

VAN EARTHQUAKE, TURKEY 2011

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Earthquake Department



REPUBLIC OF TURKEY
PRIME MINISTRY
Disaster and Emergency Management Presidency

23 October 2011 Van Earthquake

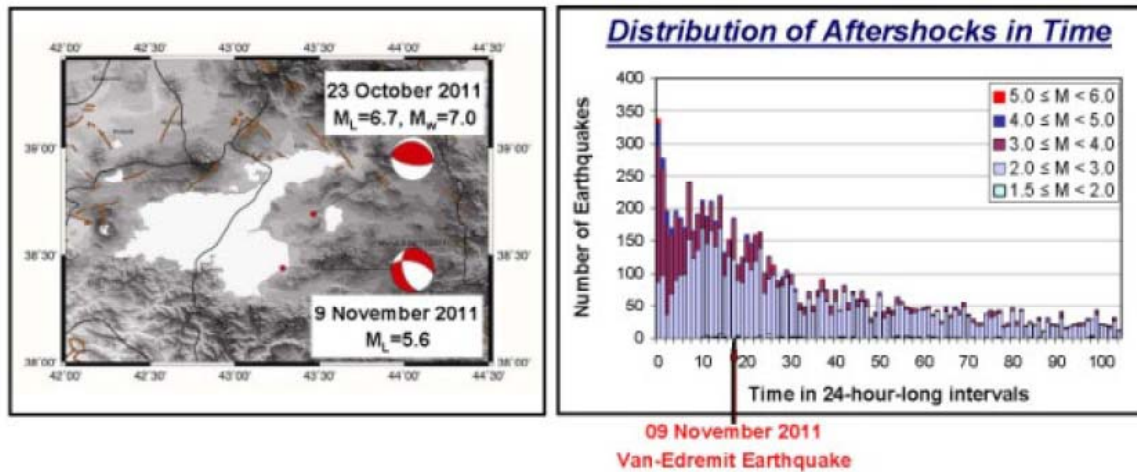


International Video Conference on Reconstruction of Safer Houses
after Earthquake Disasters
22 February 2012



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23 October 2011 Van Earthquake



As a result of 23 October and 9 November 2011 earthquakes, 644 people lost their lives whereas 292 people were saved alive from the debris.

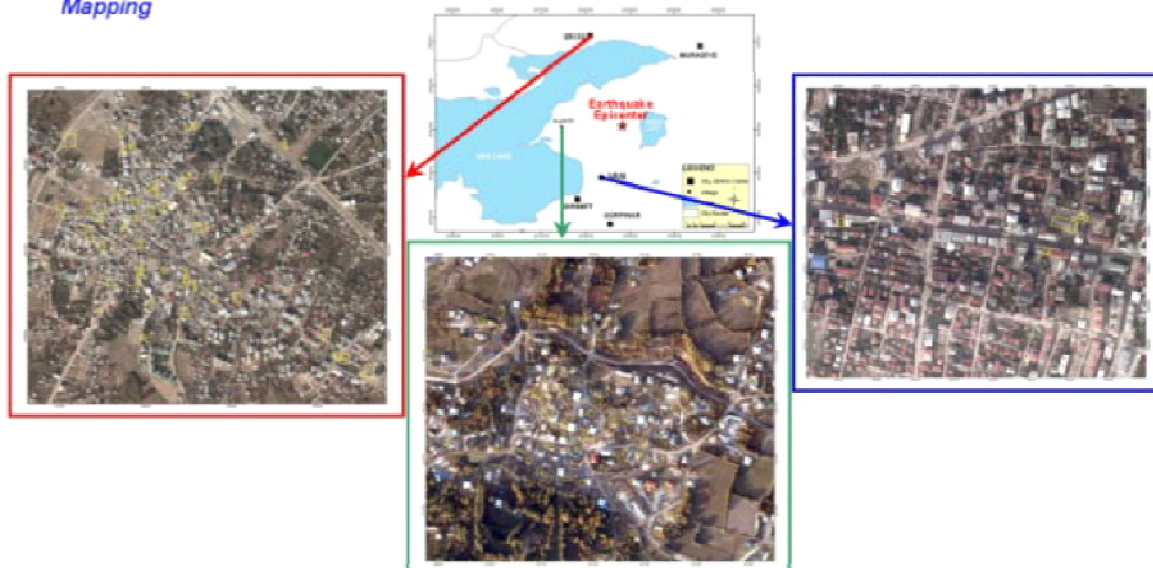
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Collapsed Buildings from 23 October 2011 Van Earthquake

- Preliminary Evaluation of Collapsed Buildings from Orthophotos produced by General Command of Mapping



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General Characteristics of Buildings

- Building stock in **Van city center and Erciş district center** generally consists of 4-8 story **reinforced concrete structures**.

- In most of the buildings, **asmolen slab** (infilled joist slab) is used.
- Particularly, collapsed buildings are observed to have shops in their ground levels with heights that are almost twice the normal story heights.



- In **villages**, most of the existing building stock comprises of one- or two-story **rural masonry buildings**

- with adobe, stone and brick walls
- constructed by local people without taking into consideration any regulation, standard and earthquake resistant design rules
- that are older than their expected service life.

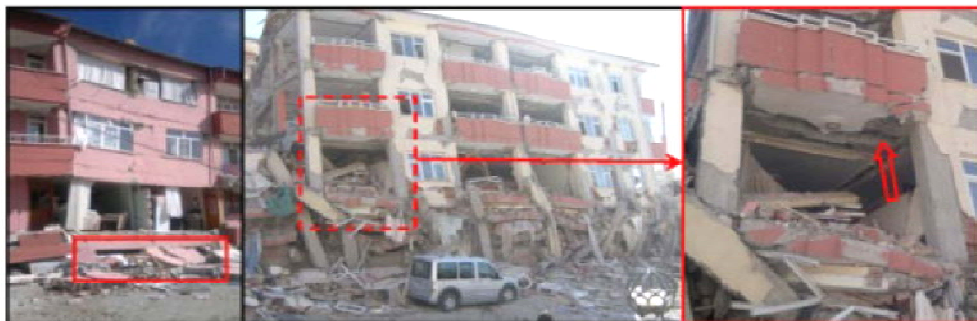
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Damage in Reinforced Concrete Buildings

- **Soft / Weak Story and Asmolen Slab**



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Damage in Reinforced Concrete Buildings

- **Improper Detailing of Reinforcement**

- Use of plain reinforcing bars,
- Large stirrup spacing,
- Inadequate / improper transverse reinforcement in the critical regions (e.g. beam-column joints, plastic hinge region of column ends etc.),
- 90° hooks at both ends of the stirrups, etc.

- **Poor Concrete Quality and Workmanship**

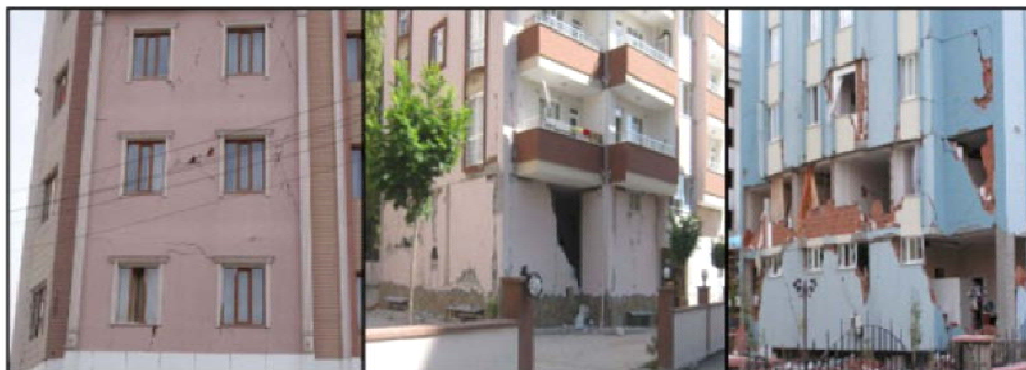
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Damage in Reinforced Concrete Buildings

- **Infill Wall Damage**



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Damage in Masonry Buildings

- **Poor Wall-to-Wall and Wall-to-Floor Connections**



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Damage in Masonry Buildings

- **Poor Material Quality and Workmanship**

- Use of low quality mud mortar as bonding material between adobe, stone and brick units



- Use of various load-bearing wall materials (i.e. adobe, stone or brick) in the same building

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Final Remarks



As a summary,

- buildings that are not in compliance with the Turkish Earthquake Code,
- poor quality of construction material and workmanship,
- lack of inspection

are the main causes of damage in the region.

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Thanks for your interest

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