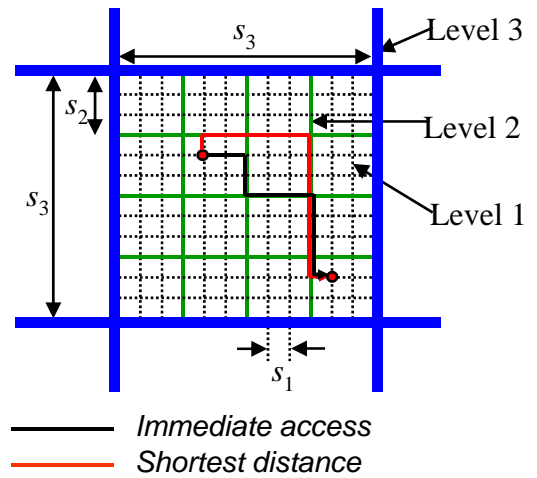


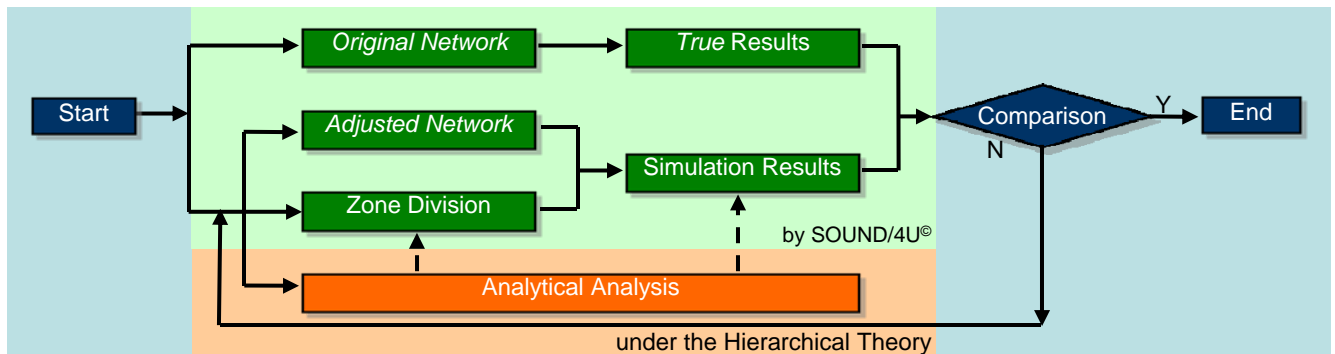
## Hierarchical Network Theory

In Kuwahara Laboratory, Research works are being carried on to investigate the hierarchical network nature of roads. Analytical methods are developed to estimate traffic flows, travel times and other traffic related information by categorizing roads into 3 functional levels that are shown in the right. And 2 route choice models are used, *immediate access* to higher level roads and the *shortest distance* route.

The theory is intended to support road and urban planning practices in Japan, but it can also be applied to other fields, like in the simplification of traffic simulation.



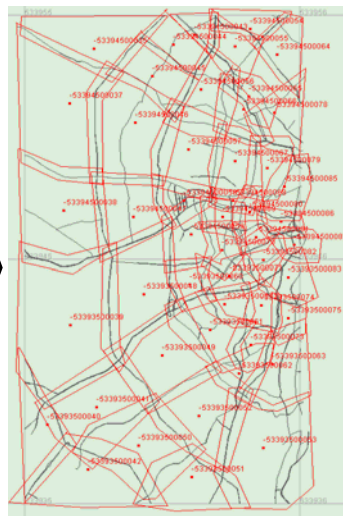
## Simplification of Traffic Simulation, the flowchart



## Validations by a Practical Network from Tokyo



Original Network



Adjusted Network

Under the hierarchical network theory, simple analytical methods are proposed to estimate traffic flows on minor roads, so that complicated traffic simulation can be saved for relatively higher level roads.

As shown in the above flowchart, this is a repeated process of theoretical analysis, simulation application, and comparison works, until an acceptable accuracy criterion can be met. A practical road network from the metropolitan Tokyo area is used for validation.

**THANKS!** The road network data and the SOUND/4U traffic simulation platform provided by the i-Transport Lab. Co., Ltd (ITL) is highly appreciated.