

Update of High-Precision Three-Dimensional Map with Probe Vehicle Data

Overview

Objectives

- We have developed the first version of High-precision three-dimensional map(HD map) data and it is going to be in the market soon.
- It is mandatory for automated driving systems to keep HD map data usable by updating anyhow.
- Usually HD map consists of many unique contents made by original processes unlikely what common digital maps(such as for smartphone/car navigation) made from so that it is not only inappropriate but also costly for us to update HDmap by using common map production tools and processes.
- Our study and research are to find the processes and technologies how to detect changes of road conditions for HDmap such as lanes, paints and signs by using car probe data generated from vehicles.
- Using the results of our researches HDmap update more efficiently and more cost effectively.

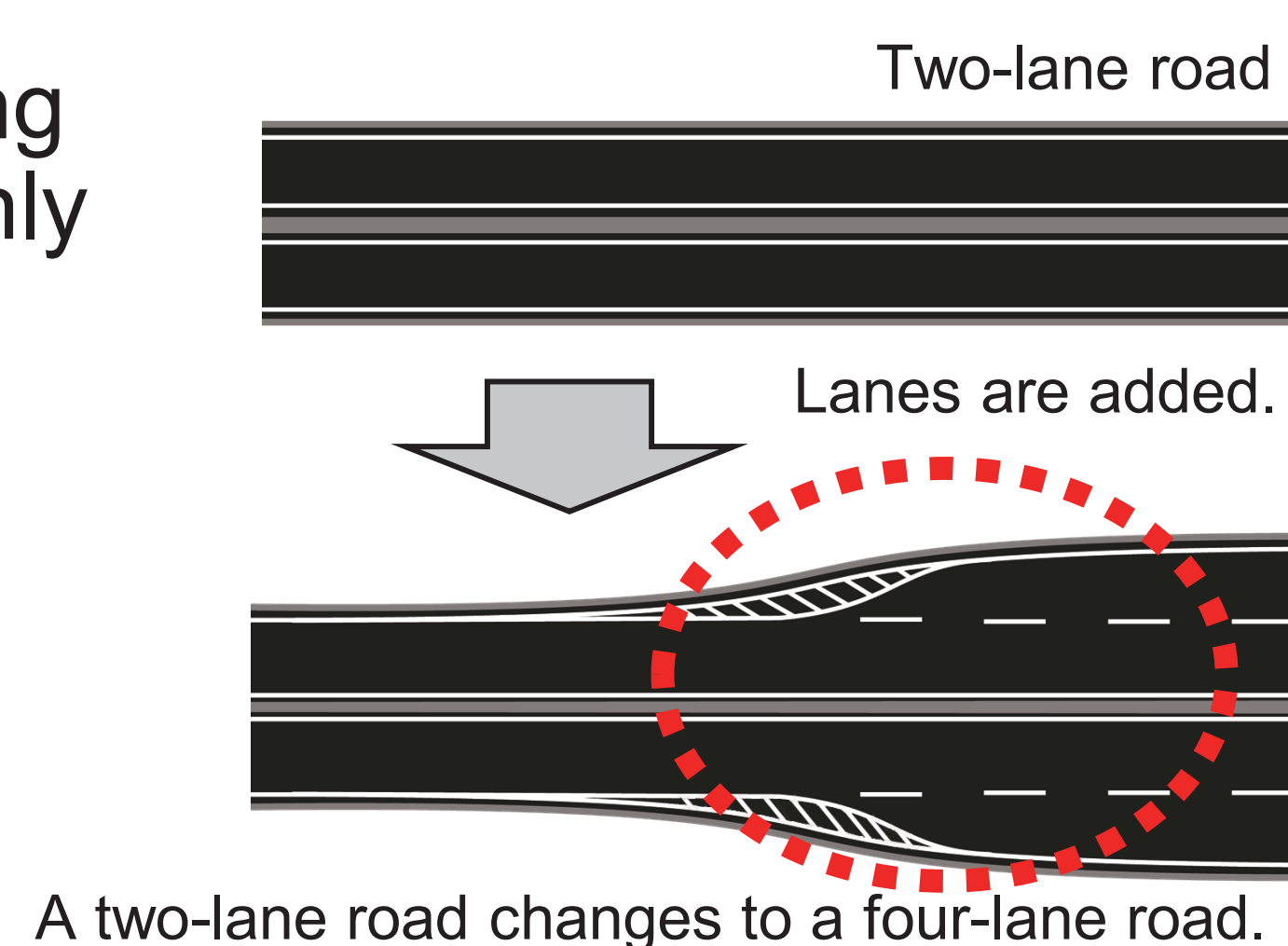
Schedule and abstracts of studies

Items	2019				2020				2021
	1 - 3	4 - 6	7 - 9	10-12	1 - 3	4 - 6	7 - 9	10-12	1 - 3
a. study of road change extraction technology with car probe data	[Blue arrow]								
b. study of road change extraction technology by using drive recorder solutions	[Blue arrow]								
c. study of processing of update HD map data with car probe data and the images out of drive recorders					[Blue arrow]				
d. field test								[Blue arrow]	

At present

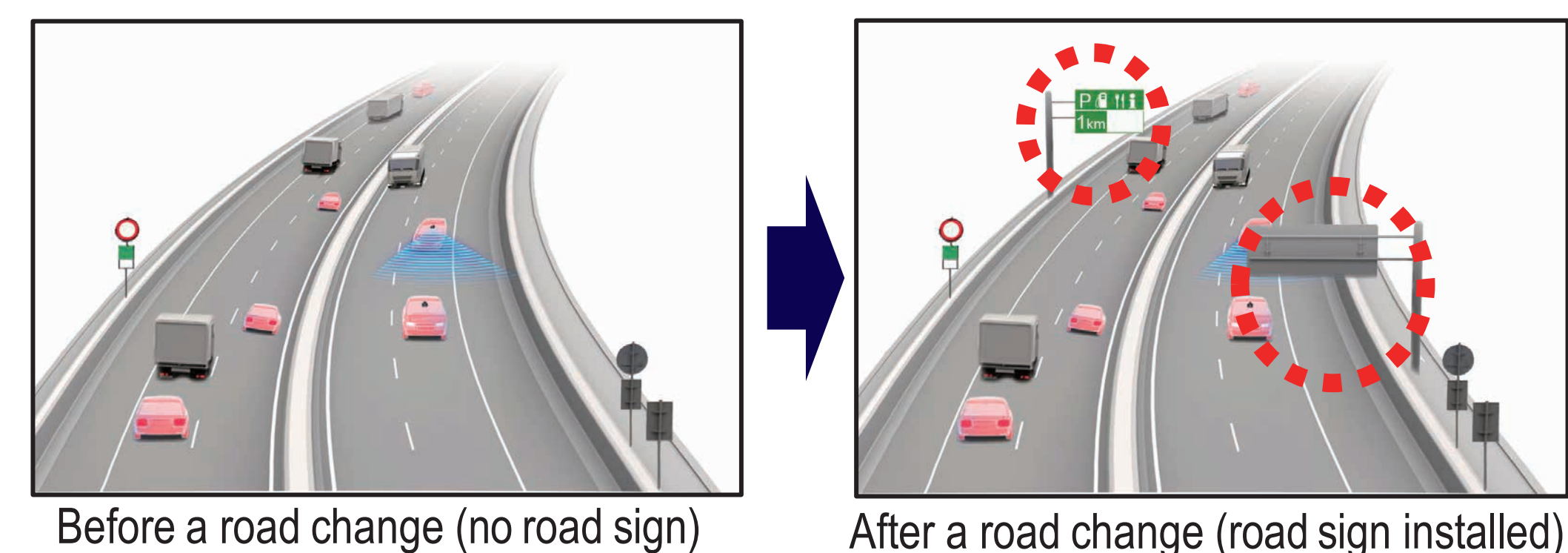
a. study of road change extraction technology with car probe data

- A technology for extracting road change points (mainly increase/decrease in the number of lanes) from probe vehicle data.



b. study of road change extraction technology by using drive recorder solutions

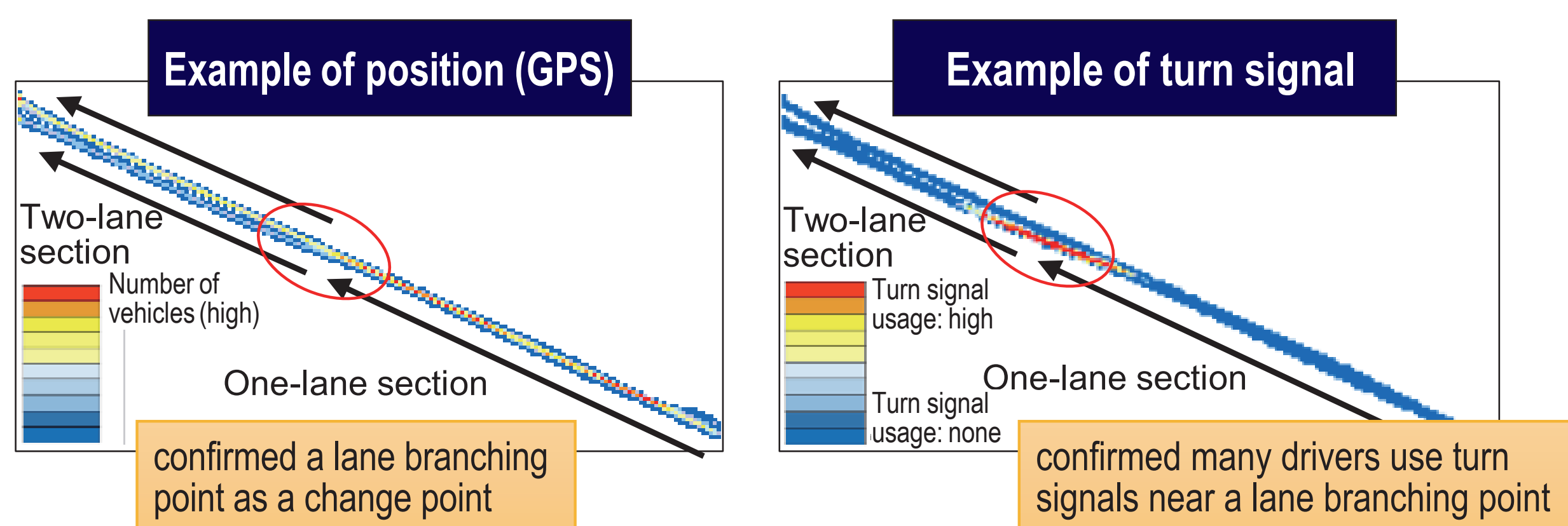
- A technology for extracting road change points (mainly road signs and road markings) from camera image data.



Current Status and Future Plan

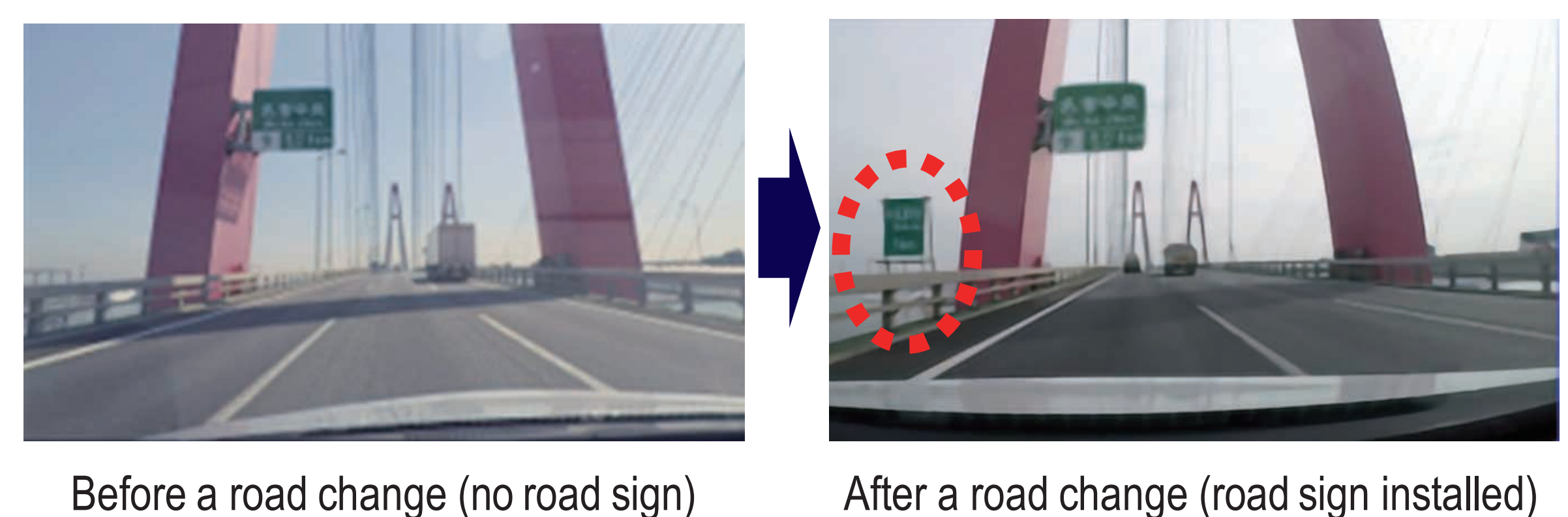
Current status of a.

- The requirements for probe vehicle data have been studied, and their validity has been verified on the test course.
- Based on the verification results, it has been confirmed that road change points can be extracted using the data that can be obtained from the vehicle (e.g., time, position, vehicle speed, acceleration, turn signal, steering).



Current status of b.

- Visual landmarks such as road signs and road markings can be extracted from images generated by drive recorders.
- the positions of visual landmarks can be identified by the position of vehicles.
- the visual difference can be detected by comparing the images between the past data and the latest data.



Future plan

- It will be verified whether road change points can be extracted by using vehicle probe information traveling in an actual traffic environment.
- Continue to verify the presence or absence of detectable features from camera images.
- Link the information obtained from a. and b. to a high-precision 3D map, and examine the technology for identifying the update location of the map.
- Conduct field tests on technologies a. to c.