

# Functions road networks need to support disaster victims of a large-scale earthquake

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### 1. Introduction

When an earthquake occurs, many disaster response organizations take a variety of disaster response actions including searching for missing people, first aid and life-saving, fire-fighting activities, medical treatment, and supplying water, food, and medical supplies in order to assist the victims of the disaster.

In order to take these disaster response activities, it is necessary for the people who perform first aid and life-saving activities, water food and other materials to be moved or transported from outside the disaster area into the disaster area; an activity in which road networks play an important role.

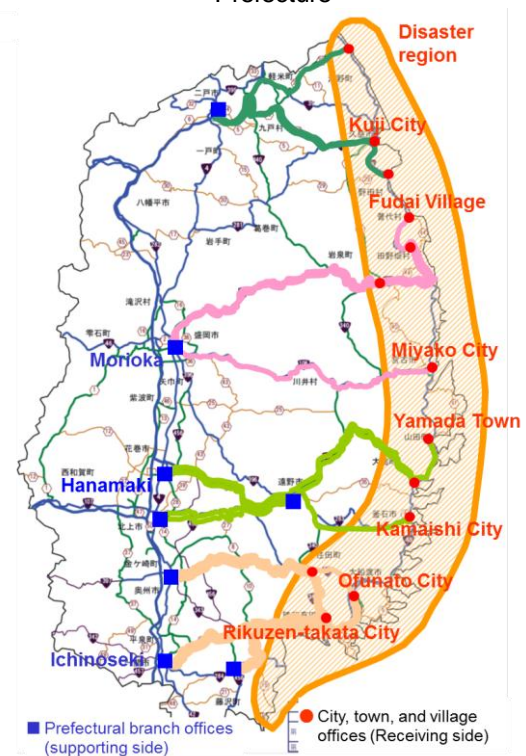
This research was done by collecting information about various types of disaster response activities by many organizations, organizing the correlation of various disaster response activities with moving and transporting people and materials, and evaluating the functions which a road network must have to ensure smooth movement and transport.

### 2. Organizing response activities by different organizations during a disaster

Based on the 9 categories of disaster emergency measures in the Basic Disaster Prevention Plan (edited by the Cabinet Office), the researchers comprehensively collected all kinds of disaster response activities from legally required plans of all organizations that respond to disasters (prefectures, cities, police, fire departments, Self-defense Forces etc.), from disaster prevention related plans (guidelines, BCP, disaster prevention work plans, disaster prevention project plans etc.) and from actual actions taken in response to the Great East Japan Earthquake, and abstracted and organized about 250 activities that roads can support based on the characteristics of various modes of transportation (speed, capacity, mobility, etc.).

Next, they categorized the abstracted activities according to purpose such as “ensuring traffic to perform emergency transport”, and organized the question, “What is transported from where (base) to where (base)?” for all the approximately 250 activities.

Example of Response Activities in Iwate Prefecture



### 3. Evaluation of road networks focused on disaster response activities

An attempt was made to evaluate the functions of a road network as emergency transport roads<sup>1)</sup> in Iwate Prefecture. Here, the range of the hypothetical disaster region was set with reference to the Great East Japan Earthquake.

The figure presents a case of evaluation of functions done by selecting, as the example of a disaster response activity, movement from a base (regional office of a prefecture outside the disaster region) to a base (city, town or village office in the disaster region) as the “movement of people to support the opening of roads”.

The combination of the bases (regional offices of a prefecture) (■mark) and bases (city, town or village offices) (●mark) was set based on distance and the degree of relevance at normal times, and the roads for

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movement between the bases were selected as the shortest routes. And the degree of overlapping of roads linking the bases was represented by the thickness of the lines in each section of the road network.

Roads represented by thick lines in the figure are roads necessary for “movement of people to support the opening of roads”, and sections are evaluated assuming that the thicker the lines, the more important the section. By representing other actions on the map in the same way, for example, using those which represent these superimposed on other purposes, it is possible to evaluate the functions a road network needs to support disaster victims

[Sources]

1. Iwate Prefecture Regional Disaster Prevention Plan (March 2012)