

Dead Sea Earthquake of 11 February 2004, Mb 5.1

A Preliminary Report

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The Dead Sea Earthquake of 11 February 2004 (Mb 5.1) occurred at 08:15 UTC. The location of the Earthquake was at latitude 31.679 N, longitudes 35.585 E (on the NW Dead Sea Region, about 16 km south of Jericho city) with a focal depth of 21 km.

The earthquake was felt in the Palestinian cities: Jericho, Hebron, Nablus, Ramallah, Bethlehem and Jerusalem but no life loss was reported.

The Dead Sea Transform (DST) extends from Gulf of Aqaba in the northern part of the Red Sea to the Alpine convergence zone in the Taurus Mountains, where the Arabian plate separates from the Africa plate, a distance of some 1000 km. It forms the boundary between the Arabian plate and the Sinai Palestine sub-plate. This tectonic system formed while plate convergence was continuing along the Alpine orogenic belt. Continuing activity of the DST is documented by its seismicity.

Studies of historical earthquakes for the past few thousand years demonstrate that the damaging earthquakes were located along the Dead Sea Transform fault. The most recent destructive earthquakes of the area have ruptured the boundary between the Arabian and the Sinai plates: earthquake of 11 July 1927 and north Jericho and Aqaba earthquake in 1995.

Based on Post-earthquake Investigations, the occurred damages can be classified according to the building types to the following:

*** Reinforced concrete buildings:**

Reinforced concrete buildings in Palestine suffered slight non-structural damages (Damage grade 1 according to European Macro seismic scale 1998 “EMS-1998”), such as:

- Hair-line cracks in very few walls, specially over frame members or in walls, at the base.
- Fine cracks in partitions and in fills.

Three old schools suffered moderate to substantial damage: slight to moderate structural damage and moderate non-structural damage (according to EMS-98 Damage grade2 for one school and grade 2-3 for the other schools).

* **Masonry and Old Masonry Buildings**

The Earthquake affected many old masonry buildings in the Palestinian old cities (Jerusalem, Nablus, Hebron, Bethlehem, ...etc), in Nablus city few historical buildings have been affected with damages between grade 1 to grade 4 (according to EMS-98):

- Six Old masonry buildings suffered damages Grade2.
- Two old masonry buildings suffered damages grade 3.
- Two buildings (masonry and old masonry buildings) suffered very heavy damage (Grade 4).

The damages that had been occurred had usually been at zone of pre-existing weakness.

In the light of the post-earthquake investigations the effected masonry and old masonry buildings suffered with the following damages:

- Crack patterns in masonry pillars.
- Slippage between the blocks.
- Expulsion of blocks in poor mortar stone masonry.
- Large permanent deformation (due to the seismic action).
- Corner detachment.
- A flat vault's collapse.
- Detachment between few perpendicular walls (in a corner).
- Crushing in masonry pillars.

For more details see the attached photos.

The report was compiled by ESSEC team:

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Five Storey Masonry Building- NABLUS City



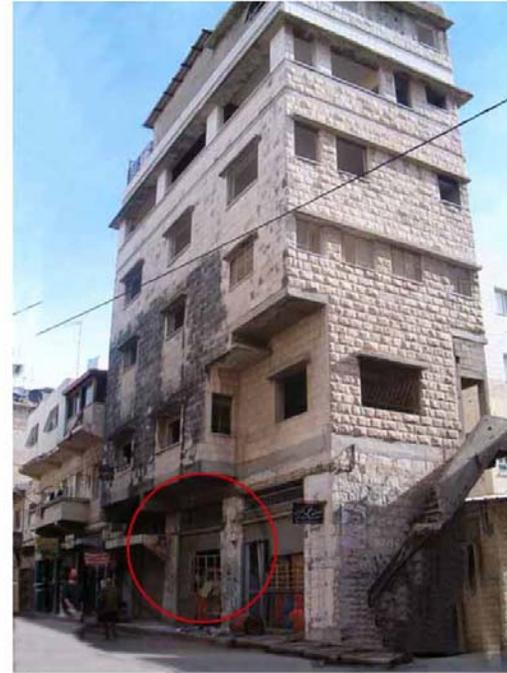
B
Expulsion of blocks in poor mortar stone



D



C



A

fig. 1
Crack Patterns, Crushing
and Large permanent
deformation in the
Masonry Pillars.
see more details page no. (4/8)
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F



G



E

Five Storey Masonary Building
NABLUS City

Outside



B

A flat vault's collapse



A

fig. 2

Old Masonry Building

Location: Old town of NABLUS city

Structural System: Cross Vault's

Use: Soap Factory

Inside



C

Old
Masonry
Building



E

Corner Detachment of Building

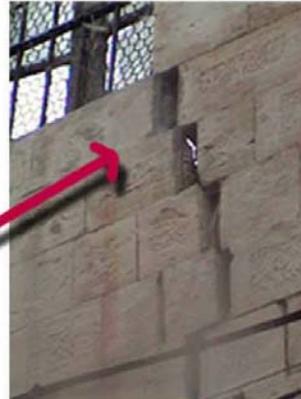


D

Location: Old town of NABLUS city
Structural System: Cross Vault's
Use: Soap Factory



F



G



B



A



C

fig.3
Old Masonry
Building
NABLUS City

Crack patterns



D



B



A



C

fig. 4
Masonry Building
NABLUS City