

EARTHQUAKE DAMAGES ON URBAN BUILDINGS DURING SICHUAN 512 GREAT EARTHQUAKE AND PRIMARY ANALYSIS

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ABSTRACT:

1. SITE INVESTIGATION AND EVALUATION ON BUILDING DAMAGES

2. DAMAGE REASON ANALYSIS ON TYPICAL URBAN BUILDINGS

- 1). The main reason is that the earthquake intensity is greatly larger than expected.
- 2). Those buildings, well designed, constructed, and occupied according to Chinese codes and standards, had favorable earthquake-resistant performance.
- 3). Man-made and misused buildings seriously damaged in the earthquake. These include roof buildings, constructed against structural regulations, damaged seriously and even collapsed locally. The balconies, enveloped by masonry against structural regulations, damaged seriously and even collapsed locally. The longitudinal end walls, which were moved or removed, deteriorated the damage of other end walls. The change of original doors and windows would also deteriorate the damage. Man-made adding stories upon the building caused severe structural damage and even collapse. (For example, in Qingchuan county, a market building was added from 2 stories to 4 stories without structural strengthening and it collapsed in Sichuan earthquake. The death toll in the market reached 250.)
- 4). The roof extruded stories severely damaged and even collapsed in the earthquake.
- 5). The buildings with irregular plan and elevation layouts damaged more seriously.
- 6). In masonry structures, buildings having less walls damaged more severely than those having more walls. And, walls between windows or doors cracked badly.
- 7). The connection between different structural members (e.g. that between RC and masonry) seriously damaged.
- 8). Most of the RC frames were damaged in a manner of “Stronger beam and weaker column”, and only a few of them damaged in a favorable manner of “Weaker beam and stronger column”. Most of them reached the design goals of “Seriously damaged with no collapse”.

3. SUGGESTIONS ON ENHANCING THE SEISMIC CAPACITY OF URBAN BUILDINGS

- 1). Under the condition that little progress has been made on the earthquake warning and prediction system, it is necessary to reasonably set seismic protection intensity to ensure the minimum earthquake-resistant capability of any building.
- 2). District planning should be carried out to choose favorable construction site and avoid site susceptible to the geologic disaster.
- 3). Engineers in rural areas should be taught with knowledge of the seismic concept and structural design to ensure the structural safety in the future.
- 4). The government should enforce the supervision and administration of the implementation of design and construction codes to make sure of the quality.
- 5). The seismic protection, especially seismic measures, of large span/space buildings (such as school buildings and public buildings) must be appropriately improved. The seismic safety grade of very important structural members should also be enhanced.
- 6). The seismic evaluation and strengthening (if any) on existing old building in cities are extremely important, and must be put into practice.