Verification of seismic assessment and retrofit using building data from the 2016 Meinong Earthquake

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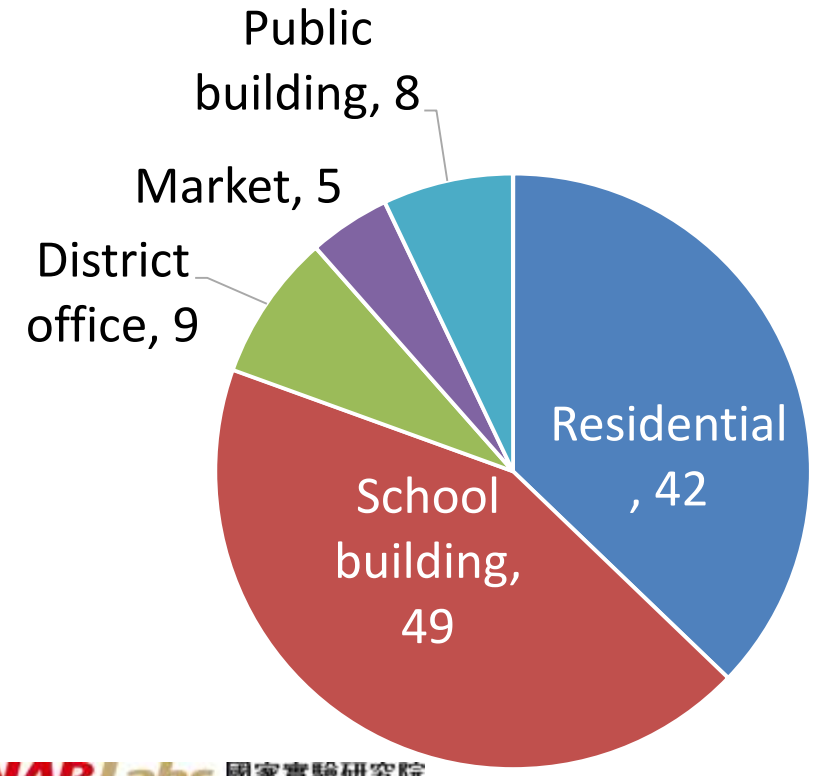
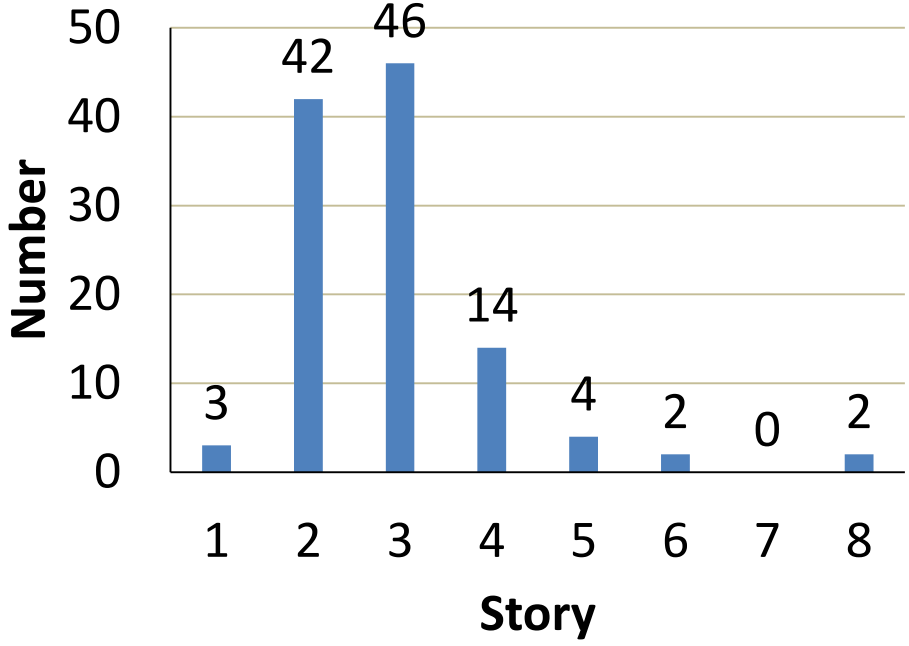
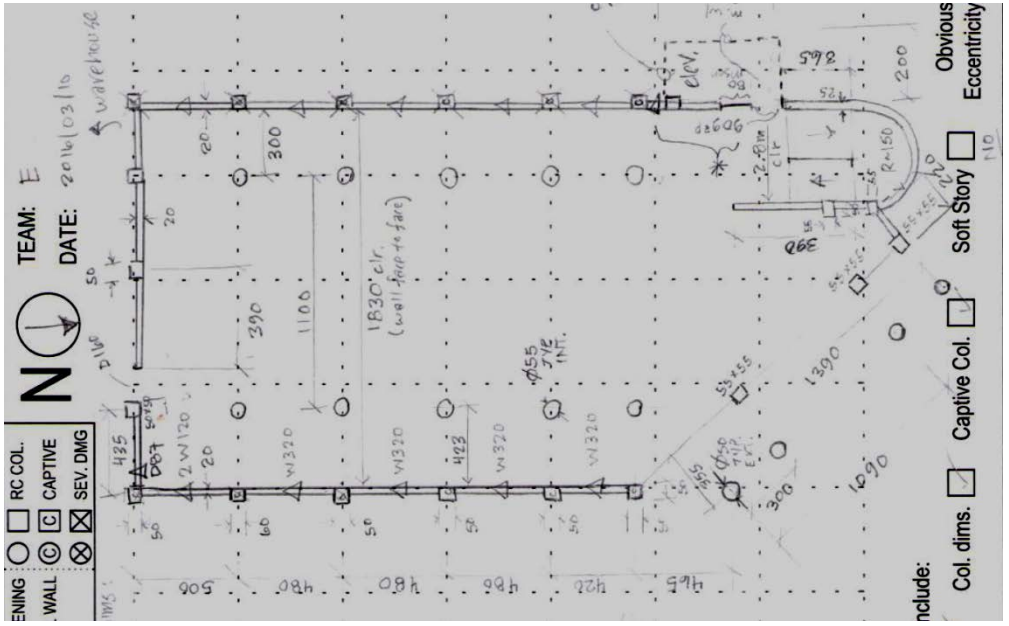
- Total number of low-rise RC buildings are 113 buildings.
- 78% of that are 2-story and 3-story buildings.

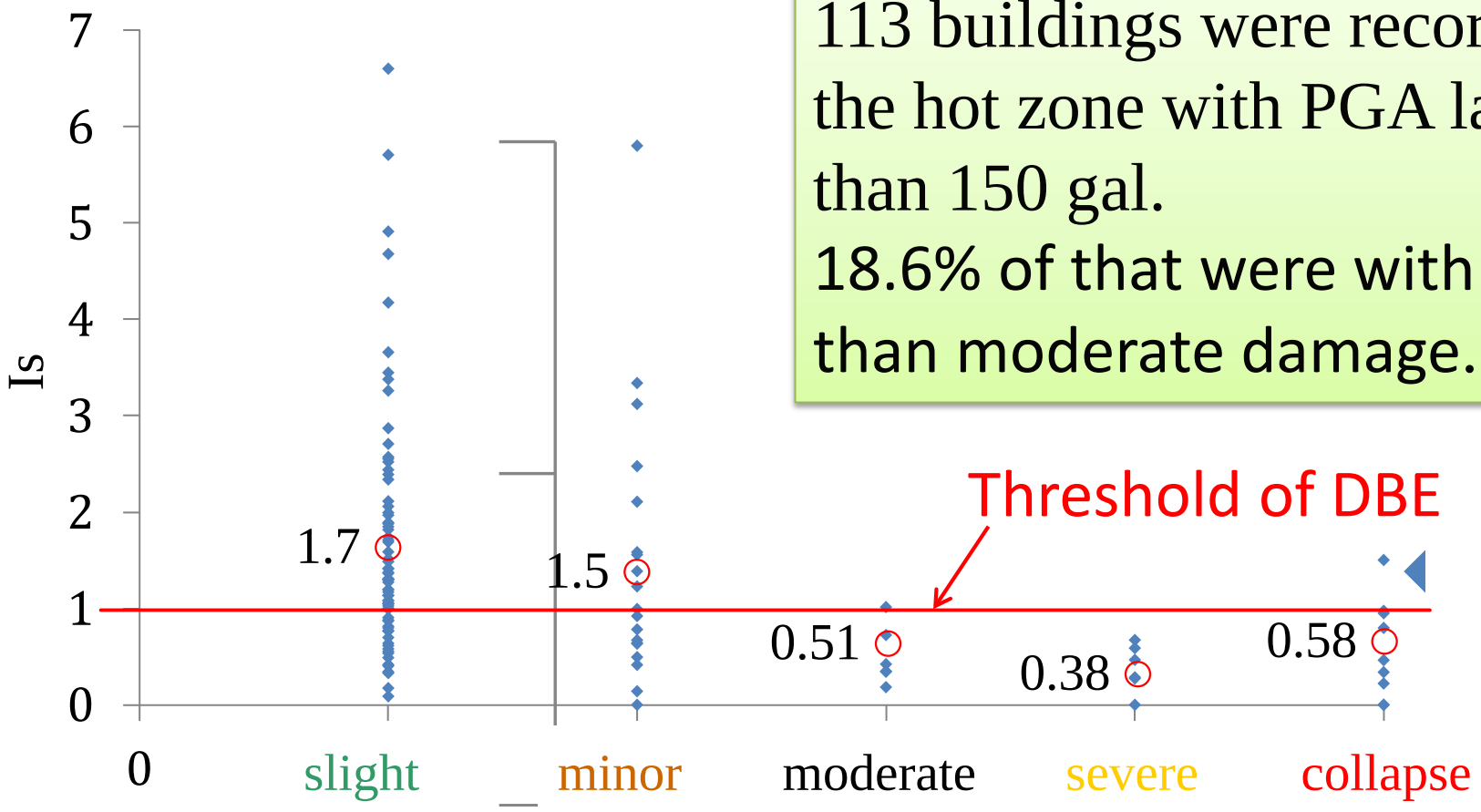




Data collection of buildings



NCREE's seismic index



113 buildings were recorded in the hot zone with PGA larger than 150 gal.
18.6% of that were with more than moderate damage.

Predicting results well correlate to the real damage status.

Chiou, et al. (2017)

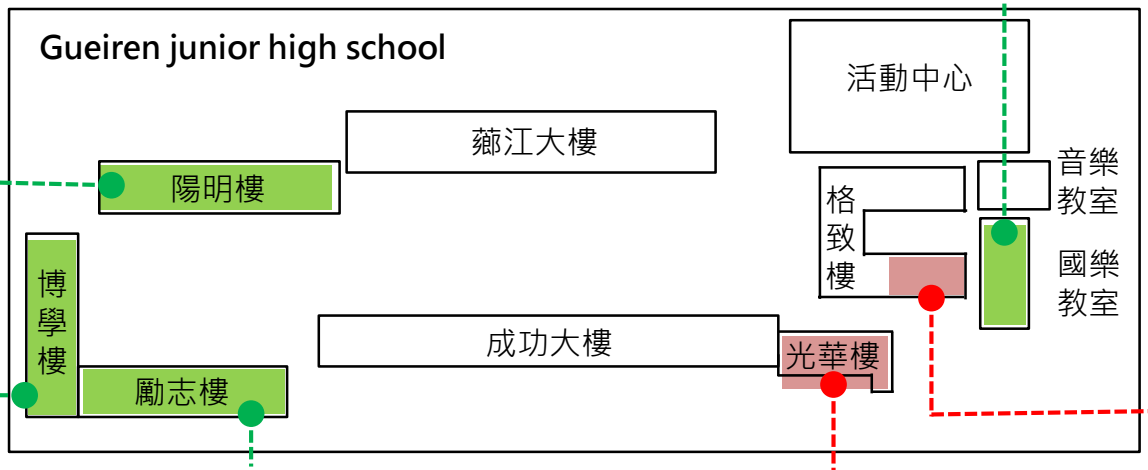
Verification of seismic retrofit

No structural damage

Retrofitted by RC wing wall in 2011

No structural damage

Expansion joints



Retrofitted by RC wing wall in 2011

Retrofitted by RC jacketing column in 2014

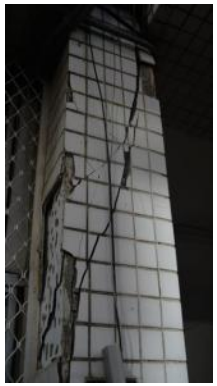
Retrofitted by RC jacketing column and wing wall in 2011

CDR=0.969
Stand by funding

CDR=0.706
Stand by funding

No structural damage

No structural damage



In the first floor, there was one column with shear failure, others were with minor cracks.

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Nanhua District Office

Classified as dangerous building

Entrance forbidden

Gueiren District Office

No damage;

Operational;

As emergency response center

Before Retrofit (Google Map)

Retrofitted with RC shear wall

Public Market

After 2010.03.04 earthquake, Nanhua Market shored with steel columns.

In 2016 Meinong earthquake, Damaged but not collapsed!

Shanshang Market didn't conduct any partial retrofit.

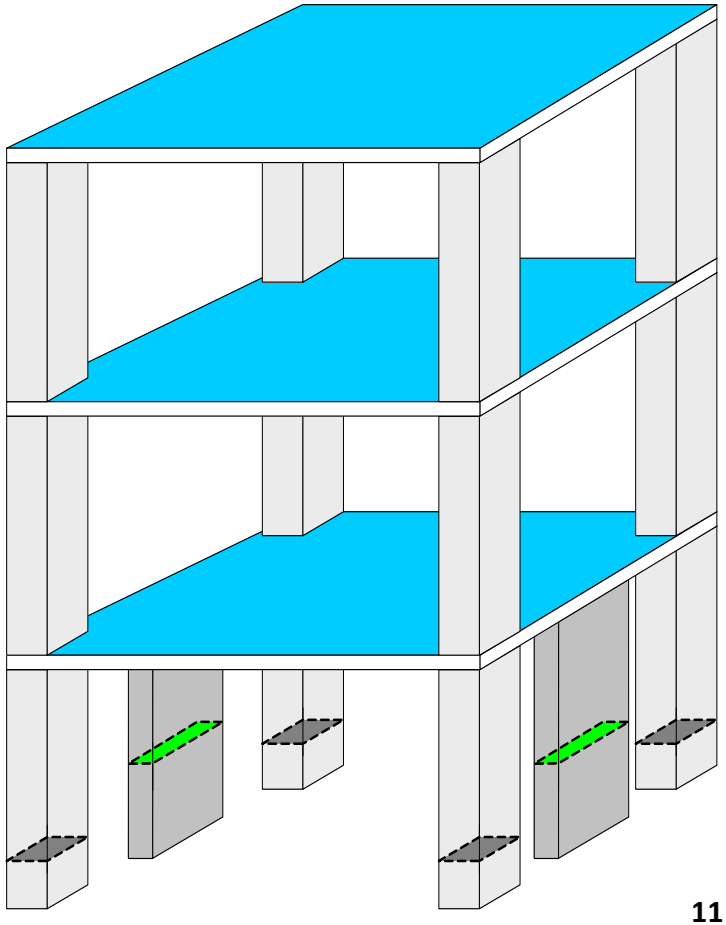
In 2016 Meinong earthquake, totally collapsed!

Conclusion

- Buildings data of Meinong Earthquake was published.
- Seismic assessment methods shall be verified by the database.
- Buildings were diagnosed as seismic insufficient, with structural damage.
- Buildings with retrofit, no structural damage.
- Market buildings with partial retrofit, structural damage but no collapse.
- For the buildings with soft-weak bottom story, partial retrofit may be one of the retrofitting options for collapse prevention.

NCREE's rapid seismic index

1. Seismic capacity of buildings shall be provided by lateral strength of columns and walls in the bottom story.
2. Seismic demand of buildings will be induced by seismic inertia force of superstructure.



Chiou, et al. (2017)