

Building damage investigations regarding landslide disasters that occurred in Hiroshima on August 20

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1. History

Regarding the landslide disasters that occurred in Hiroshima on August 20, 2014, landslides and the resulting avalanche of mud and debris struck various areas causing serious human casualties and damages to buildings.

NILIM, through joint efforts with the Building Research Institute, conducted field work investigations into the damage situation of a reinforced concrete building (Kenei Midorigaoka Jutaku) that, although were among those buildings damaged by the landslide disaster and received considerable earth load and impact from the debris flow, did not collapse.

As well, in the Building Standard Act, regarding buildings with living rooms inside a landslide disaster special warning zone, the outer wall that is expected to receive impacts from the debris flow of landslides, and its principle structural resistant parts must be of a certain construction method according to the type of natural phenomenon, or is required to have a gate or wall installed with an equal or greater withstanding strength (this region was outside the bounds of the zone concerned).

2. Investigation overview

(1) Investigation date: Tuesday September 16, 2014 (PM)

(2) Overview of Kenei Midorigaoka Jutaku

Location: 3 Chome Yagi, Asaminami-ku, Hiroshima

Construction period: 1982 to 1983 (completed)

Facility overview: Three-story wall type RC building, 9 buildings/total 120 homes

(3) Building No.5

Part of the tiles on the eaves of the housing unit's west side was out of position, making it likely that the debris (with a strong possibility that flowing rubble from houses upstream were in this debris as well) reached the height of the eaves (Photo 1). It is likely that a massive rock collided with the side facing the mountain as well, causing a cantilever retaining wall (both ends open) on the second story terrace on the mountain side to be greatly deformed in the off plate direction (Photo 2).



Photo 1



Photo 2

(4) Meeting place

Although it was a single story house wall type RC building, due to the sloping land, a portion of the side facing the mountain lay underground (Photo 3). Since the parapet was damaged considerably and rock remains were on the roof, the avalanche of earth and rocks is believed to have flooded over the building, however, large damage was not found on the building's structure. There was also hardly any detectable off-plate deformation of the retaining wall on the dry area along the road (Photo 4).



Photo 3



Photo 4

(4) Propane storage

The storage was a single story wall type RC building (10m²), with driftwood remains still left on the roof. Although it is assumed that the flood of mud and rocks reached the top of the wall, no considerable damage was found (Photo 5).



Photo 5

(5) Others

Apart from the surveys conducted on the Kenei Midorigaoka Jutaku building in the 3 Chome Yagi, Asaminami-ku district, damage situation investigations were also conducted on the building's upstream and downstream sides, as well as the 6 Chome Kabehigashi, Asakita-ku district, where landslides occurred from multiple directions.

(Reference)

NILIM, Building Research Institute "Building damage investigations regarding landslide disasters that occurred in Hiroshima on August 20, 2014"

http://www.nilim.go.jp/lab/bbg/saigai/h26/140916hiroshima_ke_nchiku.pdf