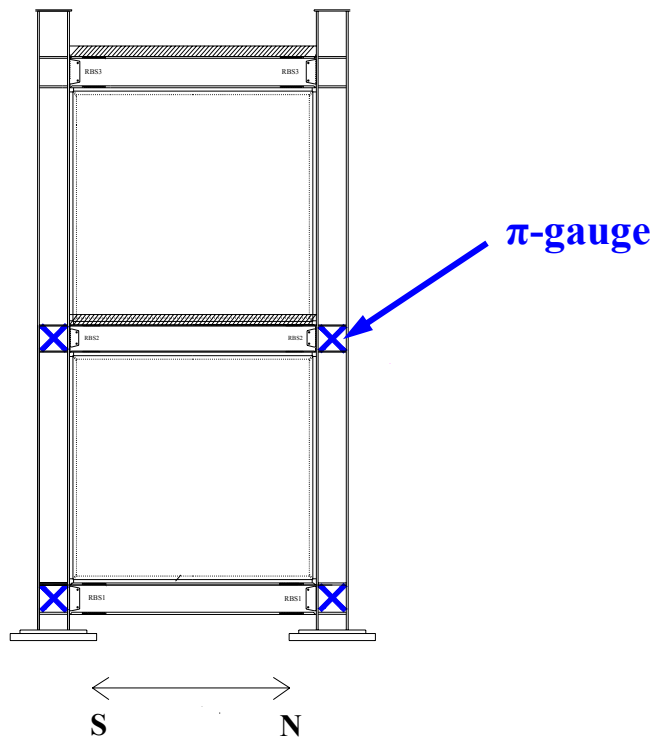


Instrumentation Plan

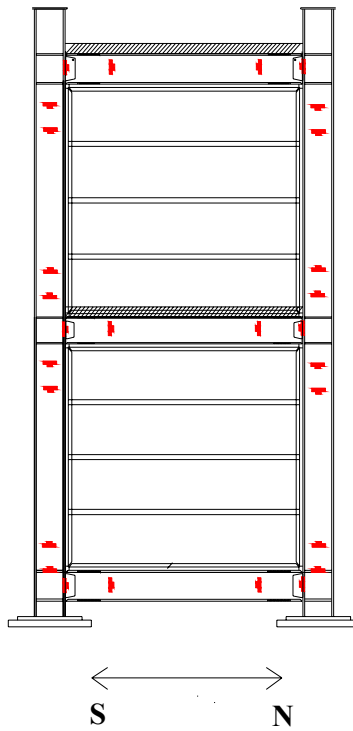
1. Temposonic



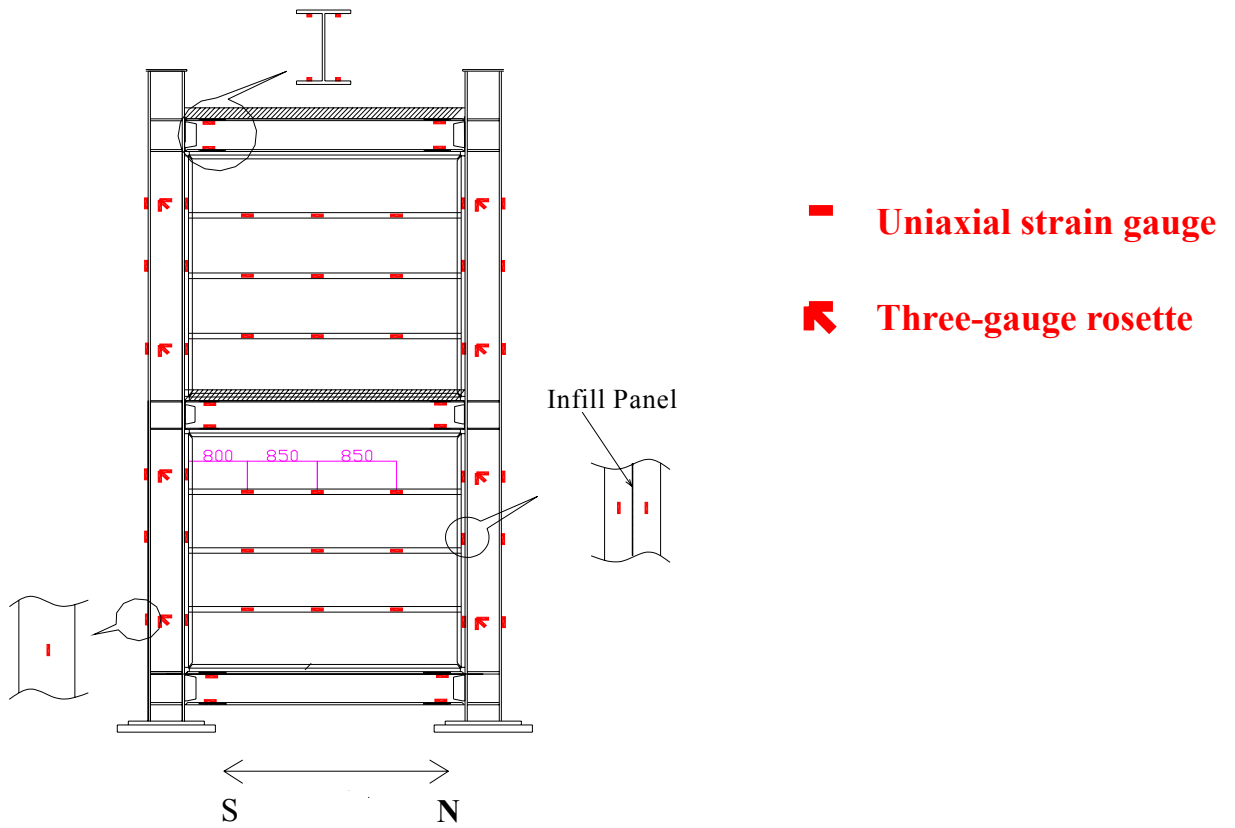
2. π -gauge (For Small displacement)



3. Tiltmeter (For Rotation)



4. Strain gauge



5. Displacement LVDT

