

Performance Measurement Related to Traffic Congestion in Road Administration

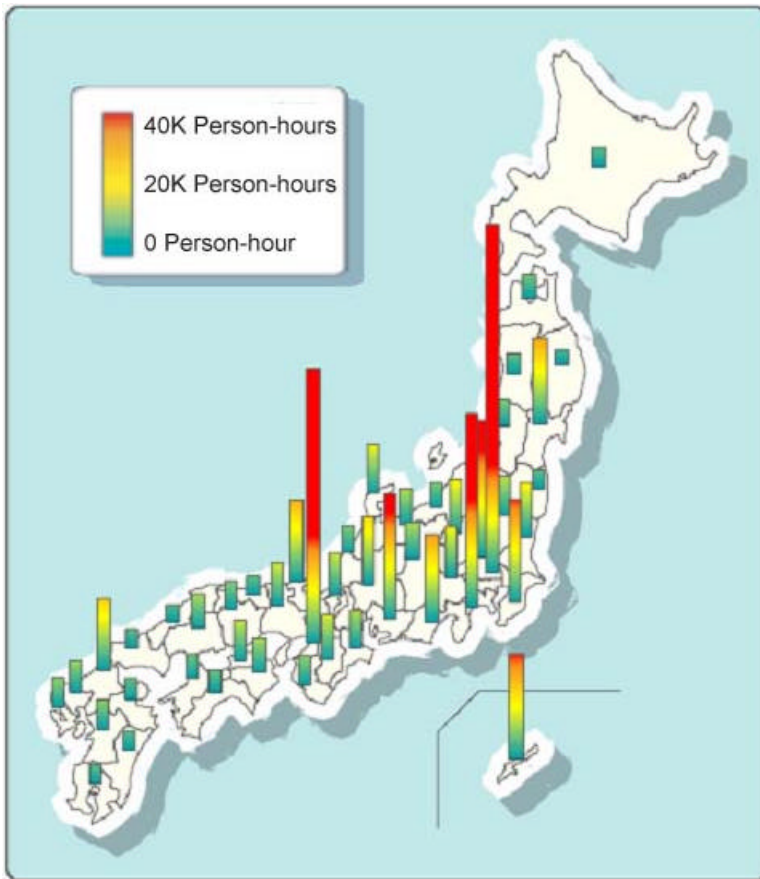
March 2004

Road Bureau, Ministry of Land, Infrastructure and Transport

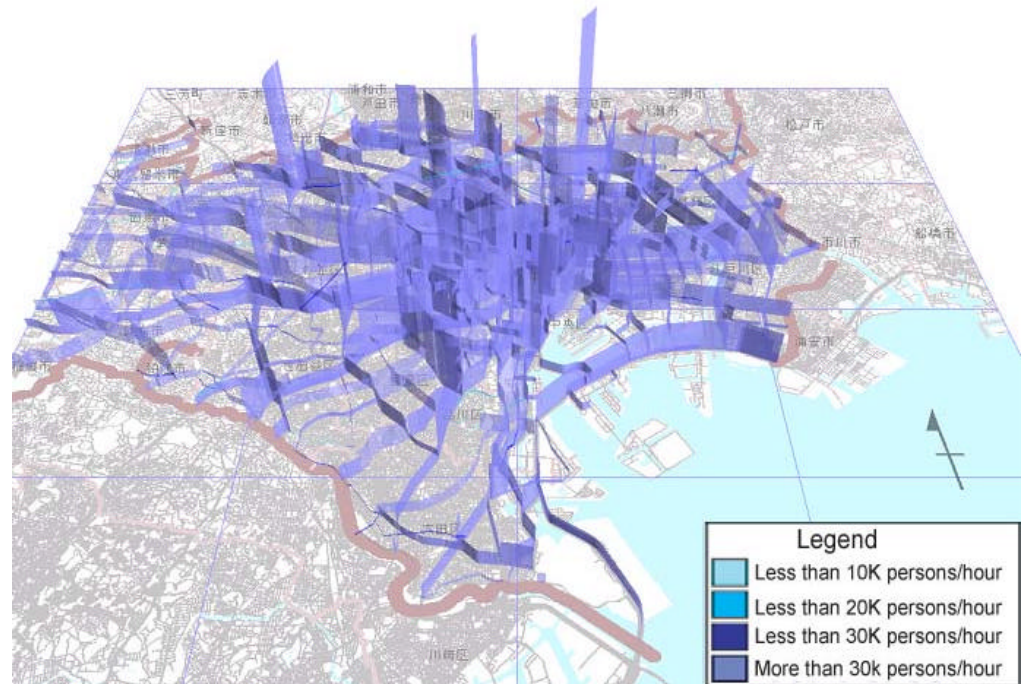
Current State of Traffic Congestion

Total time lost due to traffic congestion on National level: 3.8 billion person-hours/year
Accounts approximately 30 hours per person/year

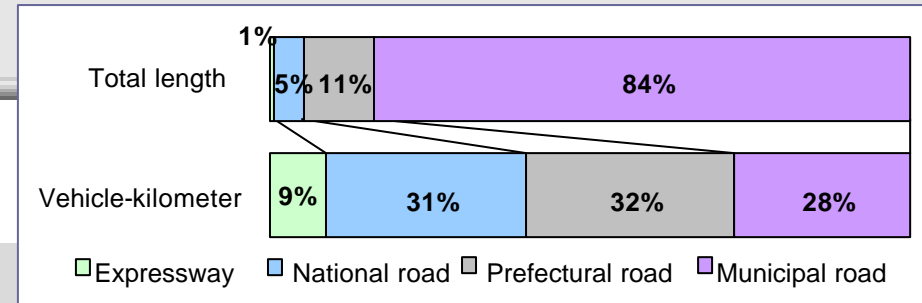
Time lost due to traffic congestion by prefecture



3D Congestion map of time loss
(Central Tokyo: Time lost due to traffic congestion/km)



Efficient Collection of Data



Conventional data collection method

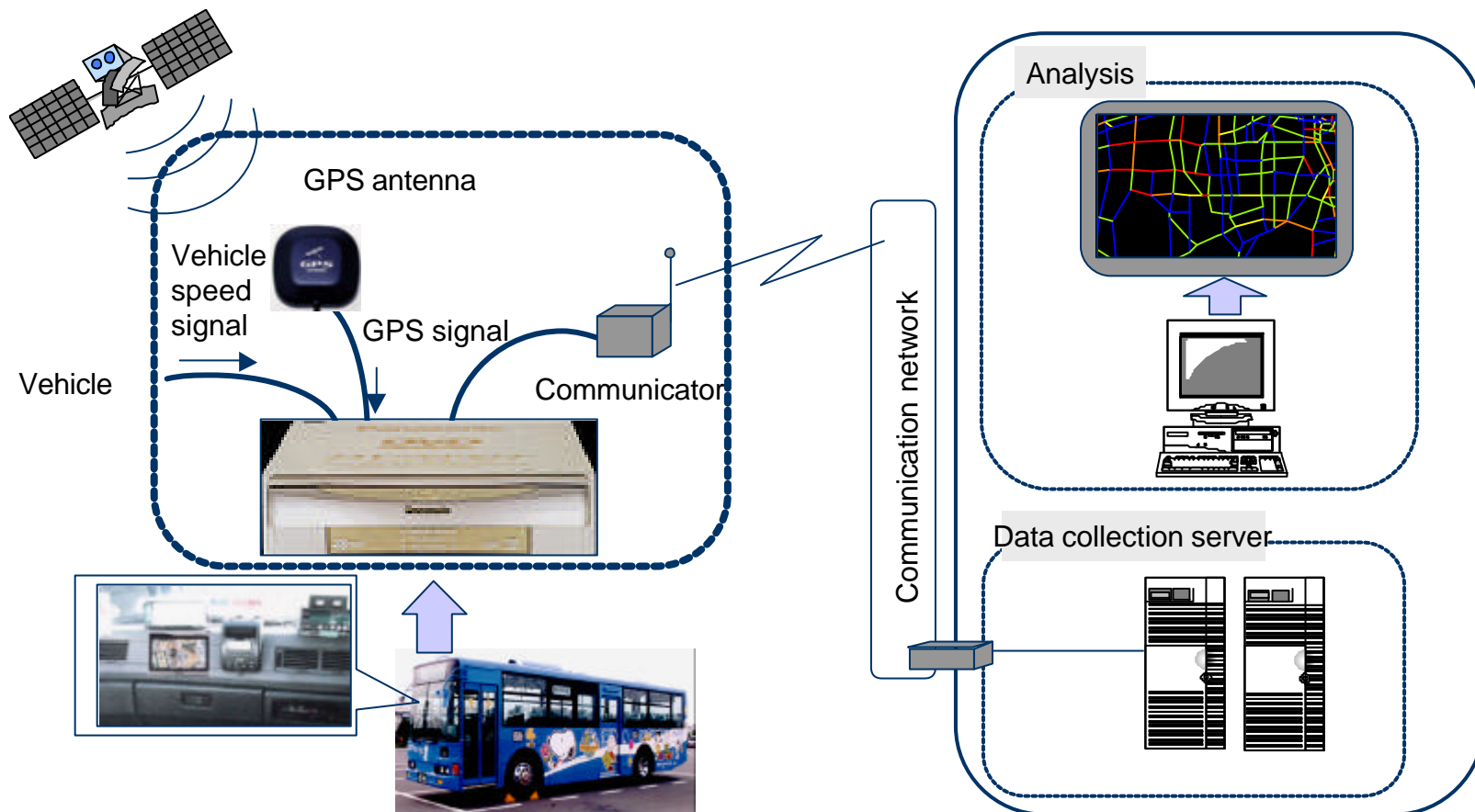
- **Road Statistics Year Book:** prepared every year
 - The main statistics are the lengths of roads of road.
- **Road Traffic Census:** conducted once every five years (one weekday and one holiday)
 - Traffic volume and travel speed investigation For expressways, national highways and prefectural roads
 - OD survey, etc.

Collection of data using IT and with an emphasis on outcome

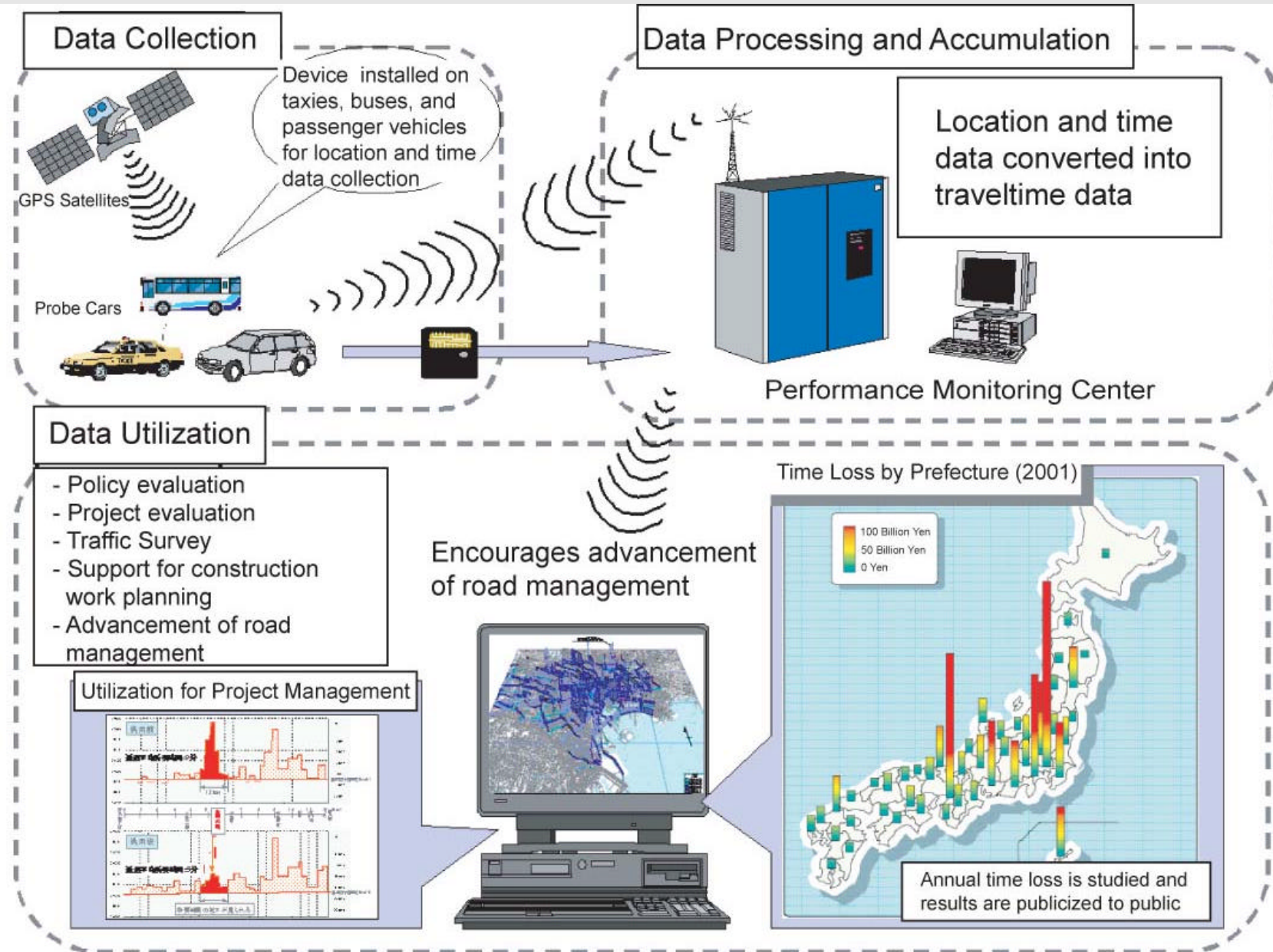
- **Traffic volume data**
 - Regular observation stations (traffic counters): Major sections of expressways and national trunk roads are covered.
- **Travel speed data**
 - Regular observation stations (traffic counters): installed for almost all expressways
 - Use of "probe cars": to be introduced sequentially for bus routes

<Reference> Outline of "Probe Car Survey"

- Real-time collection of running speed data by route
- Summation of daily real-time data by weekday/weekend, type of car, direction, etc. allows calculation of the outcome indicators and application to project evaluation.

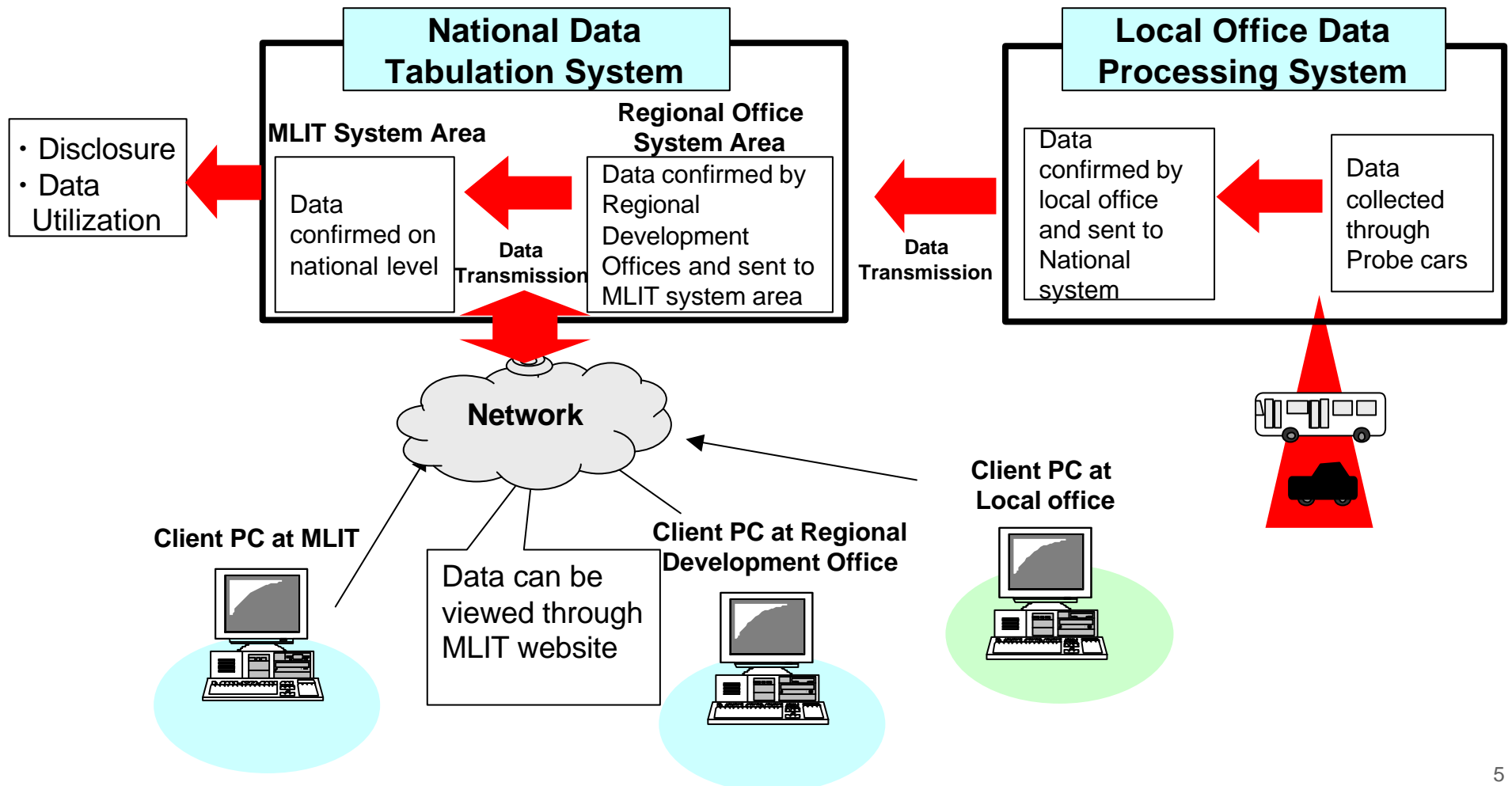


How to grasp traffic condition using Probe Cars



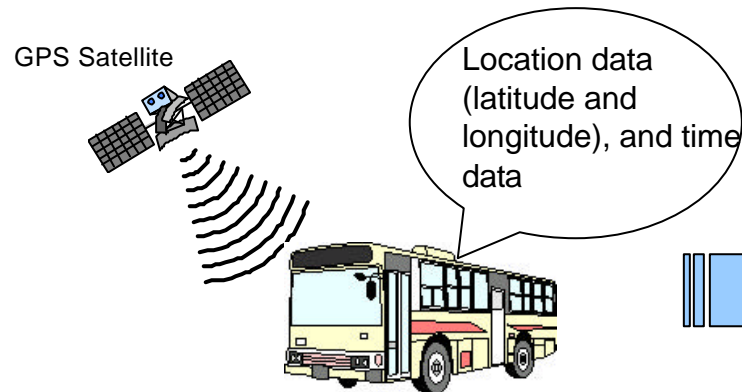
Data Tabulation System

- Probe Information System consists of “National Data Tabulation System” and “Local Office Data Processing System,” which are connected with high speed optical network.
 - Calculation results of the total loss due to congestion can be viewed though the MLIT* website.
- *MLIT: Ministry of Land, Infrastructure, and Transport



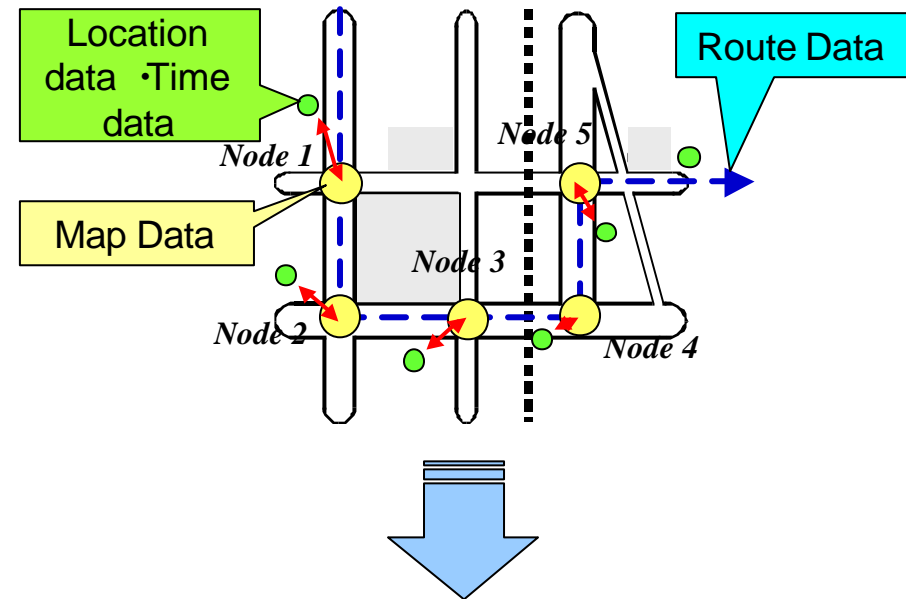
Data Conversion from Probe Car Data into Congestion Data

•Collection of location data



•Map Matching

(Route data is generated by matching map data with location data)



•Conversion into Traffic Congestion Data



•Conversion into Travel Time

	Node 1	Node 2	Travel Time
Probe Car 1	8:35:45	8:36:50	65sec
Probe Car 2	8:45:32	8:47:10	98sec
⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮



Ave .
75sec

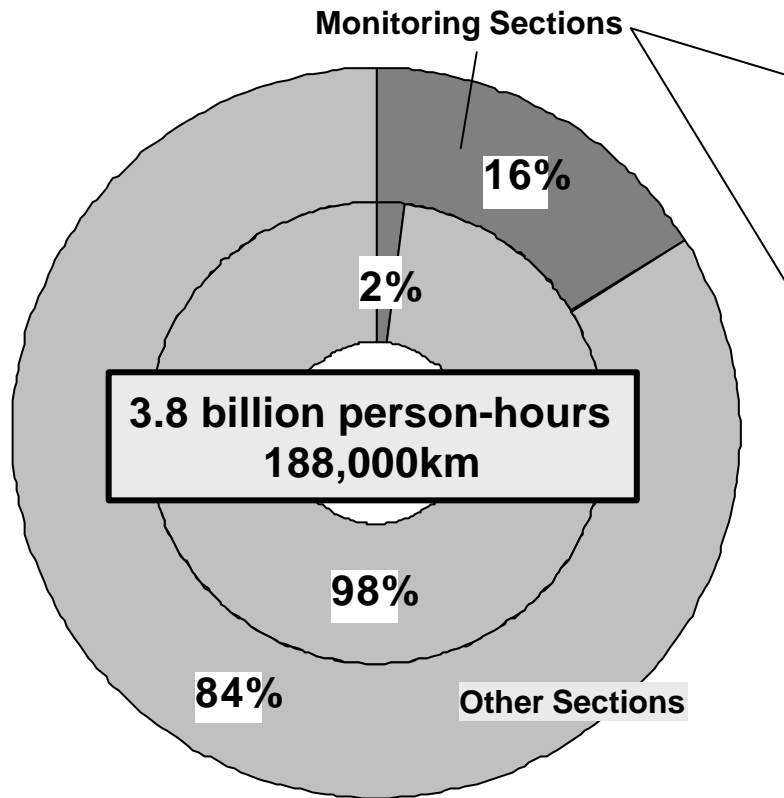
Holding Sheet of Current Status by Routes and Sections

Holding Sheet of Current Status by Routes and Sections Using Outcome Indicators
(Section being managed by MLIT directly)

Name of Regional Bureau		Work Office			Person in Charging		Filled Out By				Telephone No.				
Length of Section Managed		295.4 km			Congestion					Accidents					
Name of Route	Location of Relevant Project	Prefectural Code	Census Section No.	Length km	Traffic Volume in 1999 Census	Traffic Volume used to Calculate Congestion Loss	Amount Lost Due to Congestion	Amount Lost Due to Congestion per 1km	Amount Lost Due to Congestion per vehicle-km	Obtained Level of Data ¹⁾	Traffic Volume Used to Calculate Death & Injury Ratio	NO. of Death & Injury Accidents	Ratio of Death & Injury Accidents	No. of Deaths	Ratio of Traffic Accident Deaths
					vehicle/12 hr	vehicle/12 hr	¥ 1 million/yr	¥ 1 million/yr-km	¥ /vehicle-km	vehicle/24 hr	cases/yr	cases/100 million vehicle-km	person/yr	person/100 million vehicle-km	
Route 7		15000	1001	0.9	45,568	45,568	764.0	848.0	51.0	2	63,105	41	197.78	0	0.00
Route 7		15000	1002	0.5	39,345	39,345	793.0	1,587.0	110.4	2	54,296	17	171.56	0	0.00
Route 7		15000	1003	0.9	31,007	31,007	981.0	1,090.0	96.3	1	42,790	35	248.99	0	0.00
Route 7		15000	1004	0.8	36,209	36,209	794.0	992.0	75.1	1	49,968	24	164.49	1	6.85
Route 7		15000	1005	0.9	46,003	46,003	225.0	250.0	14.9	1	63,484	26	124.67	1	4.80
Route 7		15000	1006	0.6	59,160	59,160	3,005.0	5,008.0	231.9	1	81,641	6	33.56	0	0.00
Route 7		15000	1007	2.3	92,646	92,646	2,947.0	1,281.0	37.9	1	124,146	22	21.11	0	0.00
Route 7		15000	1008	2.8	66,202	66,202	4,093.0	1,462.0	60.5	1	88,711	24	26.47	0	0.00
Route 7		15000	1009	1.3	62,773	62,773	3,900.0	3,000.0	130.9	1	83,488	7	17.67	0	0.00
Route 7		15000	1010	2.0	71,583	68,505	2,641.0	1,321.0	52.8	1+	95,359	10	14.37	0	0.00
Route 7		15000	1011	2.6	63,988	63,988	2,069.0	796.0	34.1	1	85,104	19	23.53	0	0.00
Route 7		15000	1012	2.9	46,279	46,279	0.0	0.0	0.0	1	61,551	12	18.42	0	0.00
Route 7		15000	1013	1.9	47,086	47,086	245.0	129.0	7.5	1	62,624	2	4.61	0	0.00
Route 7		15000	1014	2.1	44,371	44,371	0.0	0.0	0.0	1	59,013	5	11.05	0	0.00
Route 7		15000	1015	1.8	29,147	29,147	0.0	0.0	0.0	1	38,766	6	23.56	1	3.93
Route 116		15000	1122	1.9	14,398	14,398	300.0	158.0	30.0	2	19,869	26	188.69	0	0.00
Route 116															
Route 116															
Route 116		15000	11119	1.1	14,343	14,343	36.0	33.0	6.3	1	19,793	0	0.00	0	0.00
Route 116		15000	11120	1.3	19,365	19,365	0.0	0.0	0.0	1	26,724	3	23.66	0	0.00
Route 116		15000	11121	1.9	22,569	22,569	705.0	371.0	45.0	1	31,145	2	9.26	0	0.00
Route 116		15000	11122	1.4	31,246	31,246	911.0	651.0	57.1	1	43,119	3	13.62	0	0.00
Route 116		15000	11123	0.8	46,060	46,060	453.0	567.0	33.7	1	63,563	6	32.33	1	5.39
Route 116		15000	11124	1.5	60,605	60,605	1,954.0	1,303.0	58.9	1	83,635	15	32.76	0	0.00
				50.8	18,615	18,615	11,646.0	229.3	67.5	0	25,732	379	79.43	5	1.05
				295.4	18,356	18,356	63,062.0	213.5	63.7	0	24,907	1,488	55.41	37	1.38

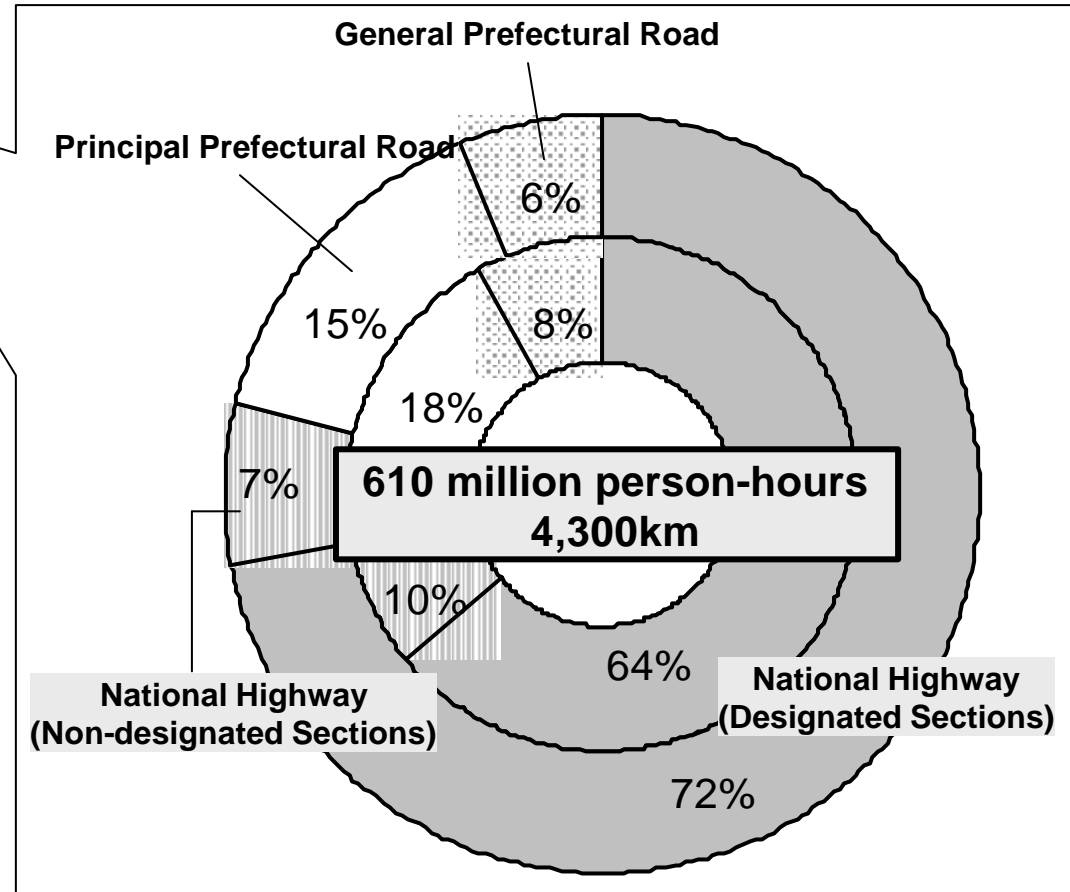
Figures in this chart are just imagery and do not represent actual sections or locations

Road Sections Surveyed for Annual Congestion Data Survey (Current Status)



% of Monitoring Sections in Entire Network

* Outer Circle: Calculation Based on Time Loss
Inner Circle : Calculation Based on Road Length



% of Monitoring Sections by Road Type

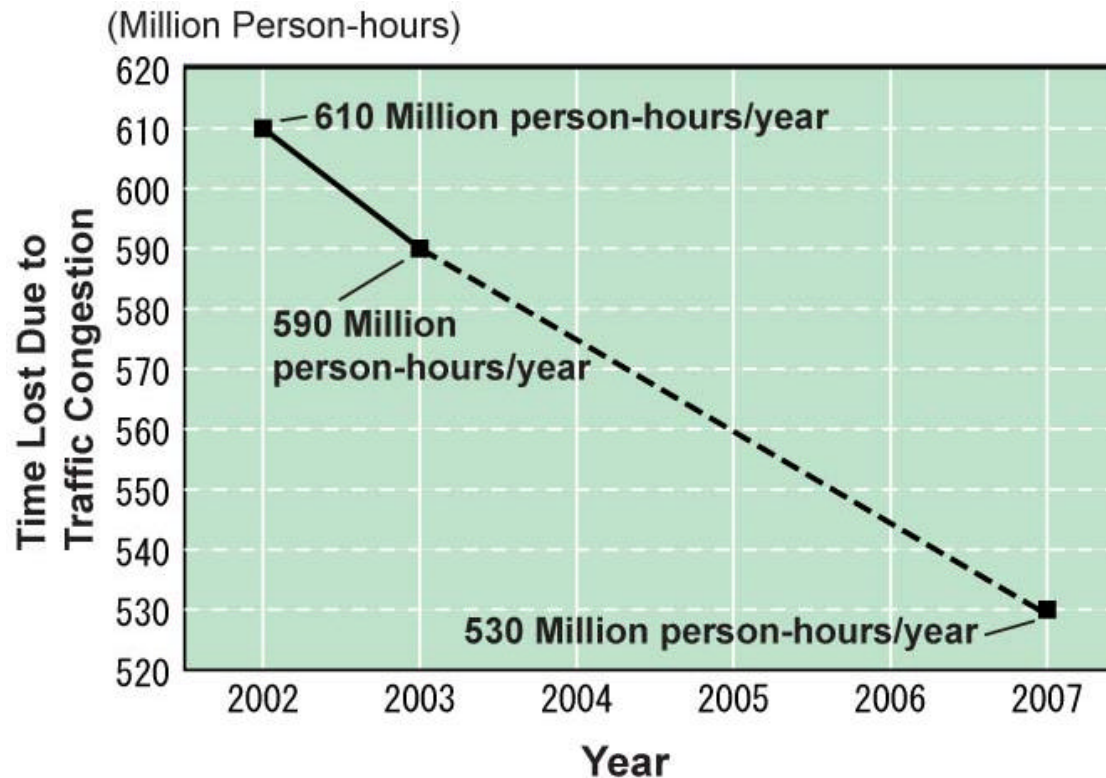
* Outer Circle: Calculation Based on Time Loss
Inner Circle : Calculation Based on Road Length

Mitigation of Congestion

Current Status : 3.8 billion person-hours/year (National; by calculation)
610 million person-hours/year (on traffic monitoring sections* ; by actual measurement)

Interim Goal : 10% reduction by FY2007 .

Goal by FY 2003 : 2.5% reduction of time loss (Down by 590 million person-hours)

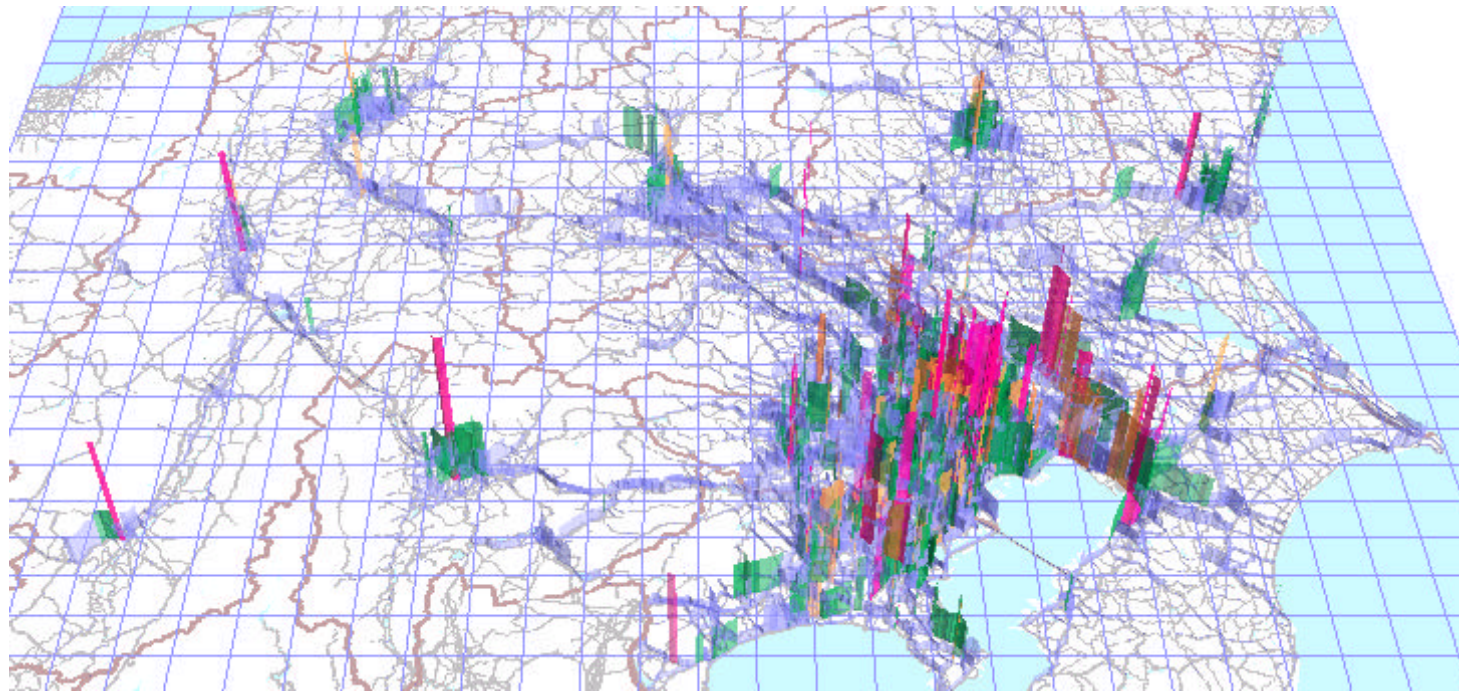


Current status and future goals of time loss on traffic monitoring sections

* Monitoring section: Road section where traffic is monitored annually. Annual goals are set on these sections.

Example of finding trouble spots by means of congestion loss data (Kanto area)

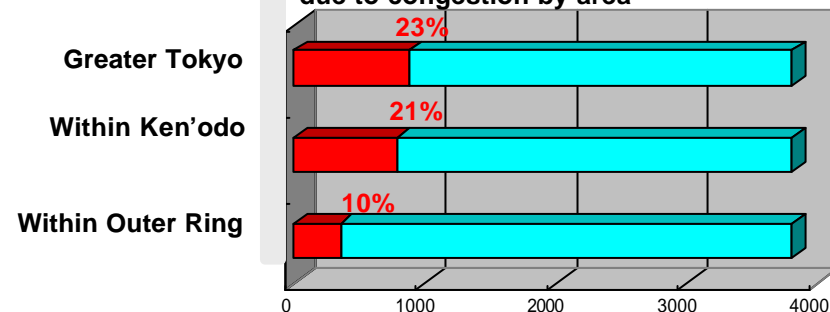
- Time lost due to congestion by area (Nationwide 3.81 billion person-hours, Kanto 1.239 billion person-hours)



- Time lost due to congestion (million person-hours)

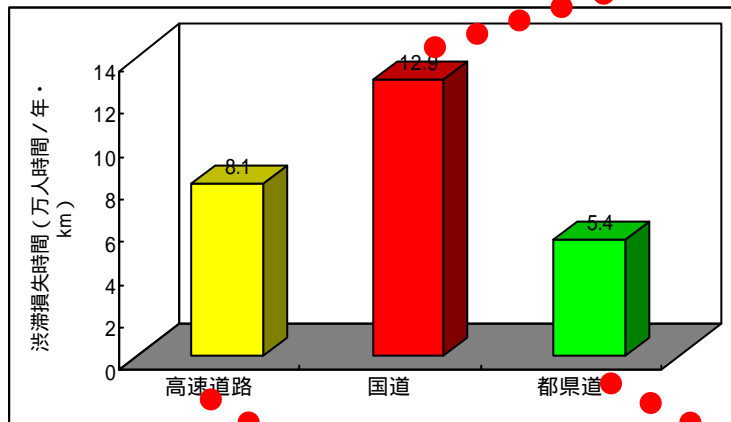
Greater Tokyo (Metropolis + 3 Prefectures)	881
Within Ken'odo Road	793
Within Outer Ring Road	355

Proportion of nationwide time lost due to congestion by area

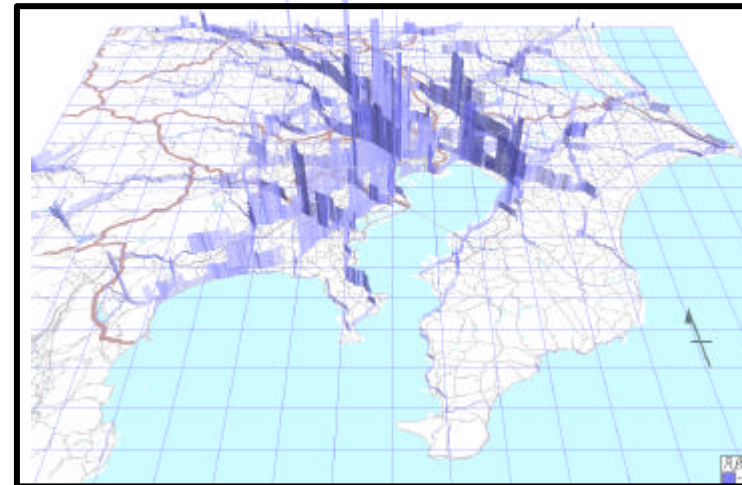


Time lost due to congestion (comparison by road type)

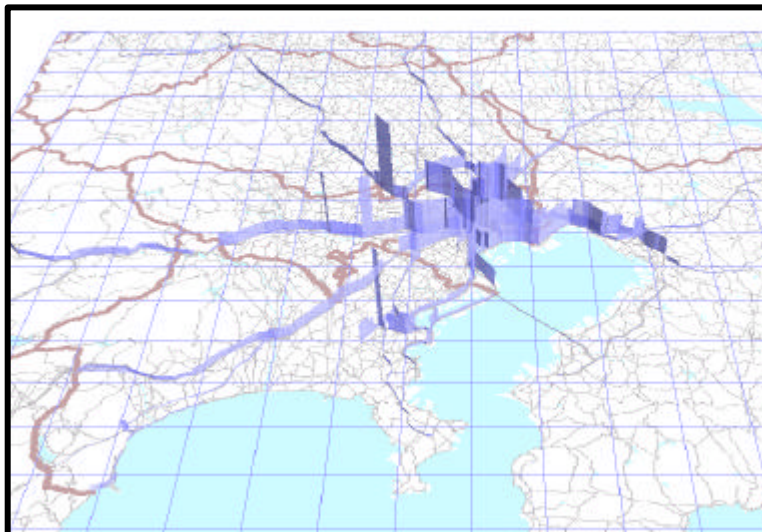
● Time lost due to congestion for each road type



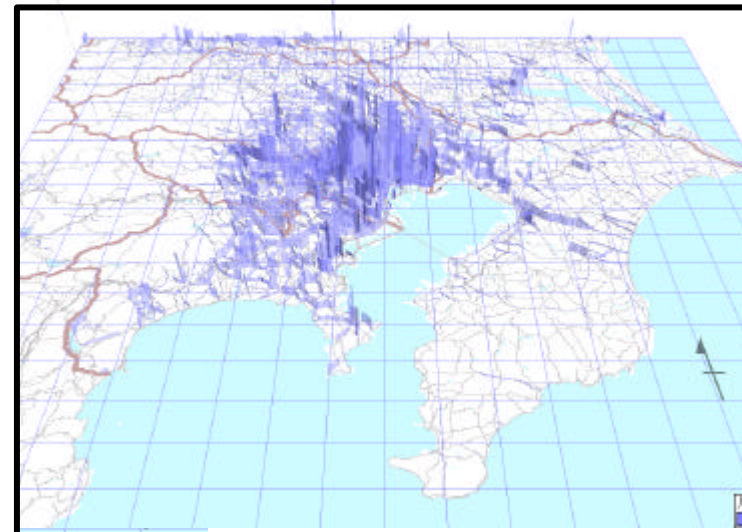
● National Highways



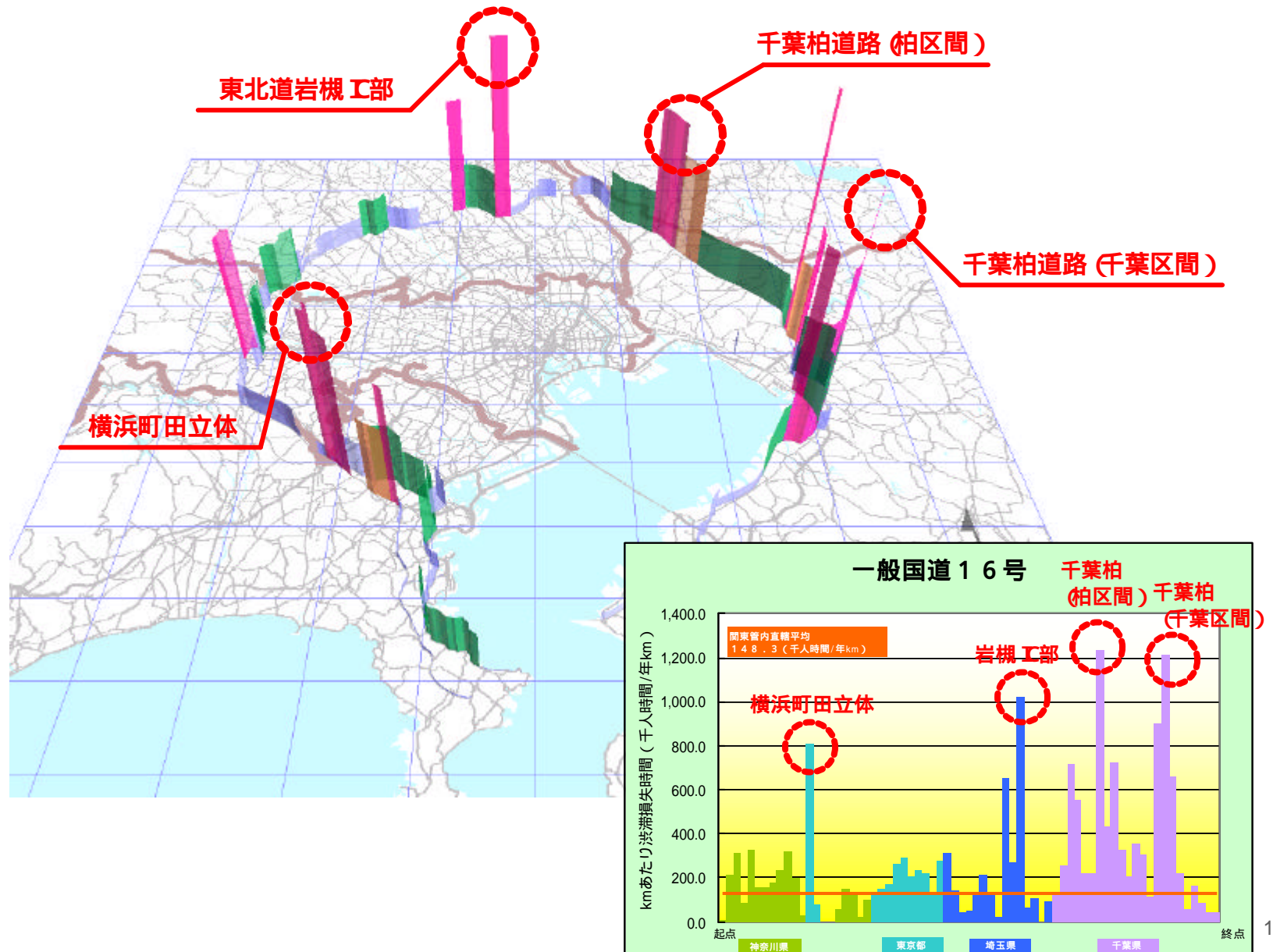
● Expressways



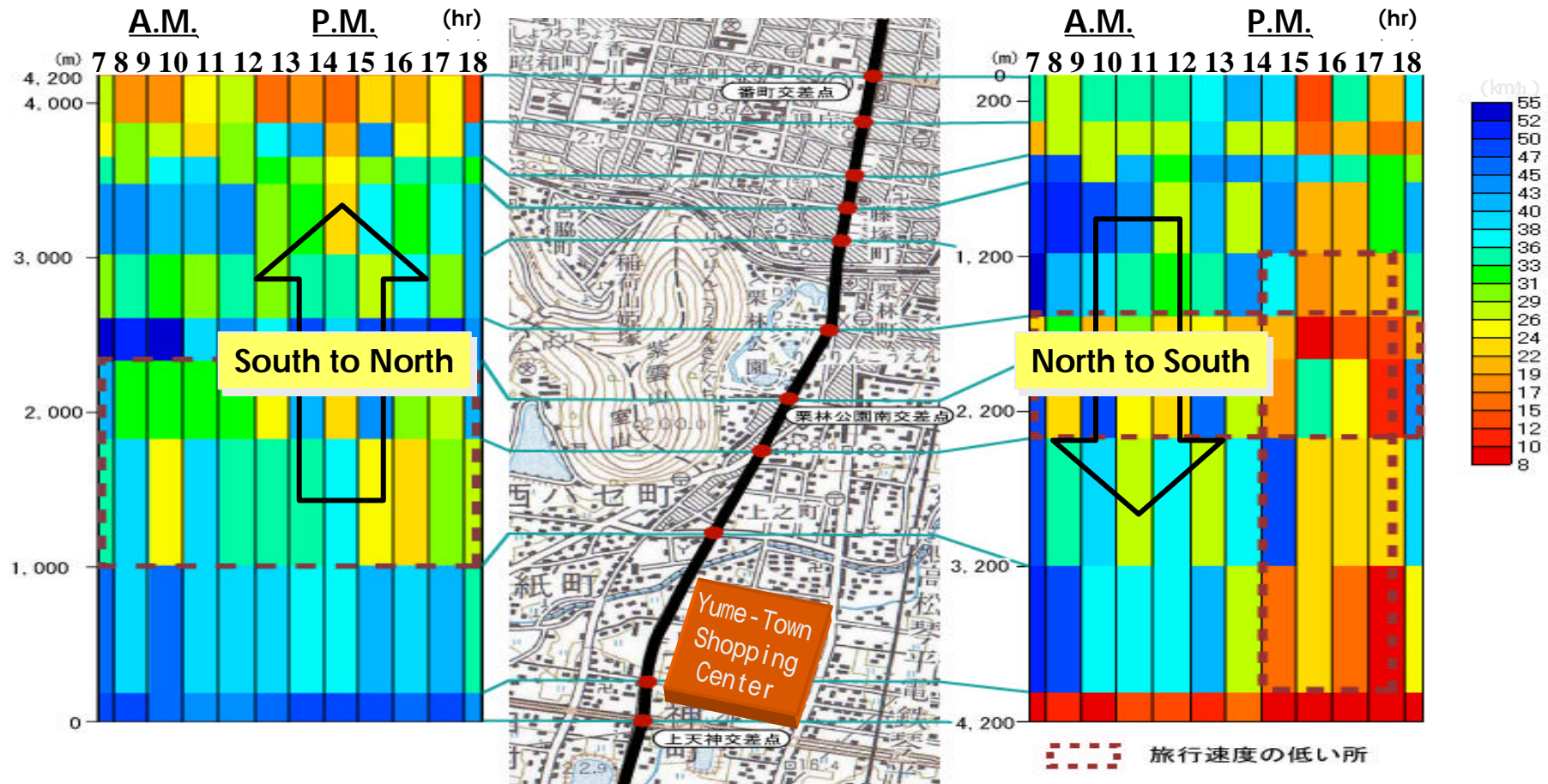
● Metropolitan and Prefectural Roads



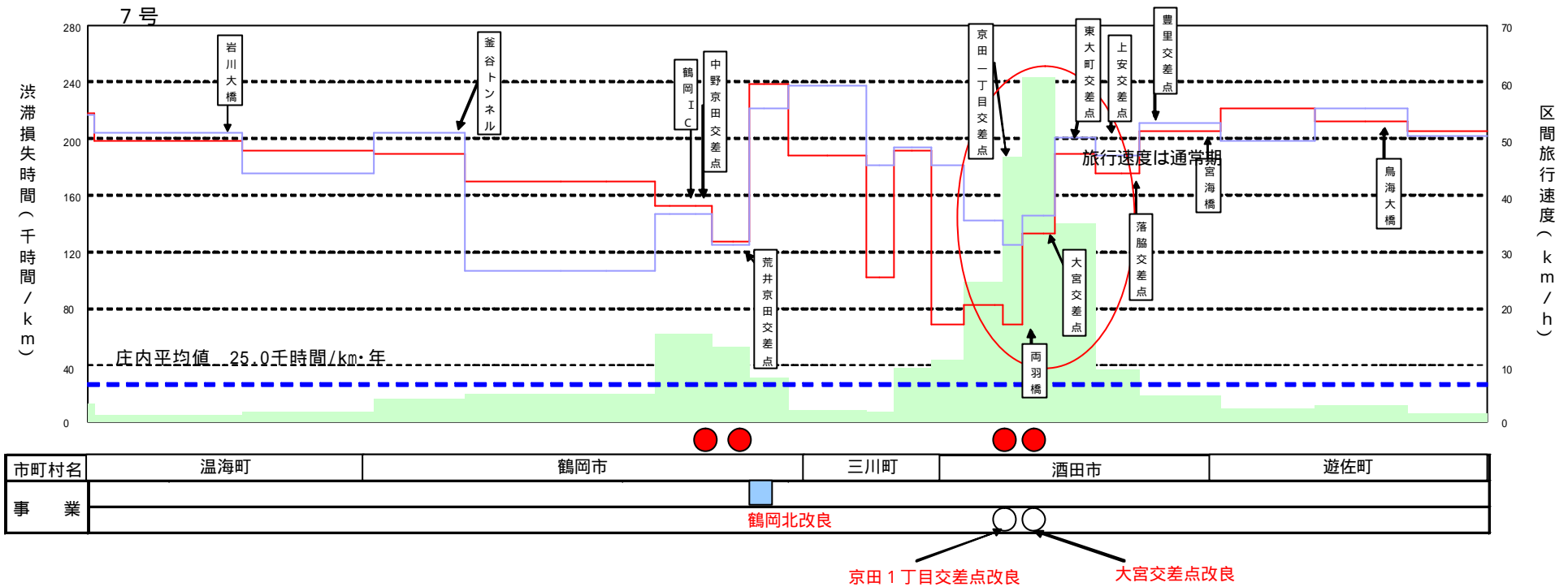
An example of finding trouble spots by means of congestion loss data (Kanto, National Route 16)



Detailed analysis of individual leg (Traffic speed on time-space diagram)



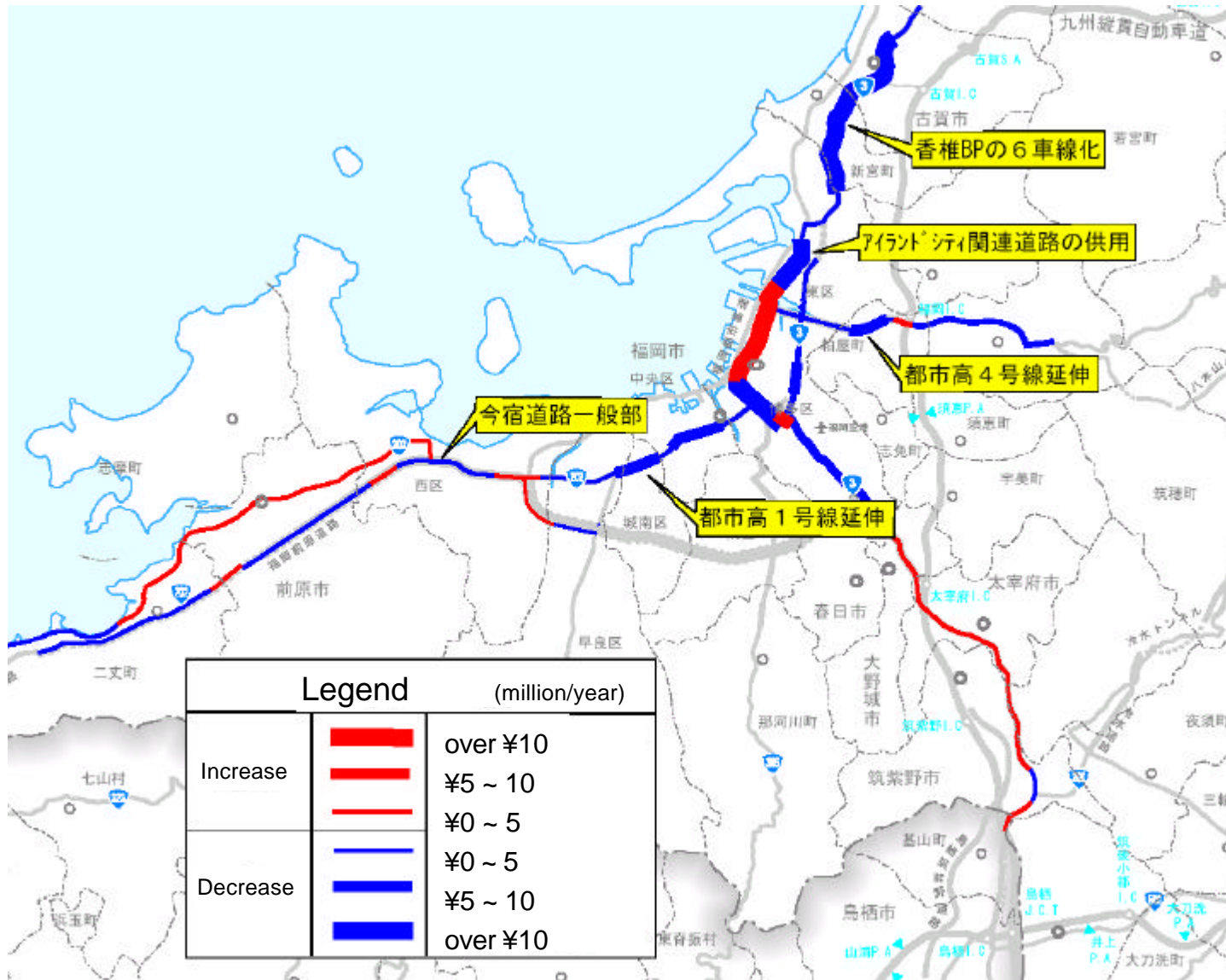
Using road records to confirm status of trouble spots and countermeasures (e.g. Tohoku, National Route 7)



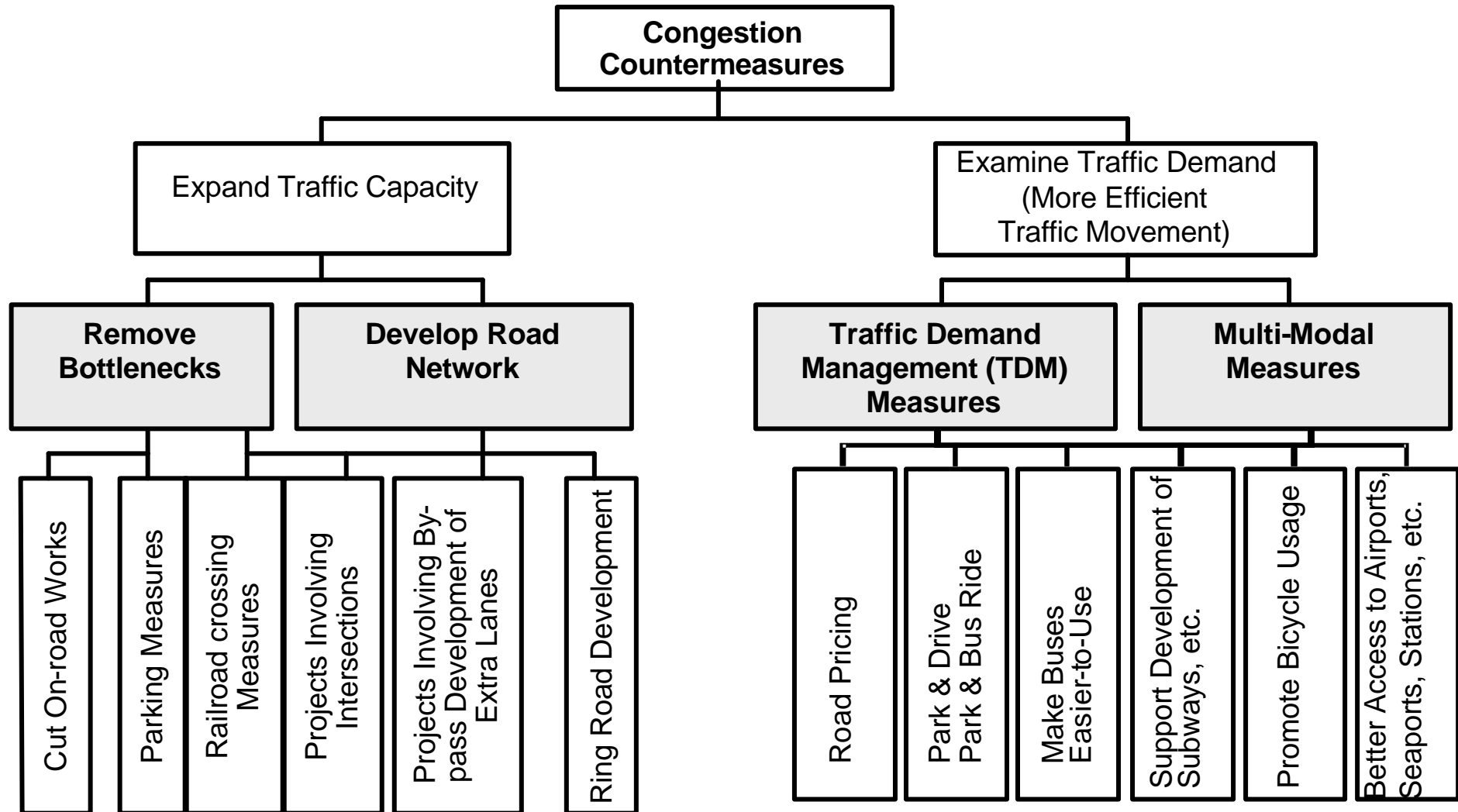
Legend

- Time lost due to congestion
- 7:00 to 8:00 travel speed (in)
- 7:00 to 8:00 travel speed (out)
- Congestion point

Change in time lost due to congestion (2002/2003) [e.g. Fukuoka City]



System of Main Congestion Countermeasures



Analysis of the effect of an individual project in which data were used (e.g. Tohoku)

Change in congestion time loss

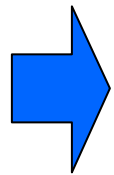
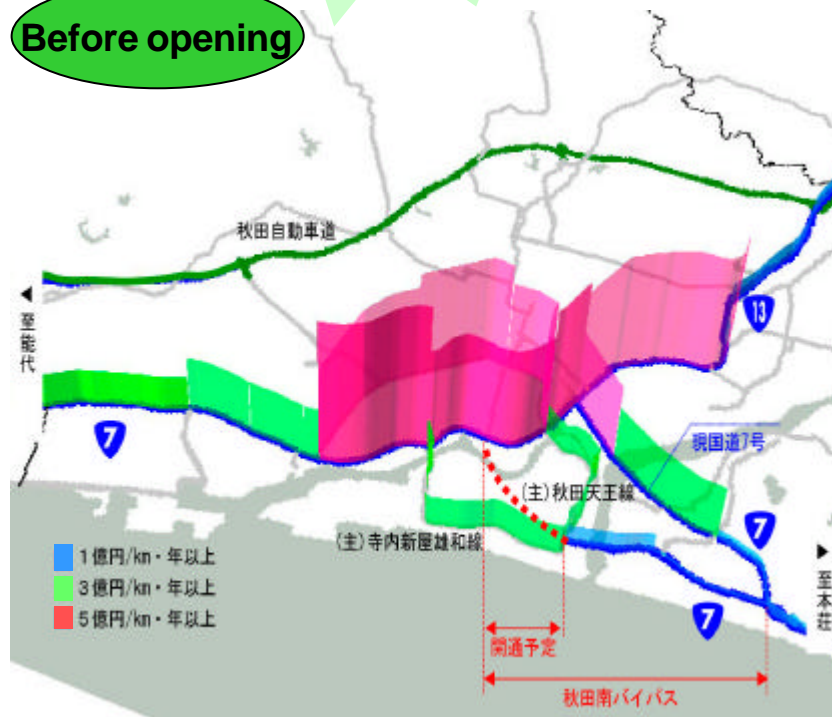
3 million people-hours/year

15 million people-hours/year

12 million people-hours/year

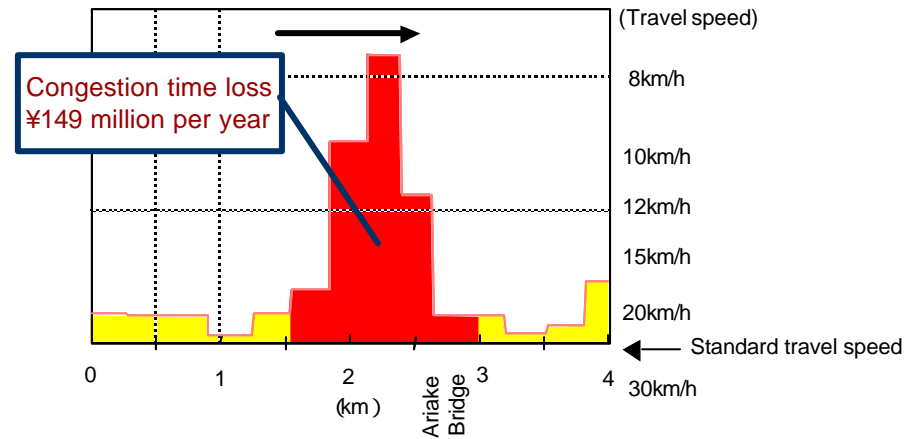
Before opening

After opening

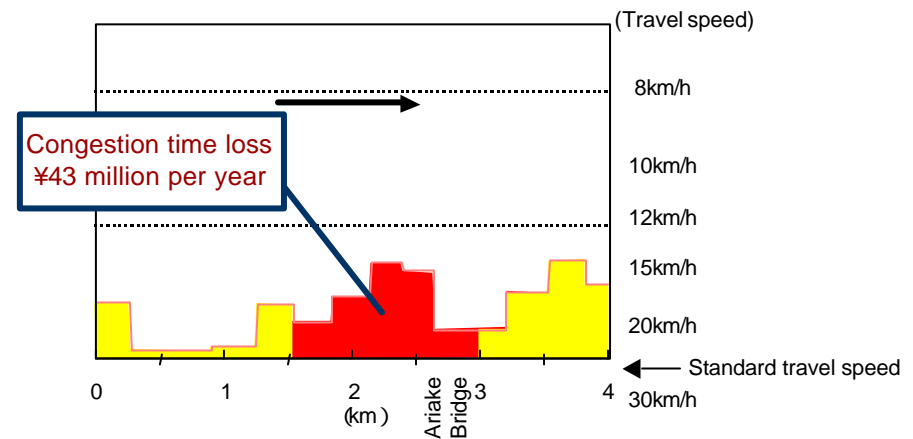


Diffusion of Management in the Execution Process - Analysis of the Effects of a Project Using Congestion Data -

●Before the project



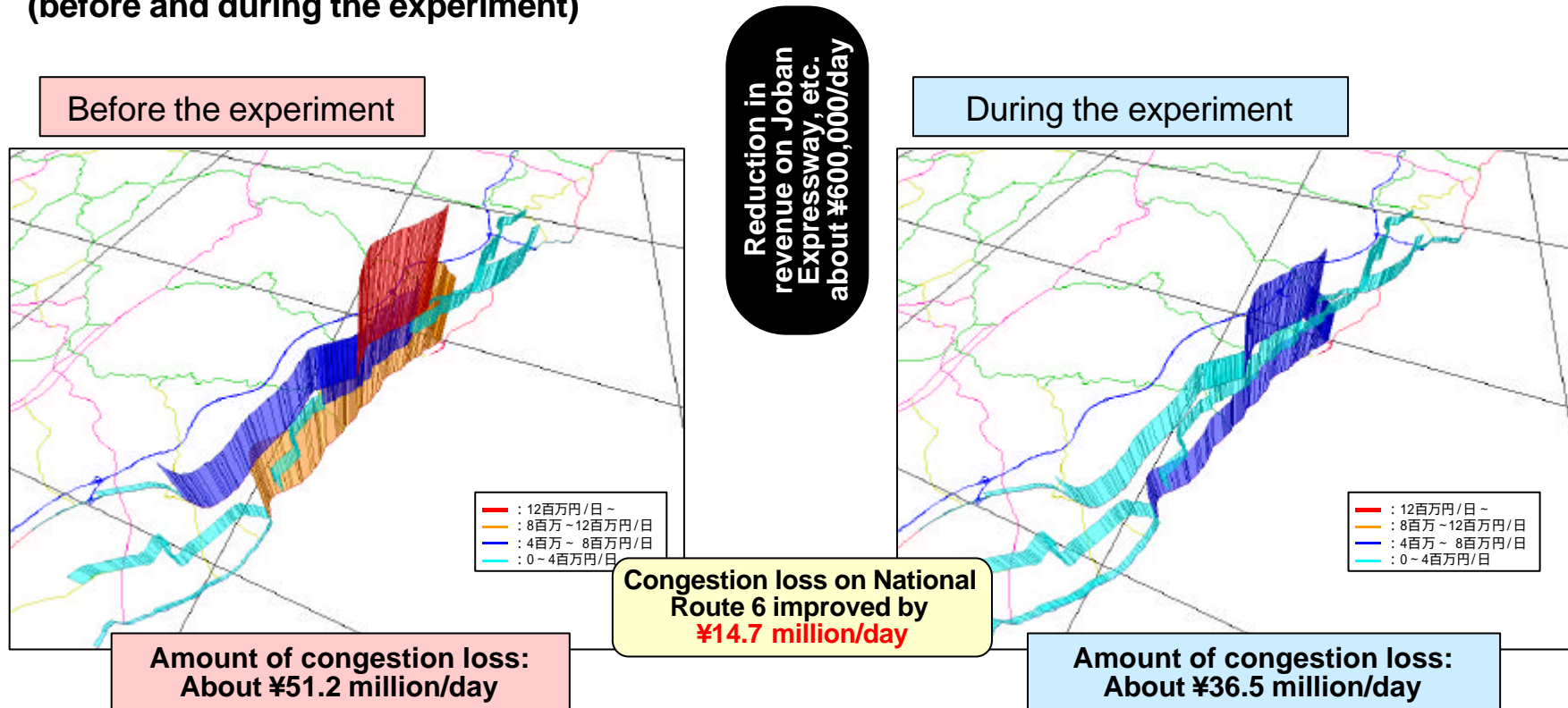
●After the project



* Source: post-evaluation of the improvement work of an intersection on Ariake Bridge, Niigata City (opened to traffic in 2001)

Understanding the effect of a toll road discount experiment

Change in amounts of congestion loss (before and during the experiment)



- 常磐道等の減収額は約60万円/日
(減収額 = (実験前の車種区分毎イカ-へ7台数 × 通常料金) - (実験中の車種区分毎イカ-へ7台数 × 実験料金))
- 国道6号等の渋滞損失額は1,470万円/日 改善
常磐道等の減収を大幅に上回る一般道路の渋滞緩和効果

Before the experiment: Wednesday, October 29, 2003
 After the experiment: average of Wednesday, November 19 and December 3, 2003