Quick report on dams

April 4th, 2011
JCOLD

As of March 31, more than 400 dams were inspected. They withstood severe ground motions and retained the water, although several dams suffered minor or moderate damage.

One water retaining structure for irrigation failed. Fujinuma-ike was an 18.5 meter high earthfill structure. Fujinuma-ike ("ike" means pond, it was not called as "dam") was on a non regulated river. Accordingly Fujinuma-ike does not fall under the regulation of River Act and hence it does not fall under the definition of dam of this regulation.

N. Matsumoto and other two engineers visited several dams in the southern Fukushima Prefecture to learn the damage of dams. The affected areas have been recovering from the disaster, but still lifelines were disrupted in large areas. This report mainly focuses the breached structure.

Fujinuma-ike was breached shortly after the earthquake. It is located in the Fukushima Prefecture of North East Japan. The epicentral distance is about 240km and the shortest distance to the fault is about 80km, in case the NIED fault model[1] is employed. The accelerometers were not installed at the site. The attenuation relationship obtained from NIED strong motion network[1] indicates that PGA at ground surface of the same fault distance is around 0.2 to 0.7g. According to the local officials of the irrigation department, 8 people were dead. In the previous report, the number of dead people was described as 9, but it was wrong. Fujinuma-ike is an earthfill structure with the height of 18.5 m. The outline of the structure follows;

Height: 18.5 m
Crest length: 133 m
Crest width: 6.0 m
Reservoir Capacity: 1.5 million m^3
Spillway: ungated

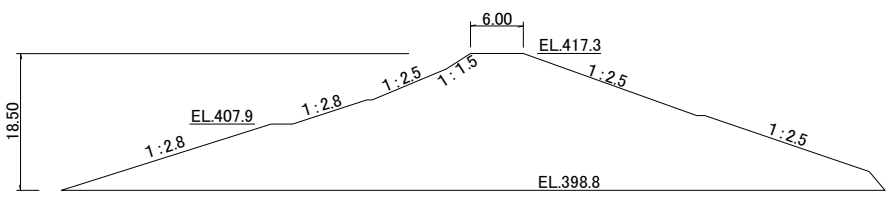

Fig. 1 Typical section

Construction began in 1937 for irrigation and was suspended during World War 2. It was competed in 1949. When the earthquake occurred, the reservoir level was almost full. According to the witness, 20 to 25 minutes after the earthquake, the water was overflowing on the crest. Later big discharge occurred and it was breached completely as shown in Photos 1 & 2. The embankment had lost the height to retain water. The structure is a homogeneous type and most materials seem to be cohesive soil. The authority concerned will investigate the cause of the failure and make the report public. In Photo 3, red lines indicate the path of flow.

Photo 1　View from upstream toward the Fujinuma-ike (Photo: Mastumoto)

Photo 2 View from downstream toward the main breached portion (Photo: Matsumoto)

Photo 3 Arial view of Fujinuma-ike and its downstream area (Photo: NILIM[2])

[1] National Research Institute for Earth Science and Disaster http://www.bosai.go.jp/news/oshirase/20110315_01.pdf

[2] National Institute for Land and Infrastructure Management http://www.nilim.go.jp/lab/bbg/saigai/ h23tohoku/110314sabo.pdf