



TS051

Effectiveness of Road-Vehicle Cooperative and Infra-Only Safety System

11th of October, 2006

Ministry of Land, Infrastructure and Transport

Takahiro Asano

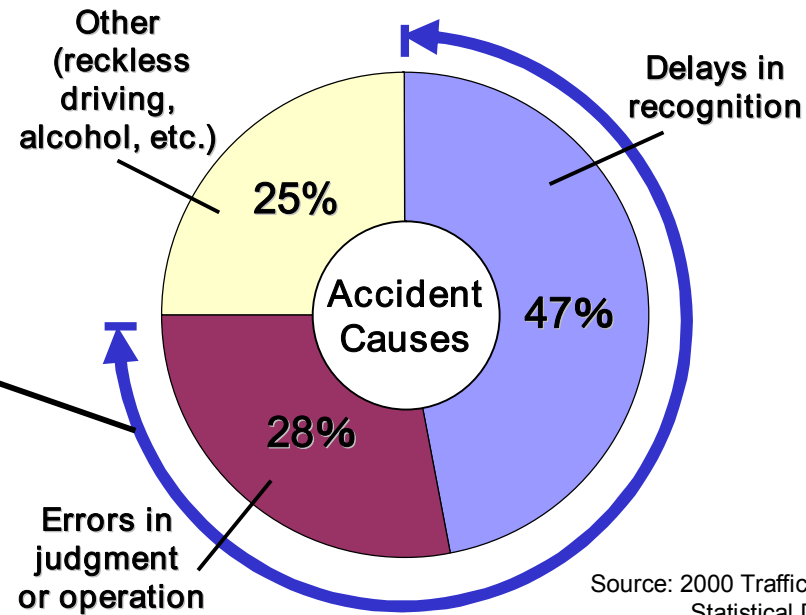
1. Commencement of Road-Vehicle Cooperative Safety System
2. Sangubashi Field Test
3. Measures Taken by the Chugoku Regional Development Bureau, MLIT
4. Conclusion

1. Commencement of Road-Vehicle Cooperative Safety System



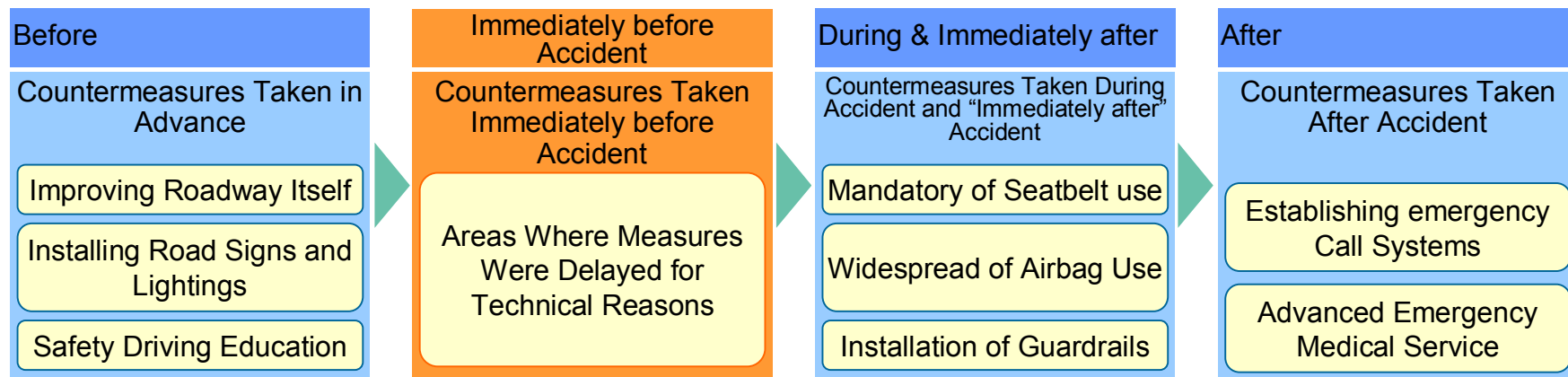
1) Concept of AHS

Driver behavior immediately prior to accident (human error) is the cause of 75% of all accidents



Source: 2000 Traffic Accident Statistical Data

Classified Traffic Accident Countermeasures with temporal transition



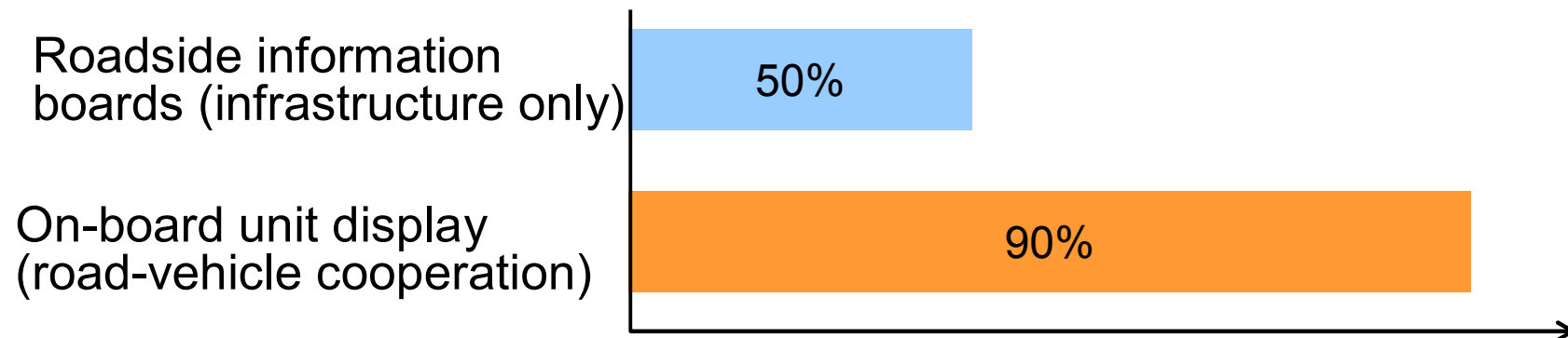
Time-Based Progression and Traffic Accident Countermeasures

1. Commencement of Road-Vehicle Cooperative Safety System



1) Concept of AHS

The providing of information through road-vehicle cooperation and countermeasures immediately prior to an accident are about 90% effective against delays in recognition.



Effects resulting from countermeasures immediately prior to an accident (reaction rate by providing information)

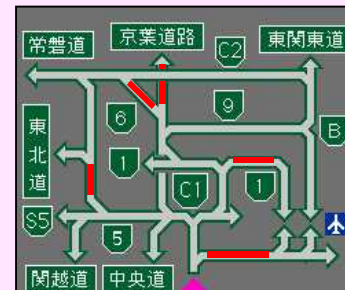
1. Commencement of Road-Vehicle Cooperative Safety System



Three next-generation road services and safe-driving support measures

(1) Information provision services along roadways

Safety information

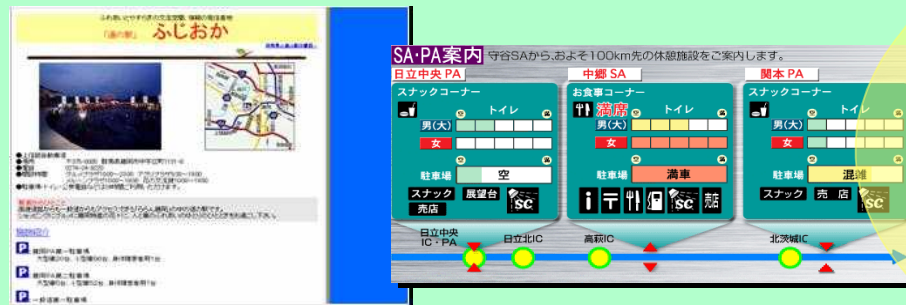


Traffic information

Provision of easily understood road traffic information

(2) Information connection services at roadside rest area

(3) Public parking lot payment services



Road station, SA, PA etc. road to information provision



Payment of fees at public parking areas



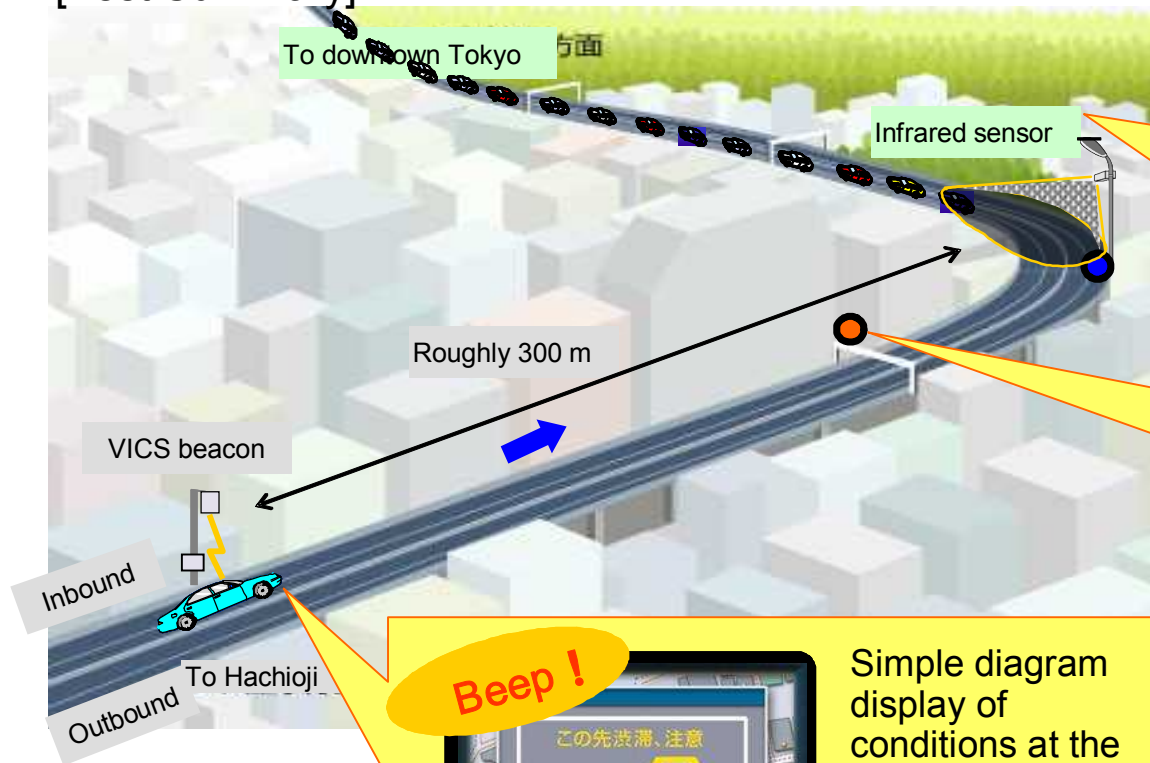
Entry/exit control at public parking areas

2. Sangubashi Field Test



1) Confirmation of Concept Validity Through Field Tests

[Test Summary]



Sensors detect traffic congestion, standing vehicles and slow-traveling vehicles



Installed on April 27

Beep!

Simple diagram display of conditions at the start of a curve

Roughly 10% of vehicles are equipped with three-media VICs-compatible car navigation systems

Test Period:
March 1 to May 31, 2005

2. Sangubashi Field Test



2) Verification of Effects by Monitoring Traffic Flow

Comparison of dangerous behavior with and without the service

	Traffic congestion, standing or slow-traveling vehicles			
	Effective sample size (30km/h or faster)	Frequency of rapid change in behavior		Frequency of high-speed curve entry (60km/h or faster)
		0.4G or more	0.5G or more	
Without Service (Feb. and Sep. 2005)	2,217 (7 days)	29.6%	17.5%	4.3%
With Service (Sep. to Nov. 2005)	10,769 (28 days)	26.7%	16.8%	3.3%
Reduction Percentage		2.9	0.7	1.0

Notes:

1) Before introduction of service: Based on images from October 15 to November 12, 2003 (28 days). After introduction of service: Based on images from March 1 to May 31, 2005 (92 days).

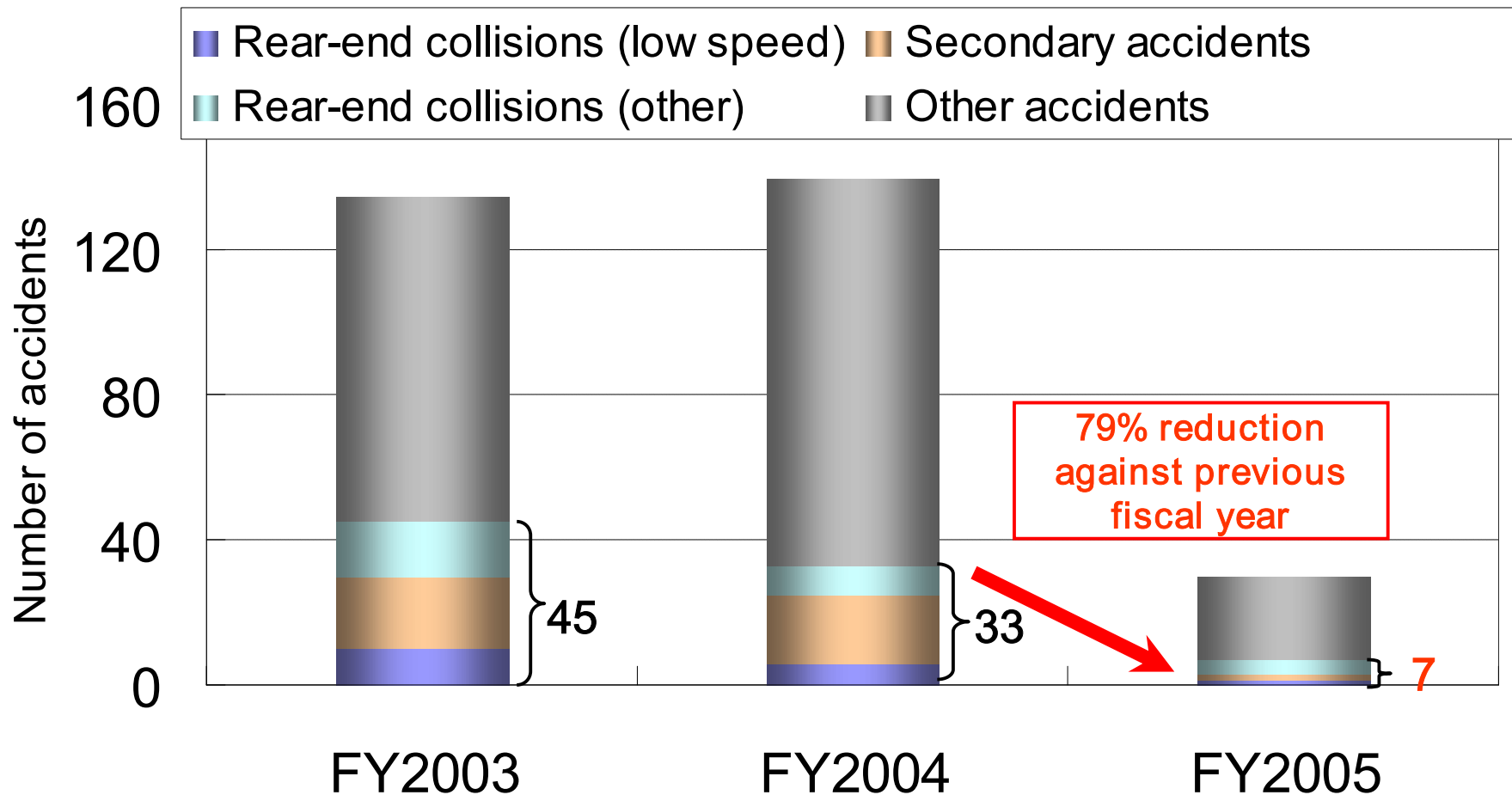
2) The number of days by road condition indicates the number of days with precipitation of 10mm or more, according to weather data from the Japan Meteorological Agency (Tokyo).

2. Sangubashi Field Test



3) Effectiveness in reducing accidents

Number of accidents per year, past 3 fiscal years



Note: Secondary accidents are accidents that occur within 60 minutes of the first accident (primary accident) in the same road section. This 60 minutes is the average time required to clear an accident scene in the Tokyo Metropolitan Expressway.

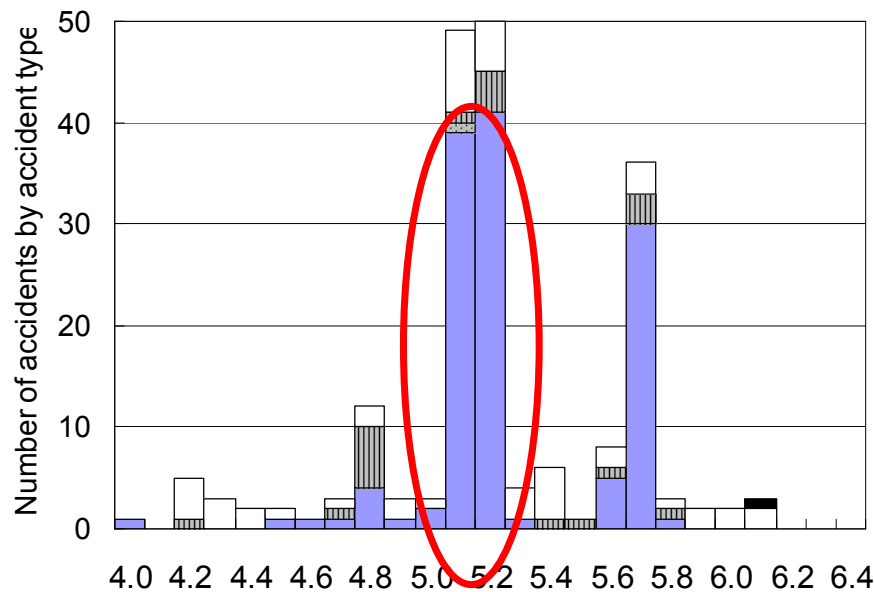
2. Sangubashi Field Test



4) Occurrence of accident (compared with other curves)

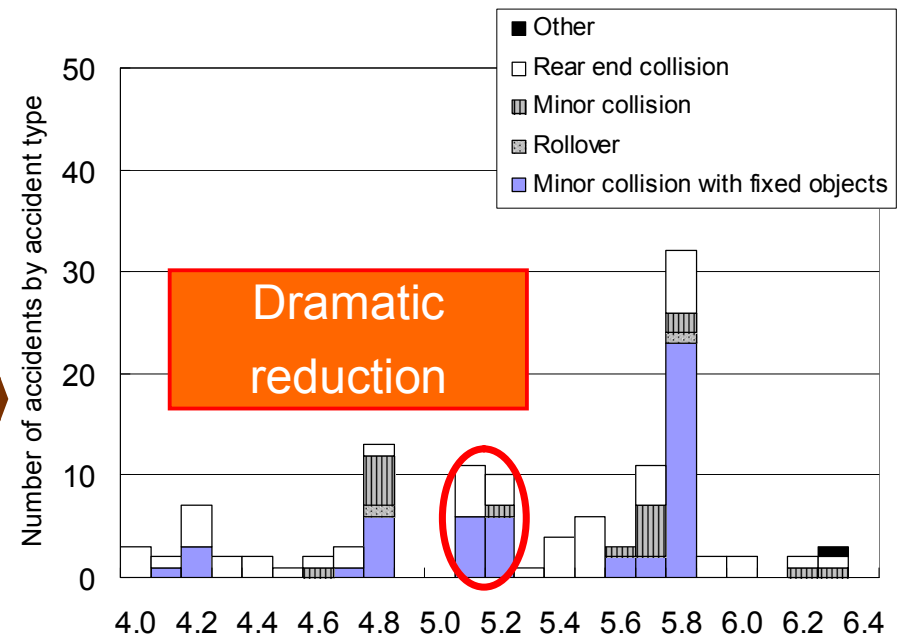
Accidents at similar curve sections on the Metropolitan Expressway, Route No.4

Before introduction of service
(Apr.-Sep.2004)



Yoyogi Curve Sangubashi Curve Shinjuku Curve

After introduction of service
(Apr.-Sep.2004)



Yoyogi Curve Sangubashi Curve Shinjuku Curve

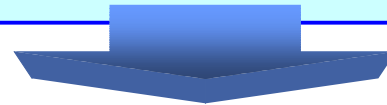
3. Measures taken by the Chugoku Regional Development Bureau



Two services were implemented within the jurisdiction of the Chugoku Regional Development Bureau of the Ministry of Land, Infrastructure and Transport (MLIT)

(1) Oncoming vehicle information provision service

- Infrastructure detects the presence of oncoming vehicles in poor visibility zone.
- The information is displayed on roadside information boards to driver entering the zone.



Reduces head-on collisions, passing collisions or damage

(2) Standing vehicles, slow-moving vehicles and merging vehicles information provision service

- Infrastructure detects the presence of standing vehicles or slow-moving vehicles in poor visibility zone.
- The information is displayed on roadside information boards.



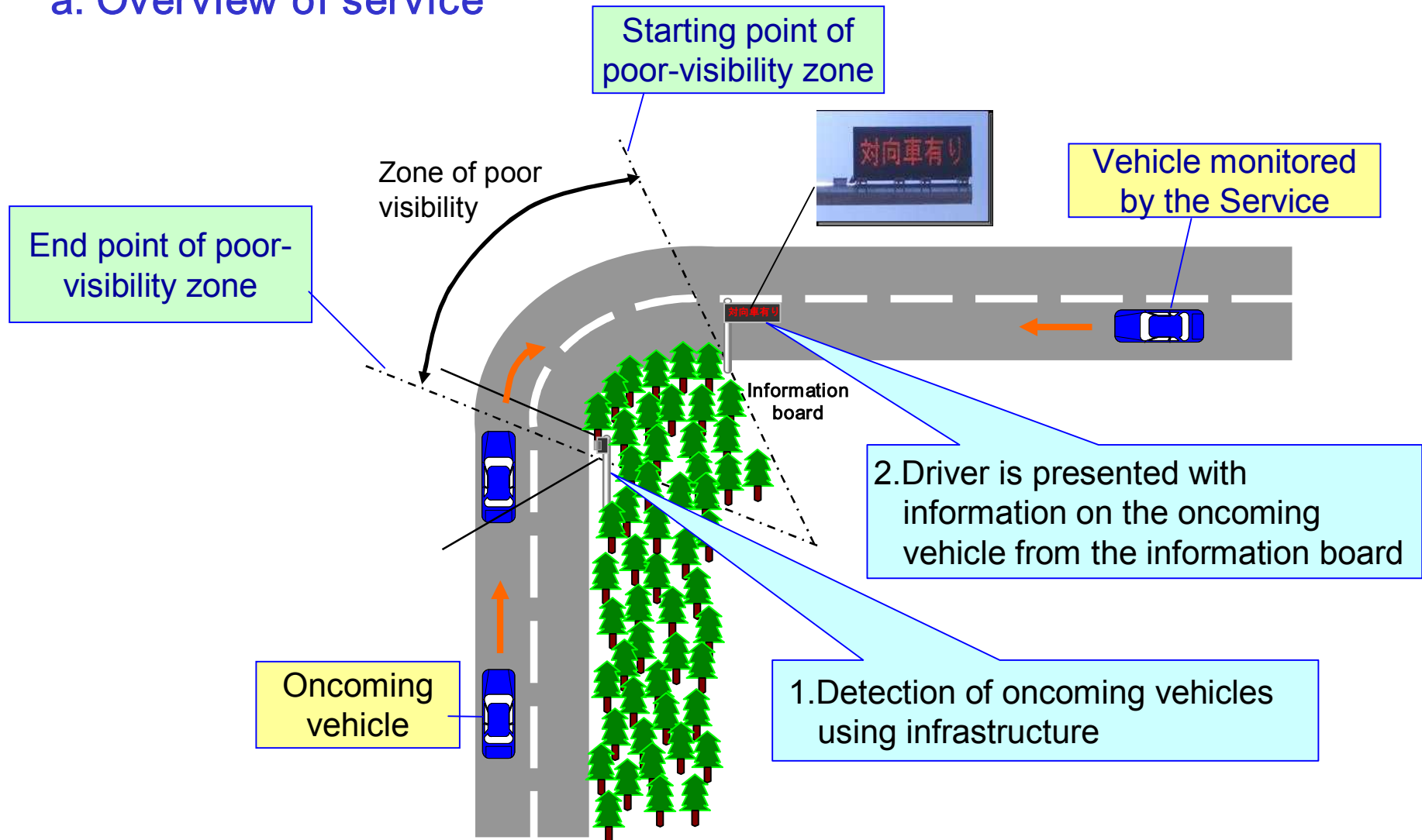
Reduces collisions with standing vehicles/slow-moving vehicles or damage

3. Measures taken by the Chugoku Regional Development Bureau



1) Oncoming vehicles information provision service

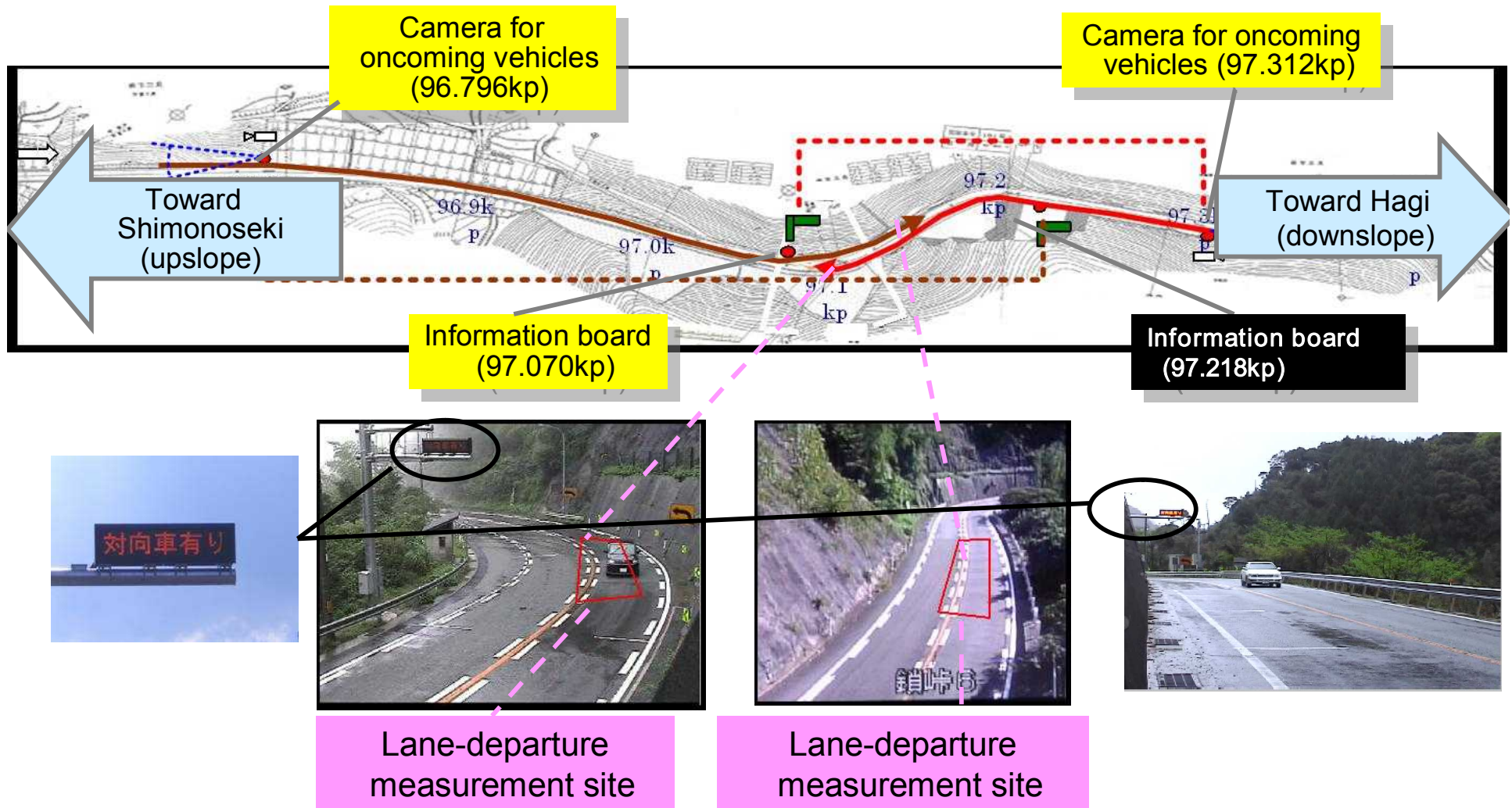
a. Overview of service



3. Measures taken by the Chugoku Regional Development Bureau



1) Oncoming vehicles information provision service b. Configuration

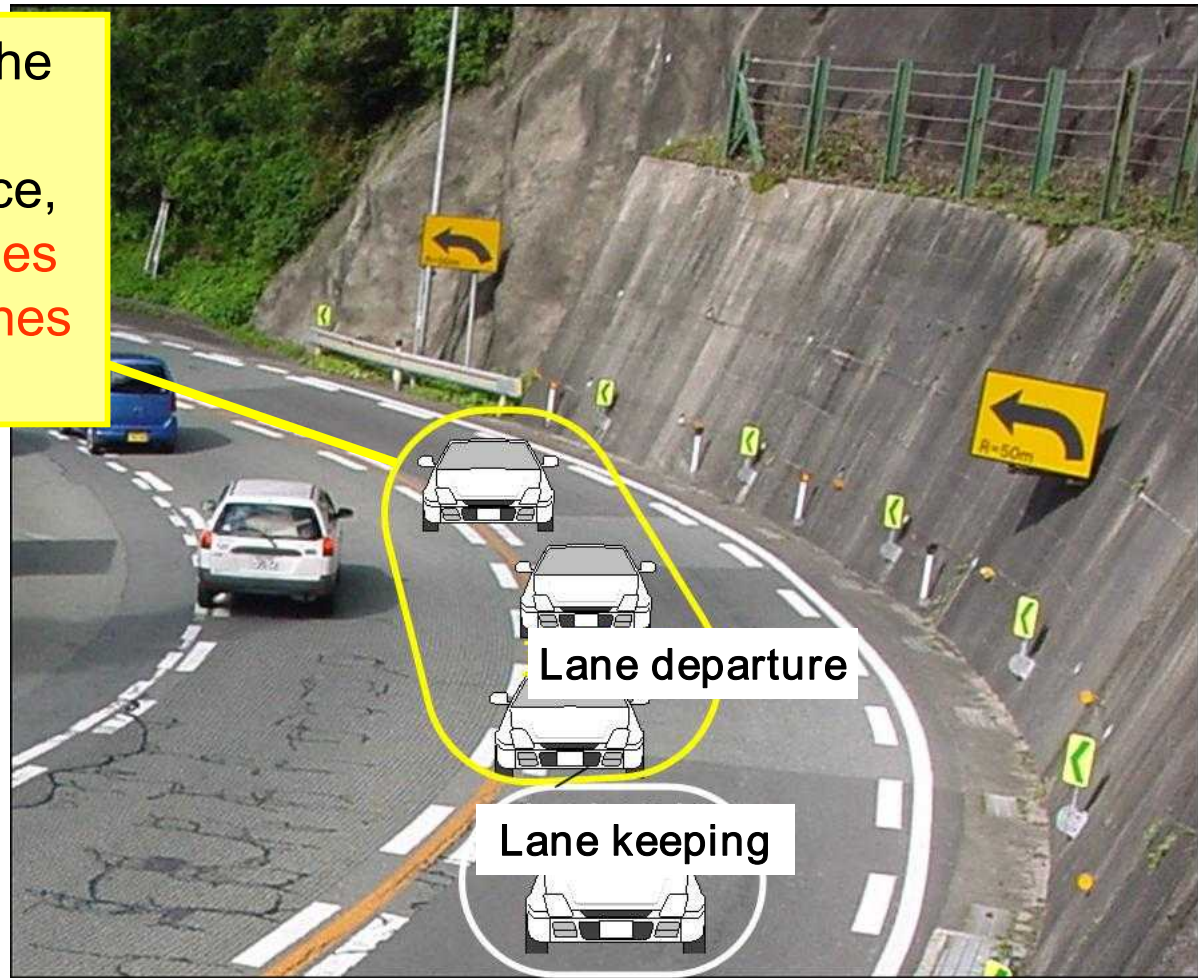


3. Measures taken by the Chugoku Regional Development Bureau



1) Oncoming vehicles information provision service c. Service evaluation indices

To provide an index of the effectiveness of introduction of the service, the **percentage of vehicles that depart from their lanes** was measured



Discriminating between lane-departing vehicles and lane-keeping vehicles

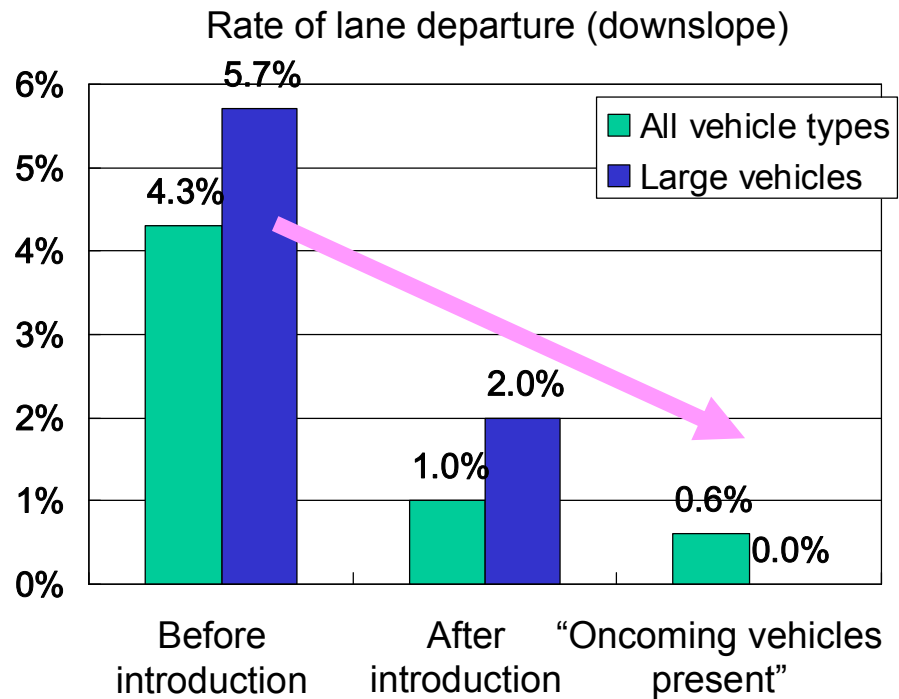
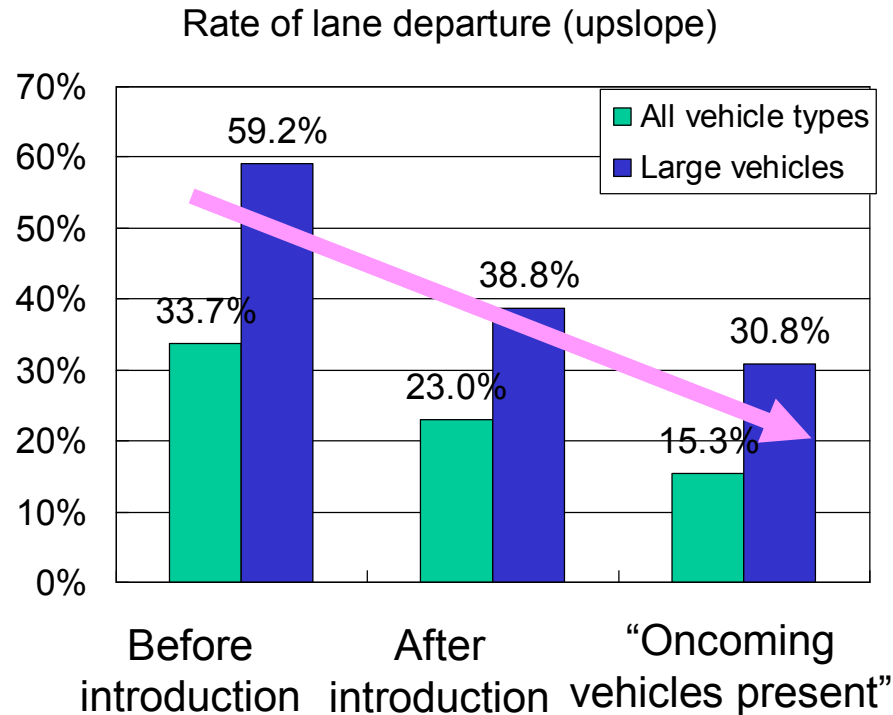
3. Measures taken by the Chugoku Regional Development Bureau



1) Service evaluation indices

d. Proving of results of service introduction

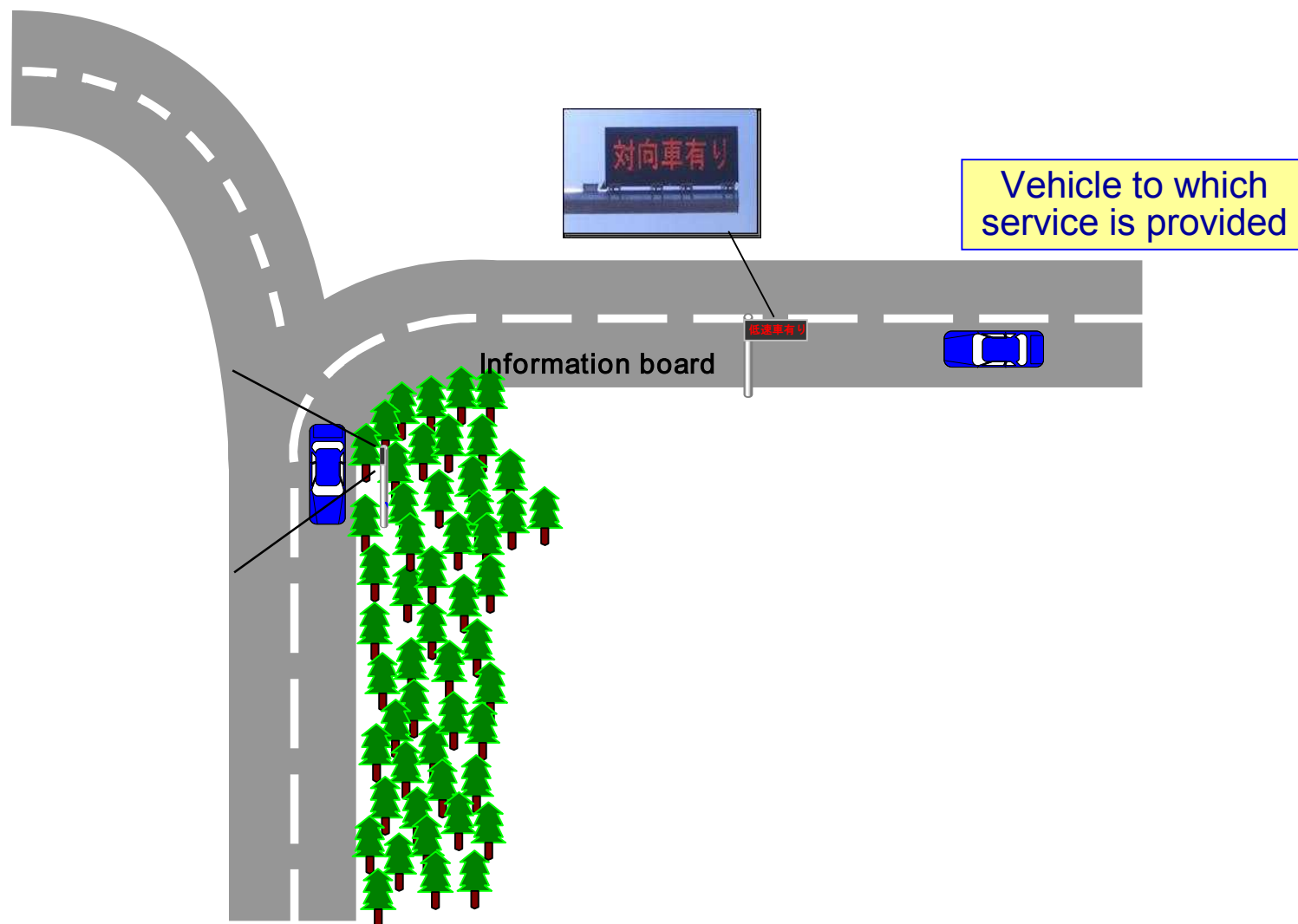
- Before introduction, the number of accidents averaged 6.5 per year
- Since introduction in April 2005, no accidents have occurred.



3. Measures taken by the Chugoku Regional Development Bureau



2) Standing vehicles, slow-moving vehicles and merging vehicles information provision service

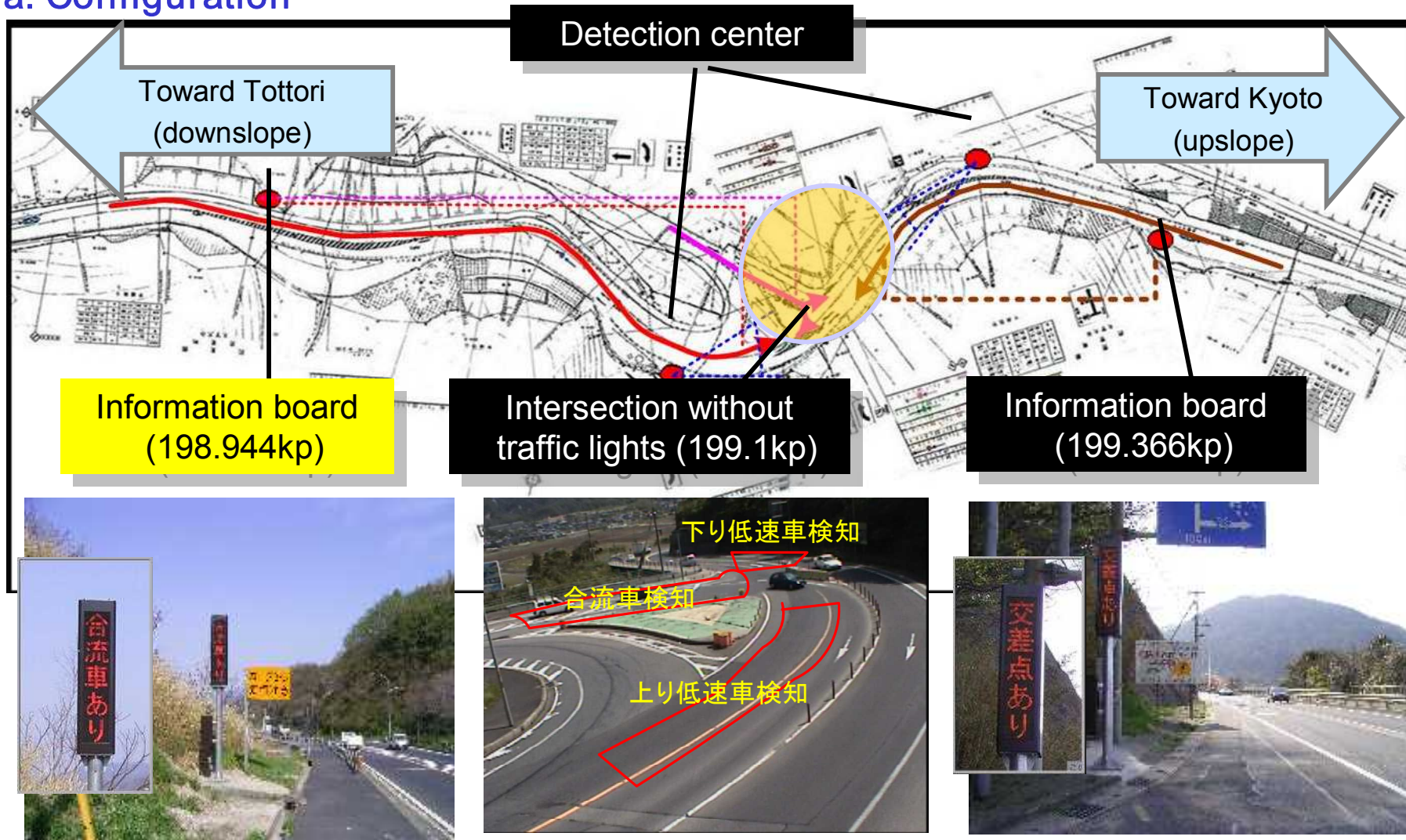


3. Measures taken by the Chugoku Regional Development Bureau



2) Standing vehicles, slow-moving vehicles and merging vehicles information provision service

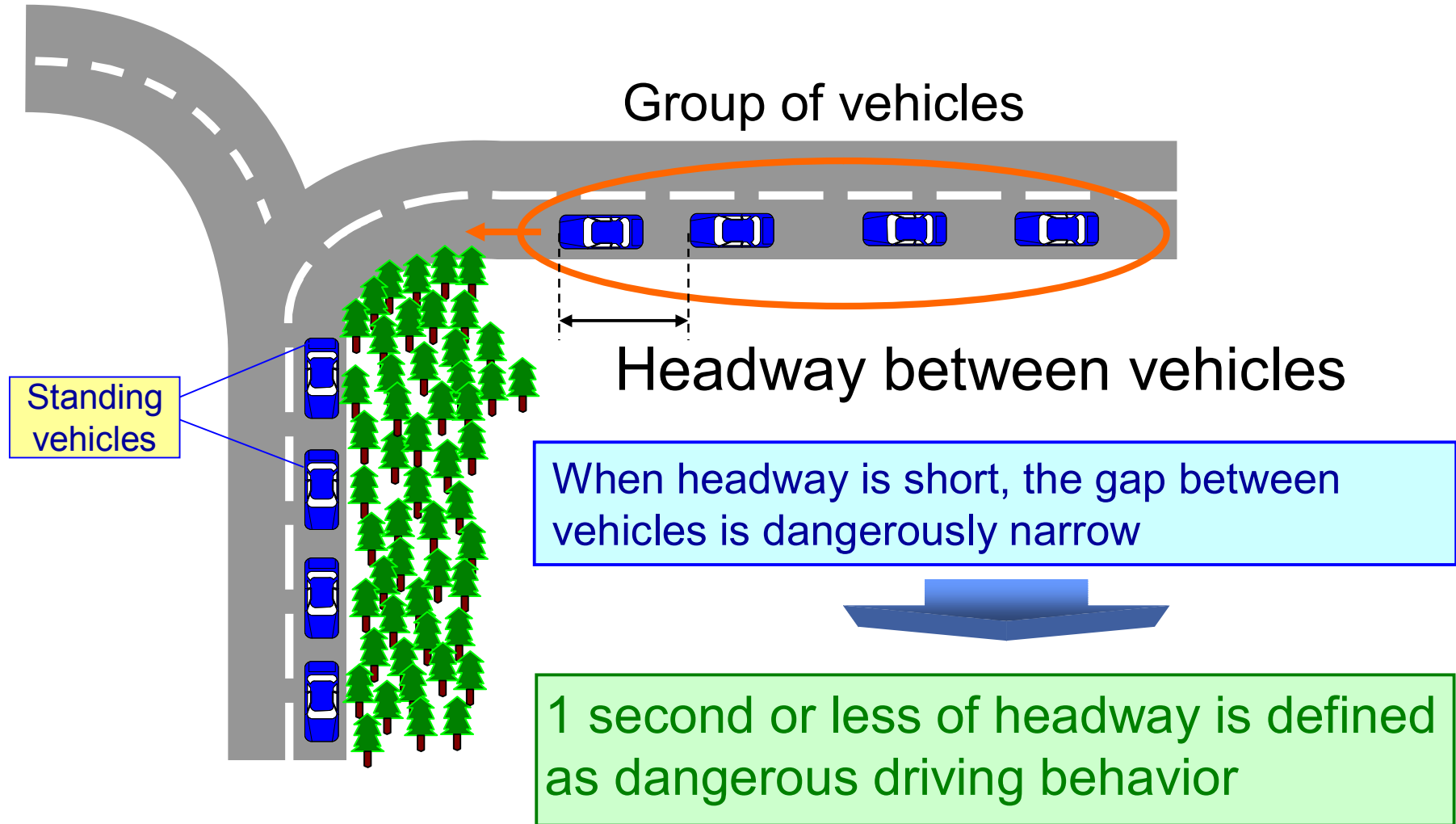
a. Configuration



3. Land Preparation Measures in Chugoku



- 2) Standing vehicles, slow-moving vehicles and merging vehicles information provision service
 - b. Service evaluation indices



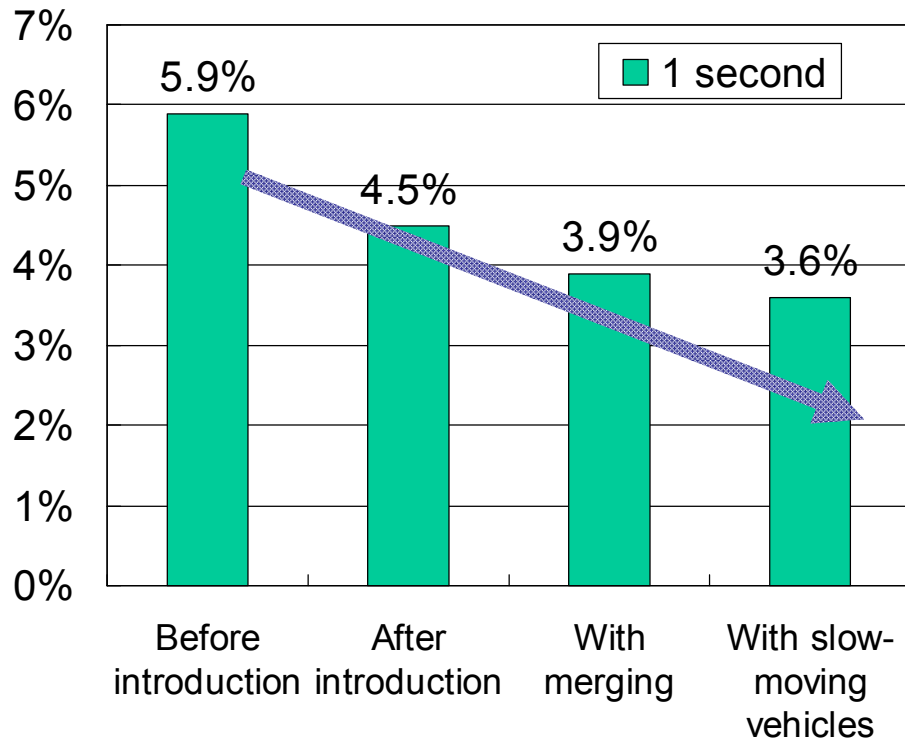
3. Land Preparation Measures in Chugoku



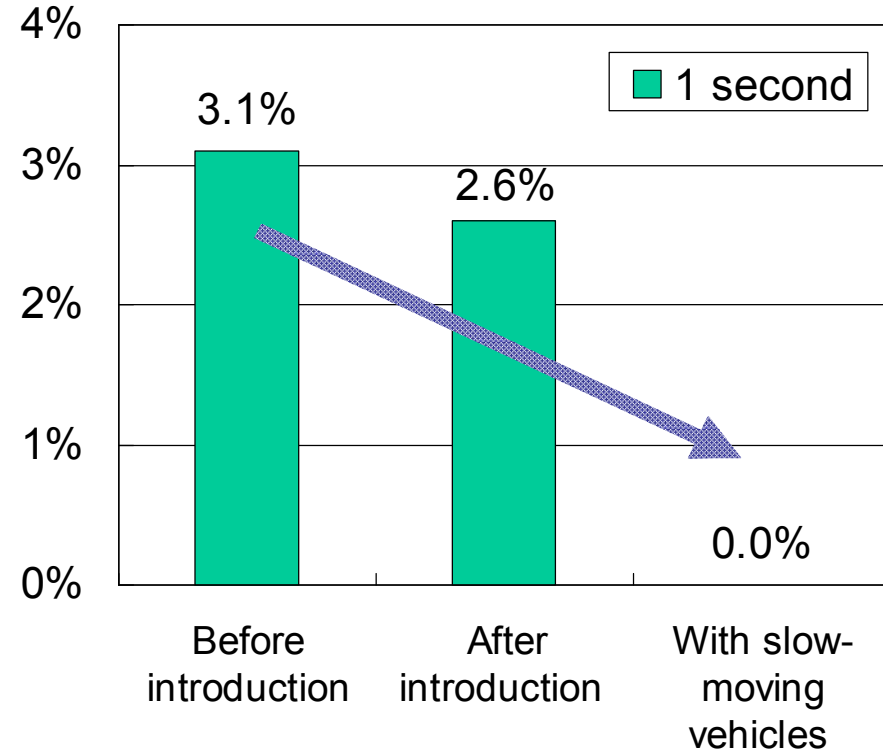
2) Standing vehicles, slow-moving vehicles and merging vehicles information provision service

c. Results of introduction of service

Headway between vehicles of 1 second or less (downslope)



Headway between vehicles of 1 second or less (upslope)



Note: "Merging vehicles present" is only displayed for the inbound lane

4. Conclusions



1. Road-vehicle cooperative safety system

- In the Sangubashi tests, it was confirmed that vehicle behavior became significantly safer.
- After introduction of the service, the accident rate declined dramatically.

2. Infrastructure-only safety system

- Providing information on oncoming, standing, slow-moving or merging vehicles, confirmed that vehicle behavior became significantly safer.
- After introduction of the service, the accident rate declined.