

Technical study of the creation of communities resistant to tsunami disasters

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1. Outline

Past tsunami countermeasures have been focused primarily on structures such as coastal dikes hypothesizing a tsunami level of constant frequency, but in reaction to the tsunami produced by the Great East Japan Earthquake, the Ministry of Land, Infrastructure, Transport and Tourism has studied and legally prescribed the creation of communities resistant to tsunami disasters. The creation of communities resistant to tsunami disasters is established to protect human lives even when the largest class of tsunami strikes by, based on the inundation assumption and under the concept of “multifaceted protective mechanisms” which, combine structural and non-structural countermeasures, comprehensively promoting the provision of tsunami protection facilities, the restriction of development activities, and the construction of warning and evacuation systems. Among these, methods of evaluating the swell head of tsunami on the front surface of a building etc. serving as an evacuation site, technical standards for filling and cutting of the ground during development activities in districts which might be inundated, and technical standards for tsunami protection facilities were studied.

2. Methods of evaluating the swell head of tsunami

When a prefectural governor designates a tsunami disaster caution district or a tsunami disaster special caution district, the government publicly announces a standard water level (inundation depth considering swell head). The mayors of cities, towns, or villages can apply this standard water level to designated objects complying with a fixed standard within the tsunami disaster caution district as designated evacuation facilities. And one essential condition for authorization of a social welfare facility, school, or medical treatment facility etc. (below called a, “designated development activity”) in a tsunami disaster special caution district is that the heights of the floors of habitable rooms be equal to or higher than the standard water level.

The standard water level adopted is the maximum value of the specific energy of each calculation mesh obtained by a tsunami inundation simulation performed to hypothesize a tsunami inundation. Its

suitability has been confirmed by a tsunami inundation simulation including a hypothetical arrangement of buildings and by a verification using the trace height of past tsunamis.

3. Technical standards for filling and cutting

A study is done of a technical standard which ensures that a precipice formed by filling and cutting executed as part of a designated development activity is safe against a tsunami which has run up.

- A precipice which is not covered with a retaining wall shall be protected by sodding instead of sprayed mortar based on the result of using a tsunami inundation simulation to calculate the depth of erosion of the cliff surface based on the flow regime of the tsunami.

- Stability against scouring of the toe of the slope of the precipice shall be analyzed based on circular slip while considering the maximum scouring depth hypothesized, and based on the results, protective work shall be installed or a fill and cut setback shall be formed premised on scouring.

- It is presumed that the overflow of the tsunami will erode the top edge of the precipice, so countermeasures are taken using regulations for the crest work of the low water revetment of the river.

4. Technical standards for tsunami protection facilities

Tsunami protection facilities, which are intended to save the lives of people from the largest class of tsunami, include embanked structures, revetments, levee walls, or lock gate, which have functions to prevent inundation by tsunami of the background urban district on dry land. Under the technical standards, after the target achievement performance and safety performance of a tsunami protection facility have been decided, the conditions and the methods which should be considered to verify these shall be organized.

[Reference]

Materials of the technical committee for creation of communities resistant to tsunami disasters.

http://www.mlit.go.jp/river/shinngikai_blog/tsunami_ousaitiiki/index.html