Supplemental Material

A Example of People Flow Data

Table S1 shows a sample of the people flow data. Each row (entry) presents the location (latitude, longitude) of a person with person ID at a certain time. We can extract a series of entries of a specific person, which shows the person's trajectory, by filtering the people flow data based on person ID, trip ID, and sub-trip ID, in this order. Furthermore, each row also includes additional information, i.e., attribute information (sex, age, address code, and occupation), trip purpose, expansion factor, and transportation method.

Table S1. Example of people flow data.

Person ID	Trip ID	Sub-trip ID	Date	Longitude	Latitude	Gender	Age	Address	Occupation	Trip Purpose	Expansion Factor	Transportation Method
27100	3	1	2011/10/3 8:00	136.844284	35.13203	1	8	10709	11	99	49	97
42152	3	1	2011/10/3 8:00	136.845291	35.134567	2	7	11608	3	99	32	97
97681	2	1	2011/10/3 8:00	136.856511	35.140432	1	6	10104	2	1	51	4
98027	2	1	2011/10/3 8:00	136.851258	35.137826	2	4	10104	5	1	60	9

The expansion factor is a parameter defined in the original person trip data. In the person trip survey, it is necessary to statistically estimate the movement of the whole people in the target area only from the sampling data. This estimation process is called *expansion*. The expansion factor is determined by the inquirer that conducts the person trip survey (Ministry of Land, Infrastructure, Transport and Tourism, Japan (2007)). In case of the data used in this paper, the expansion factor in each entry presents the number of people who follow the corresponding trip.

B Example of Calculation of Evacuation Road Demand

Fig. S2 illustrates an example of calculation of evacuation road demand where a road network consists of four nodes, $\mathcal{V} = \{a, b, c, d\}$, one destination, $\mathcal{D} = \{d\}$, and three edges, $\mathcal{E} = \{e_1, e_2, e_3\}$. At first, ordinary road demand $D_{\mathrm{N}}(t, e)$ for each road $e \in \mathcal{E}$ is calculated according to the approach in Section 3. In this case, there are three paths from nodes a, b, and c to destination d. Since e_1 (resp. e_2) is only included in one path $r(e_1, d)$ (resp. $r(e_2, d)$), $D_{\mathrm{E}}(t, e_i) = D_{\mathrm{N}}(t, e_i)$ $(i = 1, 2)$. On the contrary, e_3 is included in all the three paths, and thus $D_{\mathrm{E}}(t, e_3) = \sum_{i=1}^{3} D_{\mathrm{N}}(t, e_i)$.

Figure S1. Sample of risk map in Arako area of Nagoya city.

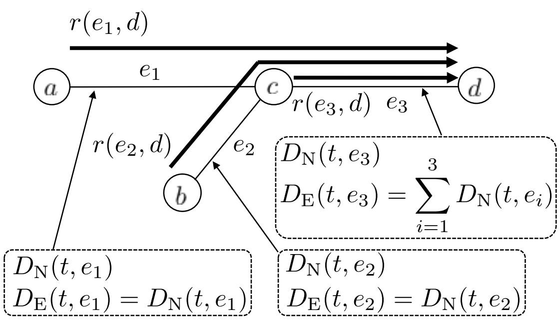

Figure S2. Example of calculation of evacuation road demand.

C Supplemental Figures

References

Ministry of Land, Infrastructure, Transport and Tourism, Japan (2007) Person Trip Survey (in japanese). Available at: http://www.mlit.go.jp/crd/tosiko/pt.html (accessed 15 June 2018).

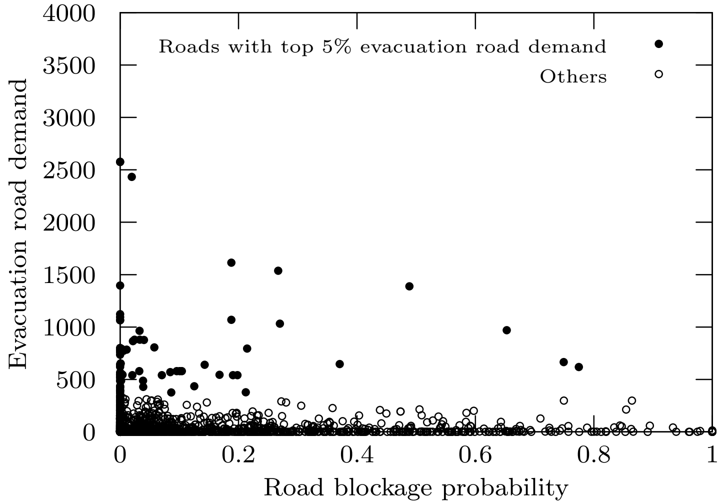

Figure S3. Relationship between road blockage probability and evacuation road demand for each road (risk-aware path selection, ordinary road demand based on people flow data, and commuting period).

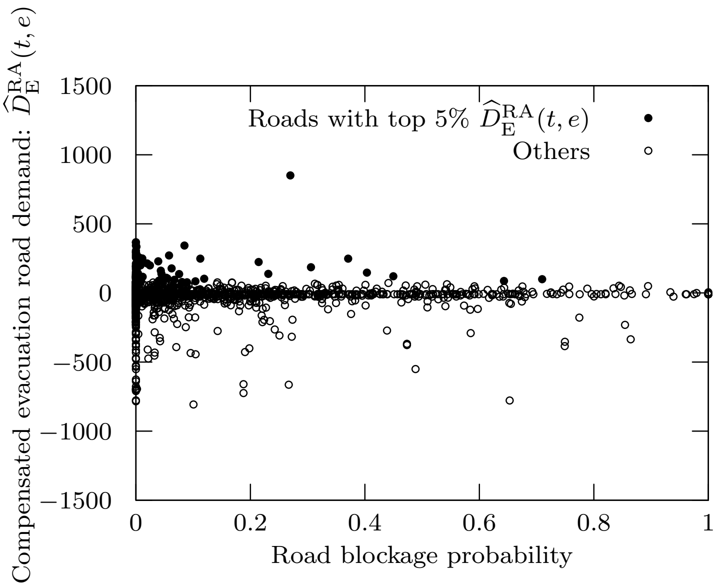

Figure S4. Relationship between road blockage probability and compensated evacuation road demand for each road (risk-aware path selection and commuting period).