NILIM Supports Local Governments on Anti Liquefaction of Housing Areas for Recovery from the Great East Japan Earthquake Disaster

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1. Anti-liquefaction Method implementable to Housing Areas

The Great East Japan Earthquake caused not only tsunami disaster but also caused very extensive land liquefaction including in housing areas. Method of anti-liquefaction which should be implemented to areas with roads and houses has been a big problem on the process of recovery because there are very seldom precedent cases other than in plain ground with no building. Another big problem is construction costs which should be affordable for ordinary house owners. Established methodology has yet to be conceived.

In order to support the local government as well as residents in the struck areas, the City Bureau of MLIT introduced new financial subsidy to the local governments in order to implement district wide treatment with both roads and housing lots integrally, which will is expected to reduce allotted payment for housing owners indirectly. Then, NILIM has taken charge of technical support to the local governments mainly for adequate selection of unprecedented method. One example will now be introduced.

2. Development of the Simple Calculation Software for Lowering Groundwater Levels Method

Firstly, we focused on Lowering Groundwater Levels Method. An advantage of this method is that construction is needed only within the area of roads but its effect will reach into the surrounding housing lots. Running cost can be reduced if the depth of groundwater lowered is less than 3 meters from the surface. However, there are a negative sub effect of potential land subsidence which caused by compaction of deeper clay layers. These positive and negative effects can be estimated but only through complicated formula. It was a kind of a bottleneck of investigation making consensus building and decision making difficult.

In order to break the bottleneck, a simple software tool based on Microsoft Excel sheets was urgently developed. As figure shows, what depth zone has liquefaction risk by FL value graph as well as easily calculate potential ground sinkage both by liquefaction and clay layer compaction can easily be seen. The output is frequently updated according to the input on scale of earthquakes and groundwater levels.

NILIM offered the calculation software for free through its homepage, which has been contributed to local decision making in the struck areas.

3. Development of Second Software for Grillwork Underground Walls Method

Next, NILIM developed second simple calculation software on Grillwork Underground Walls Method which is an alternative for the ground where unsuited for downing groundwater level. It also use Excel sheets, but its output is calculated by high speed computer in advance with approximately 18,000 ways of equivalent linearization analysis, which is hard to do for local governments by themselves. This is also able to download free from NILIM homepage.

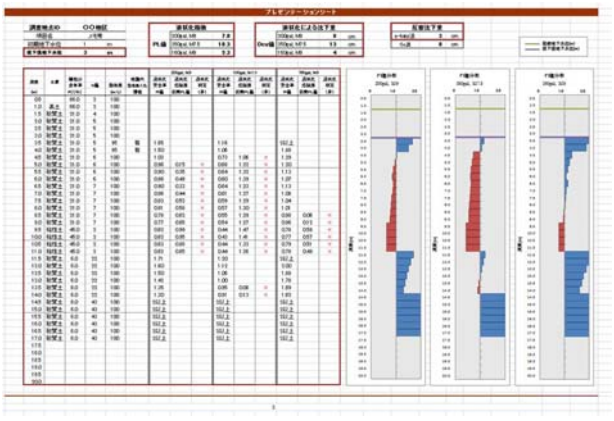

Figure: Image of Calculation Software for Anti Liquefaction Effect (NILIM Liquefaction Sheets)

[Sources]

1) NILIM homepage
http://www.nilim.go.jp/lab/jbg/takuti/takuti.html