

Reports on the results of the following elements of the Implementation and Management of Strategic Innovation Promotion Program (SIP) for Automated Driving Systems / Large-scale Field Operational Test / Dynamic Map / Dynamic Map Prototyping and Design, Establishment of Center Functions and Updating Methods, etc.

“Dynamic map prototyping and design and establishment of center functions and updating methods, etc.” and

“Large-scale field operation test implementation and management”

February 2019

Dynamic Map Large-Scale Field Operational Test Consortium

Mitsubishi Electric Corporation (representative)
AISAN TECHNOLOGY CO., LTD.
INCREMENT P CORPORATION
ZENRIN CO., LTD.
TOYOTA MAPMASTER INCORPORATED
PASCO CORPORATION

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Dynamic Map Field
Operational Test WG

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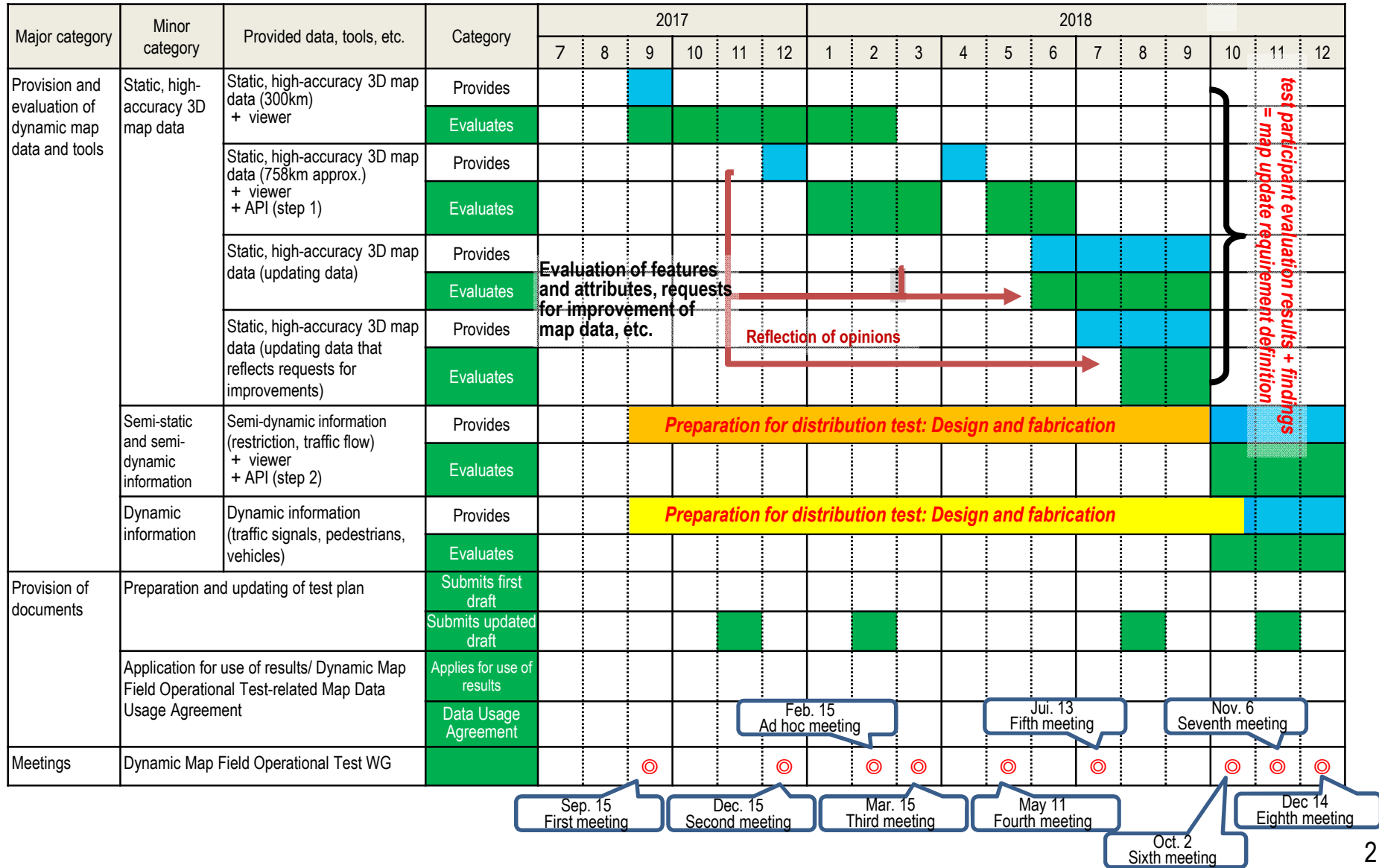
Reference 1: Main inquiries from test participants and number of inquiries

Reference 2: Feedback from dynamic map field operational test working group meetings

Reference 3: Future Suggestions -From Inquiries and Questionnaire Responses - (Notes for SIP Phase Two)

1. Overview of two year initiative

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2. Driving results (October 2017 to December 2018)

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[Ordinary roads, Metropolitan Expressway]

Road	Start point	End point	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	
ordinary roads	Bayshore area	Bayshore area	3	7	3	0	2							1		1		
	Odaiba area	Odaiba area							1				1			16	1	
	Odaiba	Tokyo Big Sight														3		
	Odaiba	Toyosu Market														3		
	Odaiba	Shinbashi											2					
	Shinbashi/Toyosu	Odaiba											1			5	1	
	Tokyo Big Sight	Odaiba														1	1	
	Tokyo Big Sight	Toyosu													1			
	Market	Tokyo Big Sight															2	
Ariake Coliseum	Tokyo Wangan Police Station															2		
Yatabe IC	JARI						2	1										
ordinary roads Total			3	7	3	0	4	1	1	0	0	0	4	1	1	33	3	
Metropolitan Expressway	All areas			1	2	1											3	
	C2 Route	C2 Route		4			2											
	C2 Route	Bayshore Route							2			4	3			1		
	Rinkai-Fukutoshin IC	C2 Route		3														
	Shibuya-sen	C1							2			4	5			1		
	Ohji JCT	Kasai JCT		4								1	1			3		
	Ohji JCT	Ohashi JCT						1					2					
	Kosuge JCT	Kasai JCT						1					2					
	Kosuge JCT	Misato JCT				3												
	Misato IC	Kosuge JCT				3	1	1										
	Misato IC	Tokyo IC										1	1	1				
	Daiba IC	Yoga IC		4														
	Daiba IC	Tokyo IC		1													1	
	Shibaura JCT	Hamazakibashi JCT				3												
	Shibaura JCT	Misato JCT					1											
	Hamazakibashi JCT	Tanimachi JCT				3												
	Hamazakibashi JCT	Ariake JCT					1											
	Iikura IC	Harumi IC											2					
	Tanimachi JCT	Hamazakibashi JCT				3	1										6	
	Tanimachi JCT	Kasai JCT		1														
	Tanimachi JCT	Ariake JCT										1	1				4	
	Tanimachi JCT	Yoga IC			1													
	Tanimachi JCT	Tokyo IC			1	3												
	Takagicho IC	Shibaura IC																4
	Tokyo IC	Yoga IC																3
	Tokyo IC	Tanimachi JCT			1		3	1					1	1				1
	Tokyo IC	Misato JCT						1	1									
	Tokyo IC	Ariake IC						1										
	Ohashi JCT	Tokyo IC						1										
	Ohashi JCT	Kumanocho JCT							1					2				
	Kumanocho JCT	Kosuge JCT							1					2				
	Komagata IC	Ariake JCT						2										
	Ariake IC	Komagata IC		4	5	2		2										1
	Ariake IC	Hakozaki		1														
	Ariake IC	Fukuzumi																1
	Ariake IC	Tatsumi JCT					3											
	Ariake IC	Shibaura JCT					3											
	Ariake IC	Ohashi JCT						1										
	Ariake IC	Harumi										1						
	Wangan Ariake	Wangan Kasai						2										
	Kasai IC	Ohji JCT		1					2				1	2				
	C2 Kasai JCT	No. 6 Misato																3
	kahei	yotugi										1						
	Itabashihonchou	Takamatu											1					
	Yatabe IC	Tokyo														3	5	1
	Metropolitan Expressway Total			6	26	4	28	17	8	4	0	2	14	24	1	3	37	1

2. Driving results (October 2017 to December 2018)

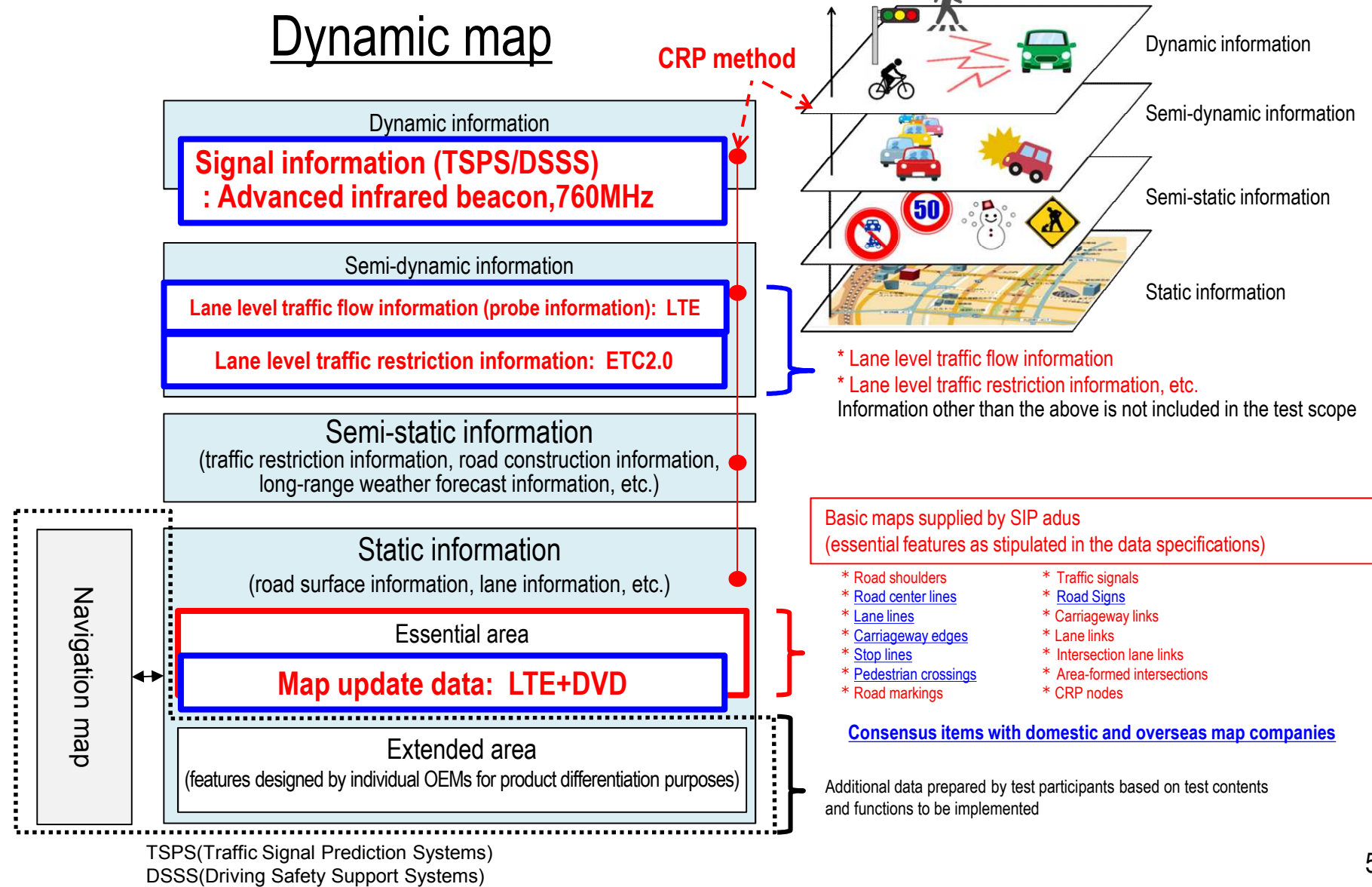
Cautions on Handling
Dynamic Map Field
Operational Test WG

[Joban Expressway, Shin-Tomei Expressway, Tomei Expressway]

Road	Start point	End point	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	
Joban Expressway	Misato JCT	Tsukuba JCT															1	
	Misato	Yatabe					2	1			1						3	
	Misato IC	Yatabe IC															3	
	Misato IC	Yatabe IC															1	
	Misato tollgate	Yatabe IC															3	
	Yatabe IC	Misato JCT					1	1				1	1	1			2	
	Yatabe IC	Misato tollgate															2	
Kosuge JCT	JARI				2												1	
Joban Expressway Total			0	0	0	2	3	2	0	0	1	1	1	1	0	14	2	
Shin-Tomei Expressway	Shin-Simizu JCT	Shimizuihara IC	2	5		2	1	1	1									
	Shimizuihara IC	Shin-Fuji IC		1														
	Shin-Fuji IC	Shimizu JCT		1														
	Gotemba JCT	Shimizuihara IC	3	6	2	2			2			4	1		2			
	Gotemba JCT	Shin-Simizu JCT		2														
	Gotemba JCT	Shimizu JCT						1										
	Atsugi IC	Shin-Simizu JCT	1															
Shin-Tomei Expressway Total			6	15	2	4	1	2	3	0	0	4	1	0	2	0	0	
Tomei Expressway	All areas			1														
	Shimizuihara IC	Gotemba JCT				3												
	Shimizuihara IC	Tokyo IC				1												
	Shimizu JCT	Tokyo IC		1														
	Susono IC	Oi-Matsuda IC		1														
	Gotemba JCT	Shimizuihara IC					1	2										
	Gotemba JCT	Hadano-Nakai IC				3												
	Hadano-Nakai IC	Gotemba JCT	3	3	2													
	Hadano-Nakai IC	Oi-Matsuda IC			1									1				
	Hadano-Nakai IC	Yokohama machida IC				3												
	Atsugi IC	Tokyo IC	1														6	
	Atsugi IC	Gotemba JCT				1											1	
	Yokohama machida IC	Tokyo IC				3	1								1			
	Yokohama machida IC	Hadano-Nakai IC							2				4	1				
	Yokohama-Aoba IC	Gotemba JCT						1	2									
	Yokohama-Aoba IC	Shimizu JCT	2	3		2	1	1	1									
	Yokohama-Aoba IC	Atsugi IC														3	2	
	Yokohama-Aoba IC	Yokohama machida IC		2														
	Yokohama-Aoba IC	Tokyo IC					2	1					1	1		3	5	
	Tomei-Kawasaki IC	Gotemba IC									1							
	Tokyo IC	Yokohama machida IC	4	5	2	1	1									1		
	Tokyo IC(Yoga IC)	Atsugi IC															5	1
	Tokyo IC	Gotemba JCT		1		1										3	3	
Tokyo IC	Shimizu JCT						1						1					
Tokyo IC	Shimizuihara IC			5														
Tomei Expressway Total			10	22	5	18	7	7	3	1	0	5	3	1	11	21	2	

3. Dynamic map data structure

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4. Large-scale field operational test system and data handling

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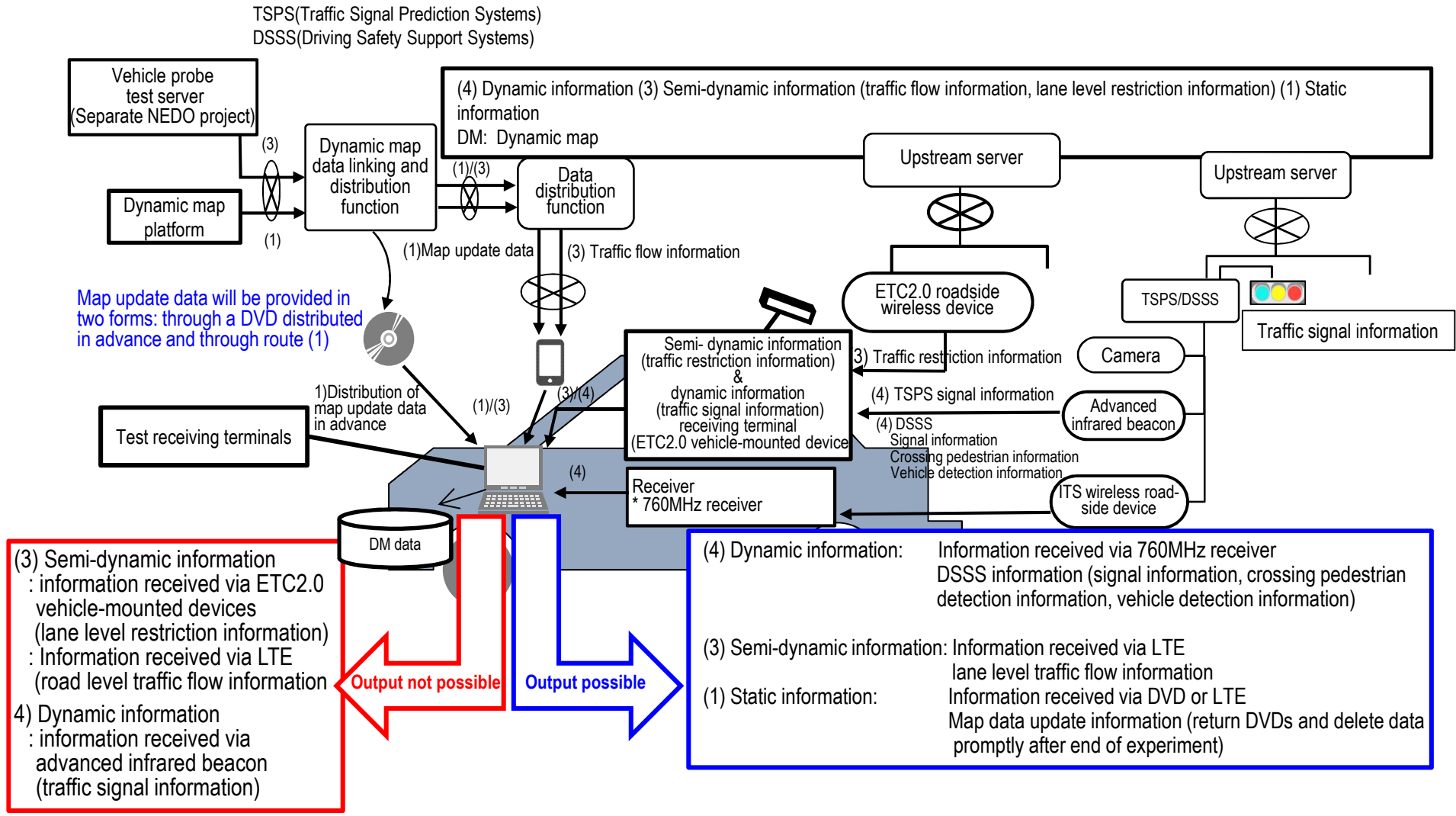


Fig. 4-1 Large-scale field operational test system and data handling

4. Large-scale field operational test system and data handling

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Table 5-1 Experiment data and experiment equipment

Item	Handled data	Experiment equipment
(1) Dynamic information	Traffic signal state information Crossing pedestrian information Vehicle detection information	Advanced infrared beacon 760MHz receiver
(2) Semi-dynamic information	Traffic flow information * Road-level * Lane level	LTE
	Lane level restriction information	ETC2.0 vehicle-mounted device
(3) Semi-static information	Restriction plan information	Public information from road operators sent to test participants
(4) Static information	High-accuracy 3D map data	DVD (distributed in advance)
	Map update data	DVD (distributed in advance) LTE (distributed in real time)

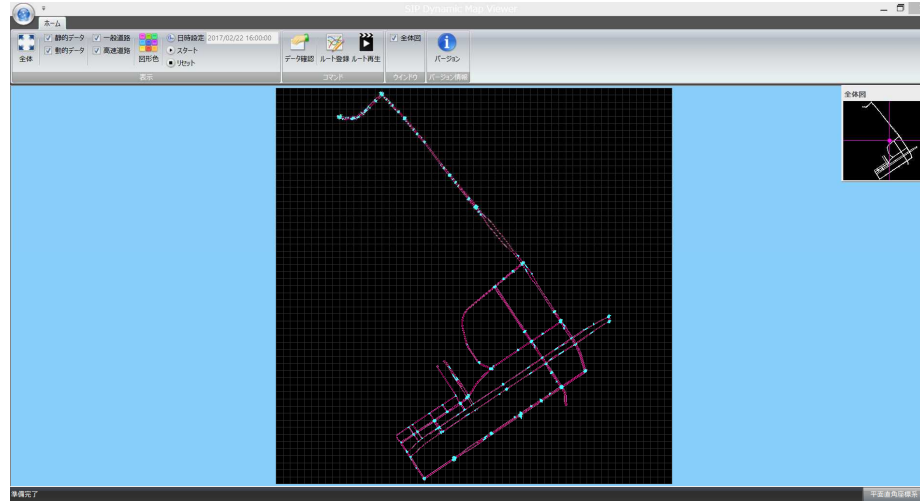


Fig. 4-2 Dynamic map structure

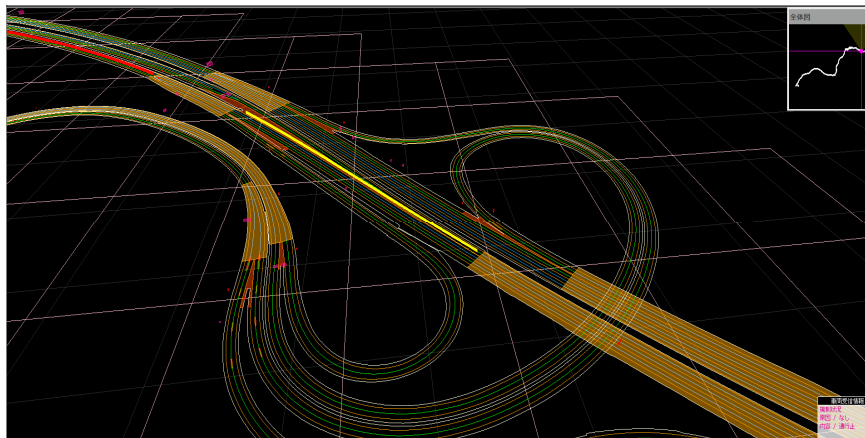
5. Photographs of equipment used in large-scale field operational test

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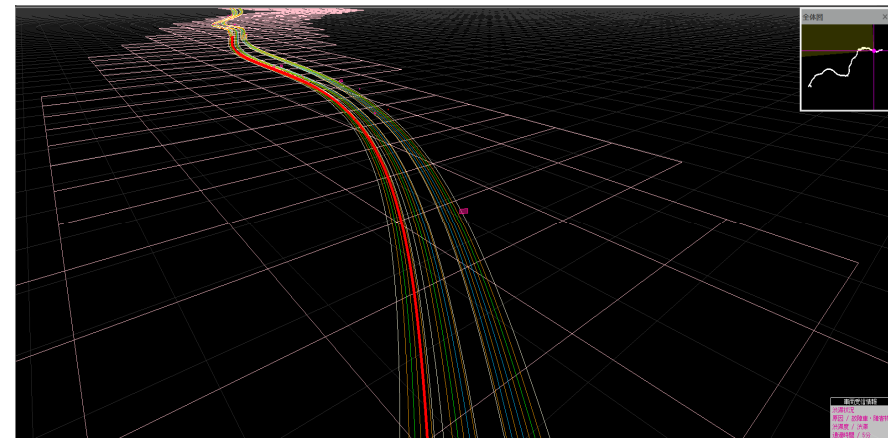
Dynamic Map Viewer display example



Dynamic Map Viewer



Display example 1



Display example 2

5. Photographs of equipment used in large-scale field operational test

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ETC transmission: Not possible
ETC card insertion: Not possible } Consideration for existing system

ETC2.0 vehicle-mounted device



ETC card accidental insertion prevention
(card slot is filled)



Dashboard type antenna



Fig.5-1 ETC2.0 vehicle-mounted device photos

5. Photographs of equipment used in large-scale field operational test

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Transmission to ITS wireless road-side device: Not possible = Data receiving only
Transmission to other ITS wireless receivers: Not possible = Data receiving only } Consideration for existing system



760MHz receiver



Antenna with magnet

Fig. 5-2 760MHz receiver photos

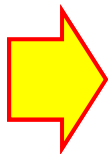
6.1 Static information evaluation

[Implementation contents]

- Evaluation of 300 km map data created in 2016 and total of 758 km of map data created through the addition of data in 2017

[Results]

- The essential area features in the dynamic map SIP specification were evaluated as sufficiently usable in their current state.
- Furthermore, in addition to the essential area features in the SIP specification there were also comments from participants indicating that they desired extended area features to be added.



* Features defined in the SIP specification were evaluated as usable.

6.1 Static information evaluation

Cautions on Handling
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Operational Test WG

(1) Evaluation by test participants



Courtesy of Mitsubishi Electric Corporation



Courtesy of Continental Automotive Corporation



Courtesy of Saitama Institute of Technology

6.1 Static information evaluation

(2) Evaluation of SIP specification features by test participants

	Test participant evaluation		
	○	△	-
Stop line	9	2	7
Pedestrian crossing	10	1	7
Traffic signal	11	3	4
Road shoulder	10	4	4
Carriageway center line	12	2	4
Lane line	11	5	2
Carriageway edge	11	4	3
Road marking	7	6	5
Road sign	8	5	5
Carriageway link	11	3	4
Lane link	13	4	1
Intersection lane link	8	7	3
Area-formed intersection	8	3	7
Request for other feature addition	8	0	10

Legend:

- "Used this feature" and "Sufficiently usable in current state" : ○
- "Used this feature" and "Acquisition standards should be reviewed and revised" : △
- Not evaluated : -

6.1 Static information evaluation

Cautions on Handling
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(3) SIP specification feature requests from test participants

SIP specification features (34 features)

Specification	No	Feature	Category	Note
SIP specification: 34 features	1	Shoulder	Essential	These are defined as a "Road shoulder" in the specification of FY2018.
	2	Streetscar stop area (island)	Essential	
	3	Toll island	Essential	
	4	Sidewalk curb	Essential	These are defined as each "Carriageway center line", "Lane line", and "Carriageway edge" in the specification of FY2018.
	5	Emergency parking zone	Essential	
	6-1	Carriageway line: Carriageway center line	Essential	
	6-2	Carriageway line: Lane line	Essential	
	6-3	Carriageway line: Carriageway edge	Essential	
	7	Stop line	Essential	These are defined as a "Road marking" in the specification of FY2018.
	8	Pedestrian crossing	Essential	Consensus items with domestic and overseas map companies.
	9	Road marking	Essential	These are defined as a "Road marking" in the specification of FY2018.
	10	Streetscar stop area (marking): Road marking	Essential	
	11	Channelizing island	Essential	
	12	Traffic signal	Essential	Consensus items with domestic and overseas map companies.
	13	Road sign	Essential	
	14	Carriageway link	Essential	
	15	Lane link	Essential	
	16	Intersection lane link	Essential	
	17	Intersection area	Essential	
	18	Grade crossing	Essential	Since it does not exist in the experiment area, data is not created.
	19	Railway	Extended	
	20	Parking zone	Extended	
	21	Parking slot	Extended	
	22	Parking slot line	Extended	
	23	Guardrail	Quasi-essential	
	24	Cat's eye	Extended	
	25	Speed breaker	Extended	
	26	Delineator	Extended	
	27	Rubber pole	Extended	
	28	Road light	Extended	
	29	Utility pole	Extended	
	30	Kilometer post	Extended	
	31	Node on carriageway link	Quasi-essential	
	32	Node on lane link	Quasi-essential	
33	Carriageway area	Quasi-essential	These are defined as a "Lane belt" in the specification of FY2018.	
34	Lane area	Quasi-essential		

SIP specification features + JAMA recommended features, etc. (24 features)

Specification	No	Feature	Category	Note
SIP specification: Other feature, attribute, etc.	35	14 Location reference platform => Marker point	Essential	These are defined as a "CRP node" in the specification of FY2018.
	36	Road sign regulation	Quasi-essential	
	37	Road marking regulation	Quasi-essential	
	38	Auxiliary sign	Extended	
	39	Restriction content	Quasi-essential	
	40	Course change prohibited carriageway position (carriageway link only)	Quasi-essential	
	41	Course change prohibited lane position (lane link only)	Quasi-essential	
	42	Lane link road structure attribute => Curvature radius	Quasi-essential	
	43	Lane link road structure attribute => Longitudinal slope	Quasi-essential	
	44	Lane link road structure attribute => Transverse slope	Quasi-essential	
	45	Road link road structure attribute => Horizontal direction attribute => Clothoid curve section	Extended	
	46	Road link road structure attribute => Horizontal direction attribute => Circular curve section	Extended	
		Road link road structure attribute => Horizontal direction attribute => Circular curve section		
	47	Road link road structure attribute => Horizontal direction attribute => Straight line section	Extended	
	48	Road link road structure attribute => Longitudinal slope attribute => Monocline section	Extended	
	49	Road link road structure attribute => Longitudinal slope attribute => Curve section	Extended	
	50	Road link road structure attribute => Transverse slope attribute	Extended	
	51	Road section ID information	Extended	
	52	DRM link information	Extended	
	53	VICS link information	Extended	
	54	Connection information	Extended	

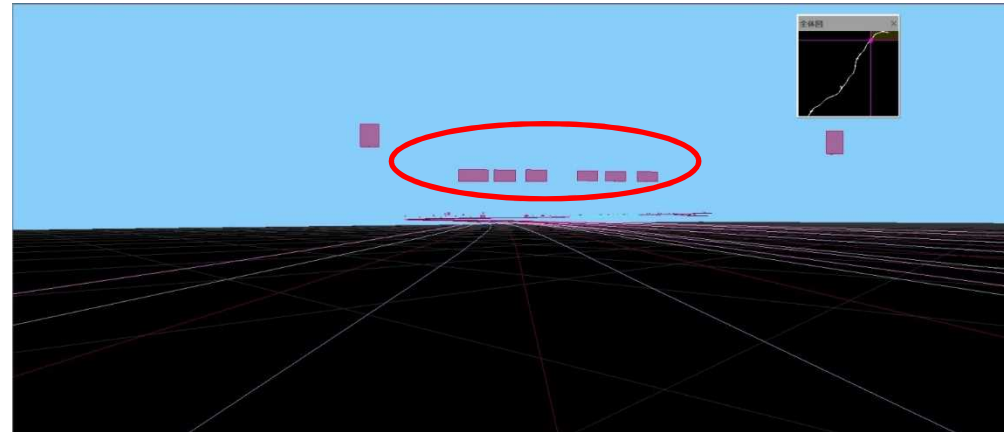
Specification	No.	Feature	Category	Note
JAMA additional specification	55	Presence of covering object (tunnel, shed, etc.)	Quasi-essential	
	56	Road border line	Extended	
	57	Road marking (symbol)	Extended	
	58	Tunnel height limit	Quasi-essential	
	59	Underpass height limit	Extended	
	60	Bridge width	Extended	
	61	Drivable area within tunnel	Extended	
	62	Road drivable by special vehicle	Extended	
	63	ETC gate position	Extended	
	64	Motorcycle stop line	Extended	
	65	Two stage right turn stop line for motorized bicycles	Extended	
	66	Bus stop	Quasi-essential	
	67	Bus-only lane	Extended	
68	Bus priority lane	Extended		
Feature not in SIP specification or JAMA additional specification	-	Parking prohibition area	Extended	
	-	Roadside mirror	Extended	
	-	Information regarding road surface	Extended	
	-	Road slope	Extended	
-	Point cloud data	Extended		
-	Building surface	Extended		

- * Features highlighted in yellow were designed this time.
- * Features described in the red were added to the SIP specification or whose category has been changed from the SIP specification based on the evaluation results.

6.1 Static information evaluation

Cautions on Handling
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(4) Differences between high-accuracy 3D map and actual environment



Non-existent sign on Tomei Expressway Yokohama Machida Interchange -Tokyo Interchange: 5 kilometers from the Tokyo Interchange

Results of confirmation of source information

- * The sign existed in the source information
- = Degradation since the data was designed
- > Map must be updated



6. Large-Scale Field Operational Test (Dynamic Map) Evaluation Results

Cautions on Handling
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6.2 Static information (update) evaluation

[Implementation contents]

- Formulated plans and carried out map update tests at five locations based on test results of 2017 static information.

[Results]

- For map updates, feature IDs must be made permanent and attribute information such as measurement dates and creation dates must be assigned.
- Based on the above evaluation results, map updating guidelines were created.
- For level 3 automated driving and above, many respondents indicated that high update frequencies would be required for all essential features (14 features).

6.2 Static information (basic map update) evaluation and approach

Cautions on Handling
Dynamic Map Field
Operational Test WG

(1) Map data update test areas and schedule

	Location	DVD distribution timing	LTE delivery timing	Update approach
1	Metropolitan Expressway Horikiri/Kosuge Junction	From 6/13	From 6/21	Road shape change (update)
2	Ordinary road Odaiba (CRP addition)	From 6/13	From 6/21	Road shape addition (addition)
3	Metropolitan Expressway Harumi entry/exit (extension)	From 7/11	From 7/18	Road shape change (matching)
4	Ordinary road: Odaiba (map update)	From 8/20	From 8/20	Road shape change (addition)
5	Metropolitan Expressway Itabashi/Kumano Town Junction	From 8/20	From 8/20	Road shape change (matching)

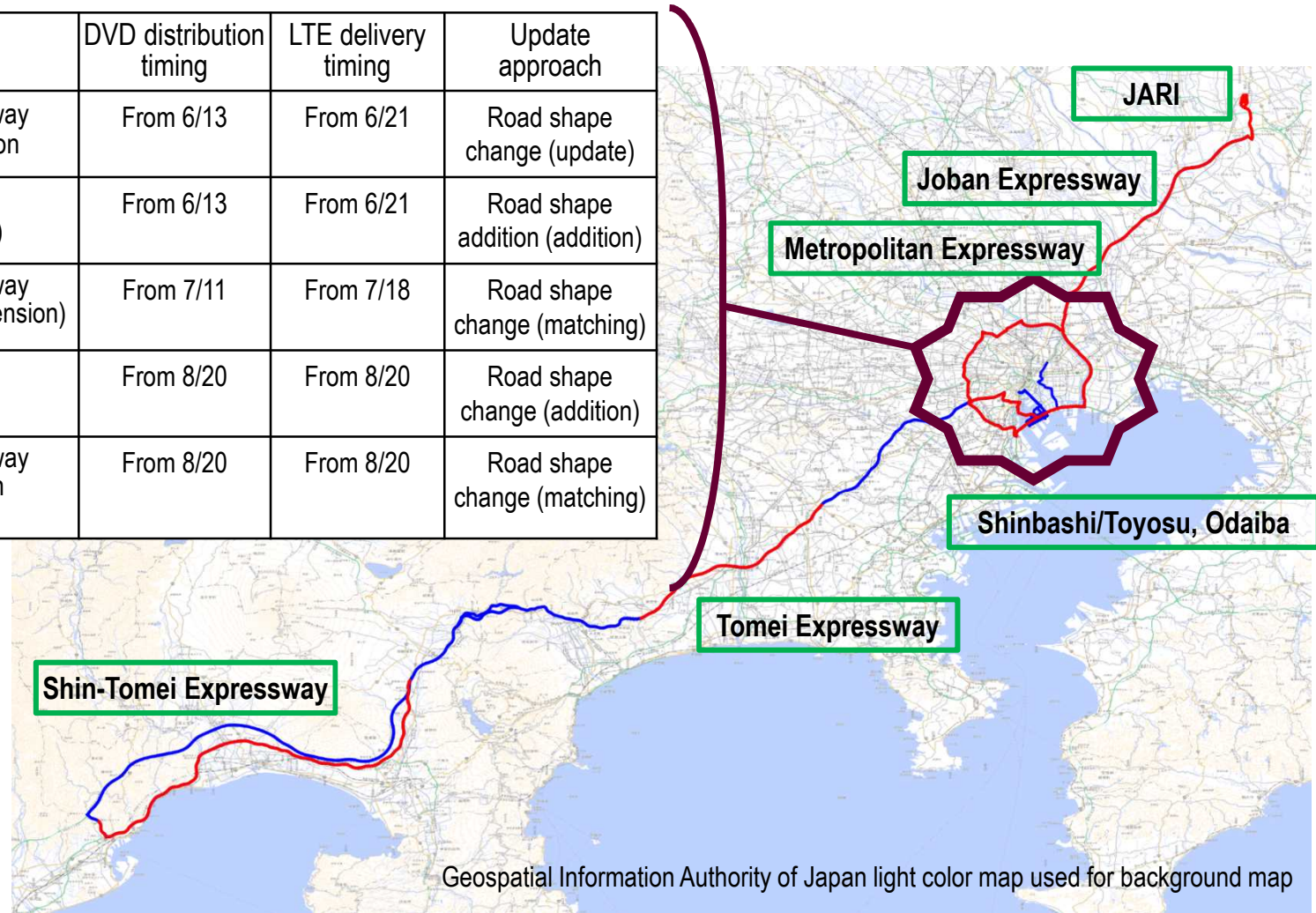


Fig. 6.2-1 Static information (update data) area and schedule

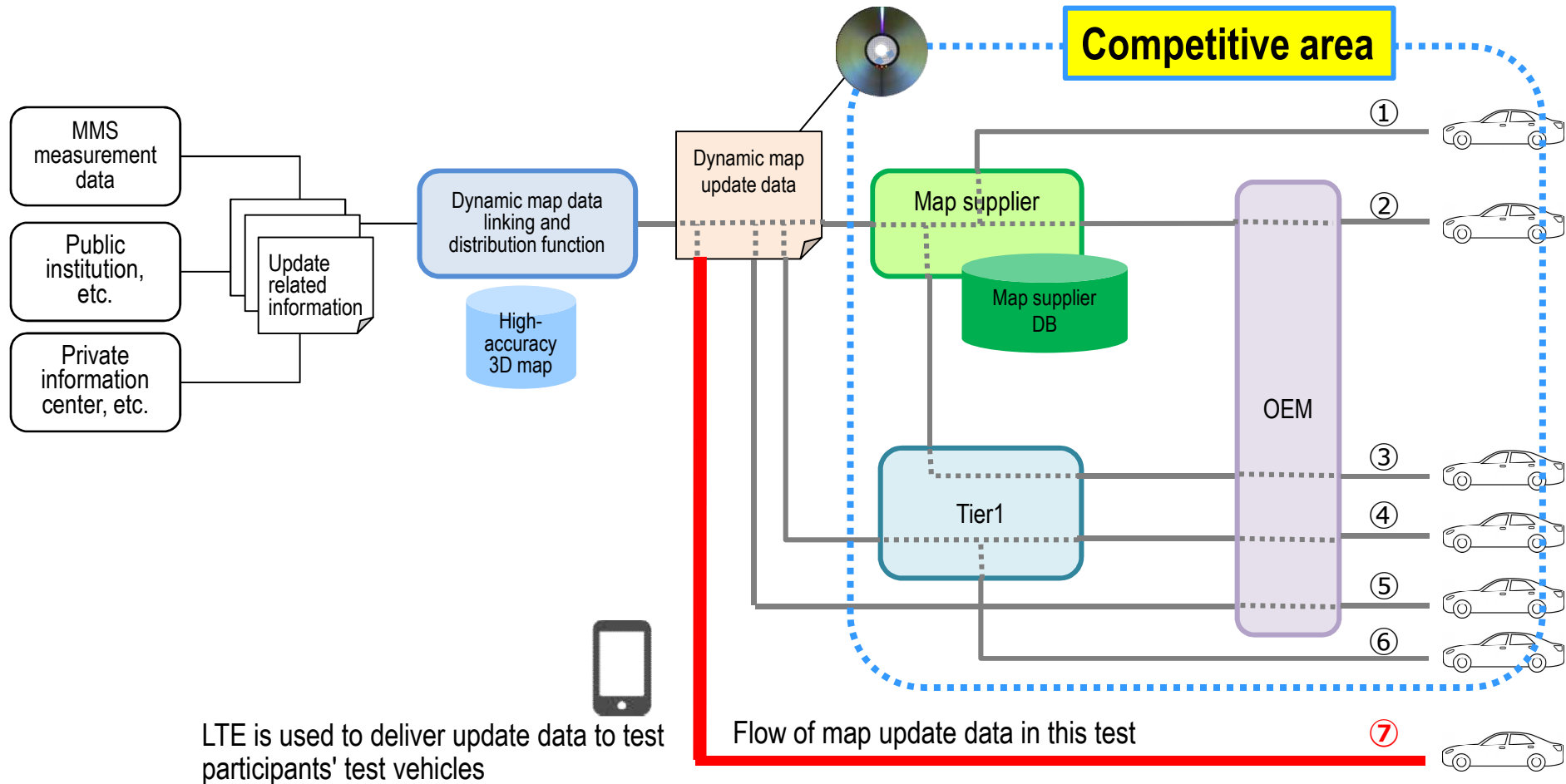
6.2 Static information (basic map update) evaluation results

Cautions on Handling
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(2) Map data update test implementation format

DVDs distributed to test participants in advance

* To be used for verification, etc., of patterns (1) through (6) as appropriate



LTE is used to deliver update data to test participants' test vehicles

Flow of map update data in this test

6.2 Static information (basic map update) evaluation and approach

Cautions on Handling
Dynamic Map Field
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(3) Map update example

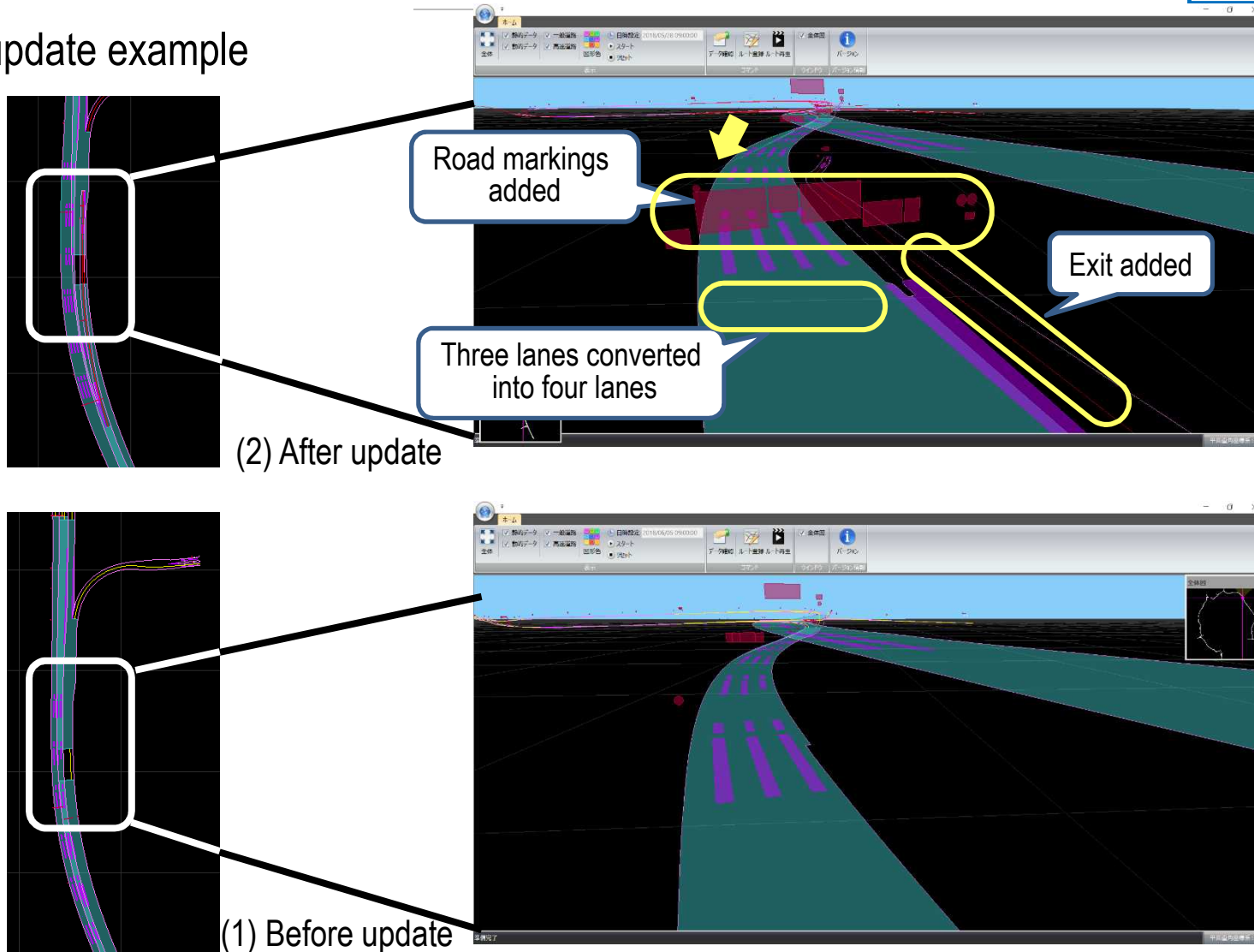


Fig. 6.2-2 Static information (update data) example: Metropolitan Expressway Horikiri/Kosuge Junction inner lanes Lane addition and feature addition (from 6/21) 19

6.2 Static information (basic map update) evaluation and approach

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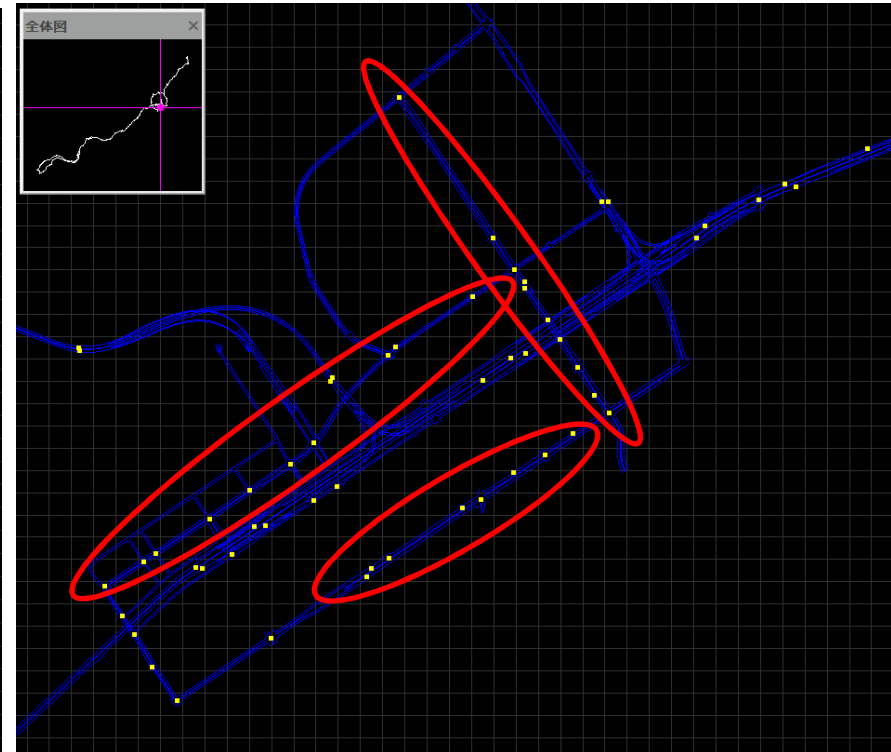
(3) Map update example

CRP configured for some intersections



(1) Before update

CRP added for major intersections providing traffic flow information, signal information, etc.

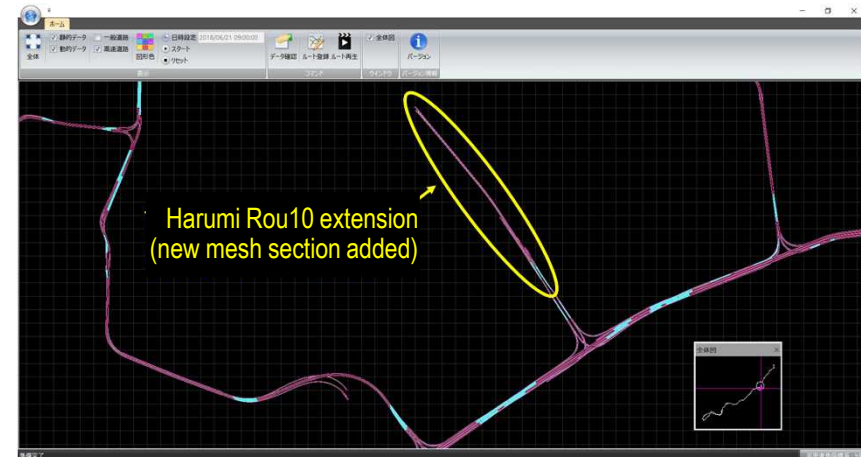
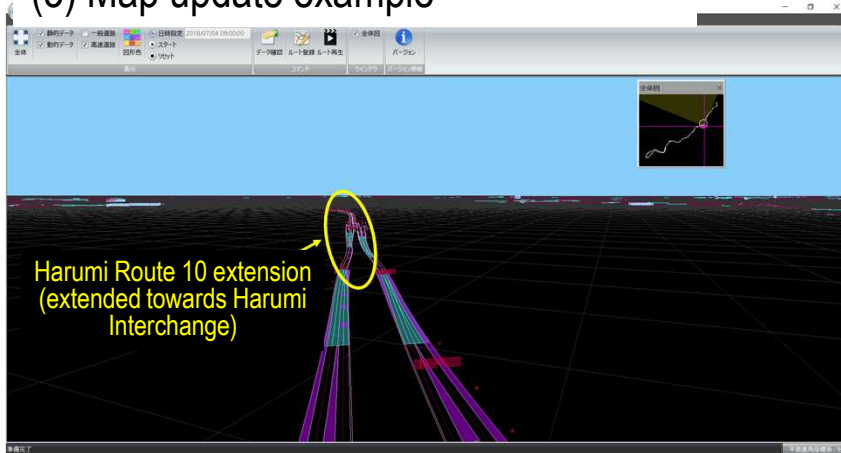


(2) After update

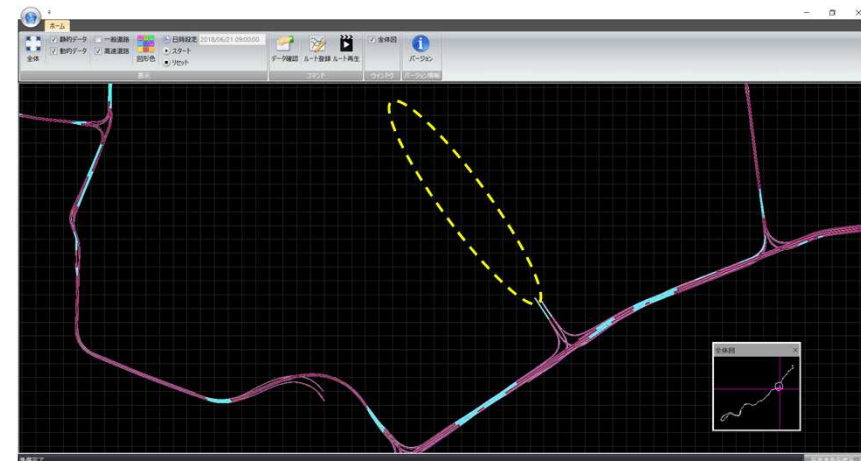
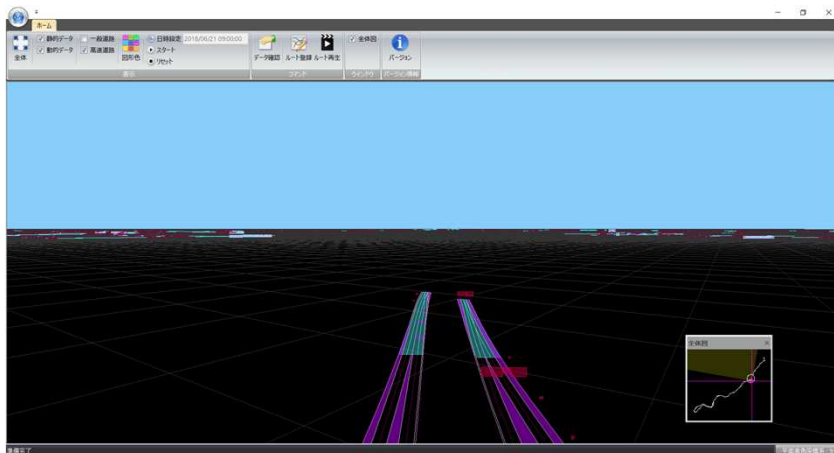
Fig. 6.2-3 Static information (update data) example: Ordinary road Odaiba area CRP update (from 6/21)

6.2 Static information (basic map update) evaluation and approach

(3) Map update example



(2) After update



(1) Before update

Fig. 6.2-4 Static information (update data) example: Metropolitan Expressway Harumi Interchange extension (from July 18)

6.2 Static information (basic map update) evaluation results

(4) Results of evaluation by test participants

- For automated driving levels 1 and 2, many respondents indicated that a low update frequency (once every six months to once a year) would be sufficient, or that updates would not be necessary. However, for automated driving levels 3 and above, many respondents indicated that high update frequencies (once every one to three months) would be best.
- The majority of test participants provided answers based on automated driving on highways.
- Many respondents indicated that it would be preferable if the following management information and management were provided
 - 1) Make IDs permanent
=> This would make it easier to search for received update data.
 - 2) Measurement/creation/update date and time information (version information)
=> This would ensure information reliability for using received update data in actual applications.
- Many test participants are still considering update units and mesh segment sizes, so it is still not clear what figures will be agreed on for the collaborative area.
- Many respondents indicated that competitive area distribution methods ("distribution via LTE" and "updating by bringing the device to a dealer") would be best for distributing update data.
- For level 3 automated driving and above, many respondents indicated that high update frequencies would be required for all 14 update feature candidates.

6.2 Static information (basic map update) evaluation results

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(4) Results of evaluation by test participants

Map Update Guidelines

- Map information changes over the course of several months after its creation, so maps must be updated to the latest version
- We are summarizing map update data provision approaches and map data management methods for ensuring speed, efficiency, and quality when updating maps

[Confidential]

Map Update Guidelines
Ver. 1.0

December 14, 2018

Dynamic Map Large-Scale Field Operational Test Consortium

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1. Introduction

These guidelines were created to set out information such as update units, the size of update data, data accuracy, update frequency for individual automated driving levels, and important points of note with respect to map data measurement and plotting. They were based on the results of evaluations by Dynamic Map Large-scale Field Operational Test working group field operational test participants and equipment-side members of update data created and distributed by the Dynamic Map Large-scale Field Operational Test conducted as part of the Strategic Innovation Promotion (SIP) Program for Automated Driving Systems.

When using these guidelines, keep in mind that technological development is currently in progress for automated driving levels 3 to 5, and OEMs and suppliers are currently considering system specifications, so the current contents of the guidelines are tentative.

1

6.2 Static information (basic map update) evaluation results

Cautions on Handling
Dynamic Map Field
Operational Test WG

(5) Equipment side verification results

Transmission times were measured for five different sizes of data (10 times for each data size, at 8 measurement locations each), and the transmission times and speeds were determined (minimum, average, and maximum).

Table 8.1-1 Transmission times and transmission speeds for each verification data sample

Size of transmission [MB] (No. of features)	Verification data 1 4.0MB (1,728)	Verification data 2 4.5MB (6,523)	Verification data 3 5.4MB (10,615)	Verification data 4 6.7MB (12,554)	Verification data 5 7.4MB (32,502)	Overall average
Max. transmission speed [Mbps]	31.7	29.7	35.3	33.6	Max. speed 38.1	Average speed 19.6
Avg. transmission speed [Mbps]	17.6	17.4	19.4	21.2	22.5	
Min. transmission speed [Mbps]	Min. speed 3.7	5.1	6.2	12.2	8.7	
Min. transmission time [seconds]	Min. time 1.0	1.2	1.2	1.6	1.6	-
Avg. transmission time [seconds]	2.2	2.5	2.6	2.7	2.8	
Max. transmission time [seconds]	Max. time 8.7	7.0	7.0	4.4	6.8	

a) Transmission speed Average: 19.6Mbps, Maximum: 38.1Mbps, Minimum: 3.7Mbps

b) Transmission time Average time for transmission of 4 to 7.4MB: 2.2 to 2.8 seconds, Minimum: 1.0 second, Maximum: 8.7 seconds

○ **Transmission times and transmission speeds varied depending on the measurement location, but the average transmission time was 2 to 3 seconds (maximum: 8.7 seconds)**

Note 1: The basic maps for updating used in this test were between roughly 4MB and 7.2MB

Note 2: These measurements were generally in line with those taken at each measurement location in the test area during the June test (average transmission time of 2.1 seconds and maximum transmission time of 8.2 seconds for 2MB of data). It appears likely that roughly 10MB of basic map data could be transmitted within 10 seconds

➡ For dynamic map static information (high-accuracy 3D map) updates, mobile networks are capable of distributing map update data with acceptable times

6. Large-Scale Field Operational Test (Dynamic Map) Evaluation Results

Cautions on Handling
Dynamic Map Field
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6.3 Semi-dynamic information (lane level traffic restriction information) evaluation

[Implementation contents]

- Participants verified the receiving of lane level restriction information distributed via ETC2.0 and the linking of this information on the vehicle end to high-accuracy 3D maps.
- Participants evaluated the potential for lane level restriction information to be used as supplementary information for sensors in automated driving systems.

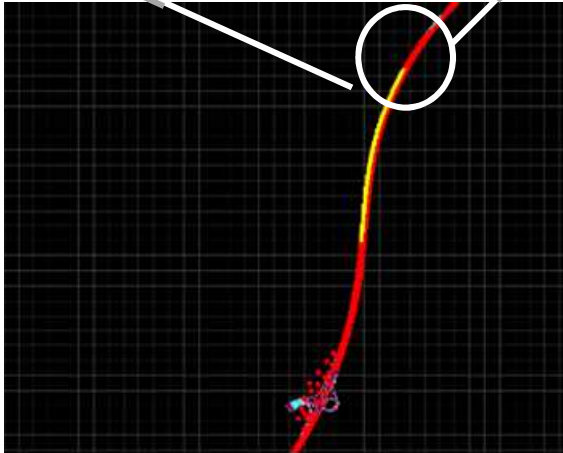
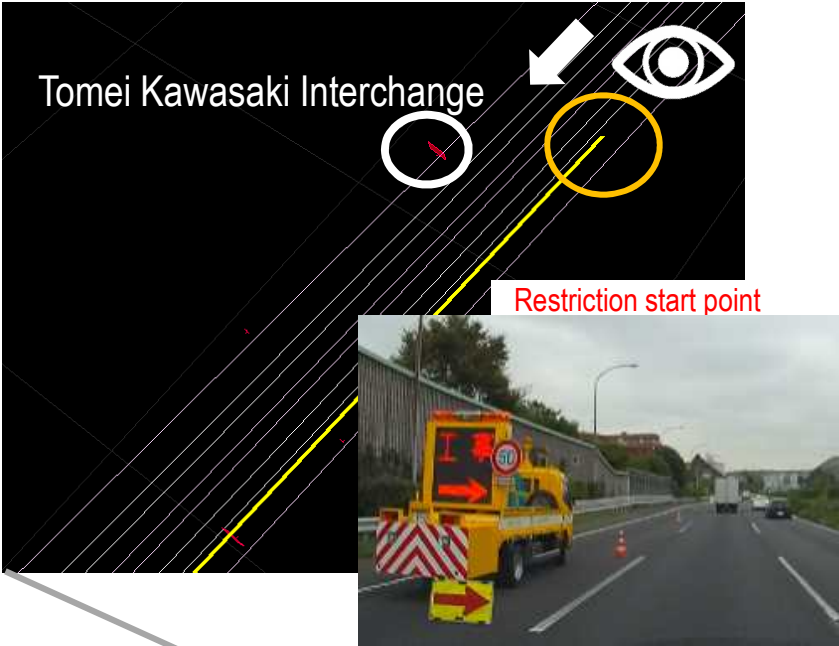
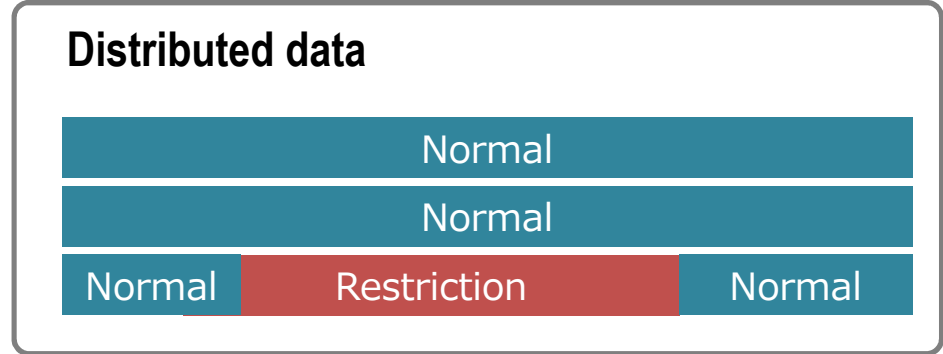
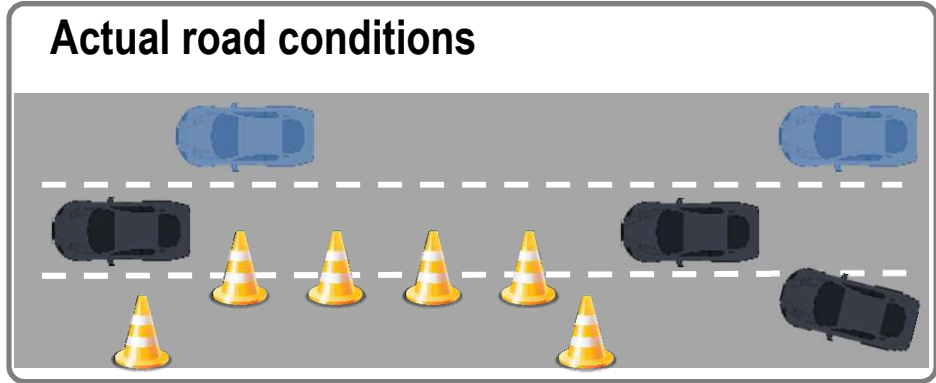
[Results]

- For automated driving level 2 and above, participants indicated that restriction (construction/traffic) information could be used as supplementary information for autonomous vehicle sensors.
- There were deviations in start point and end point locations (avg. 30 meters) between dynamic map CRPs and existing nodes.

6.3 Semi-dynamic information (lane level traffic restriction information) evaluation and approach

Cautions on Handling
Dynamic Map Field
Operational Test WG

(1) Conceptual image of testing of lane level restriction information



6.3 Semi-dynamic information (lane level traffic restriction information) evaluation and approach

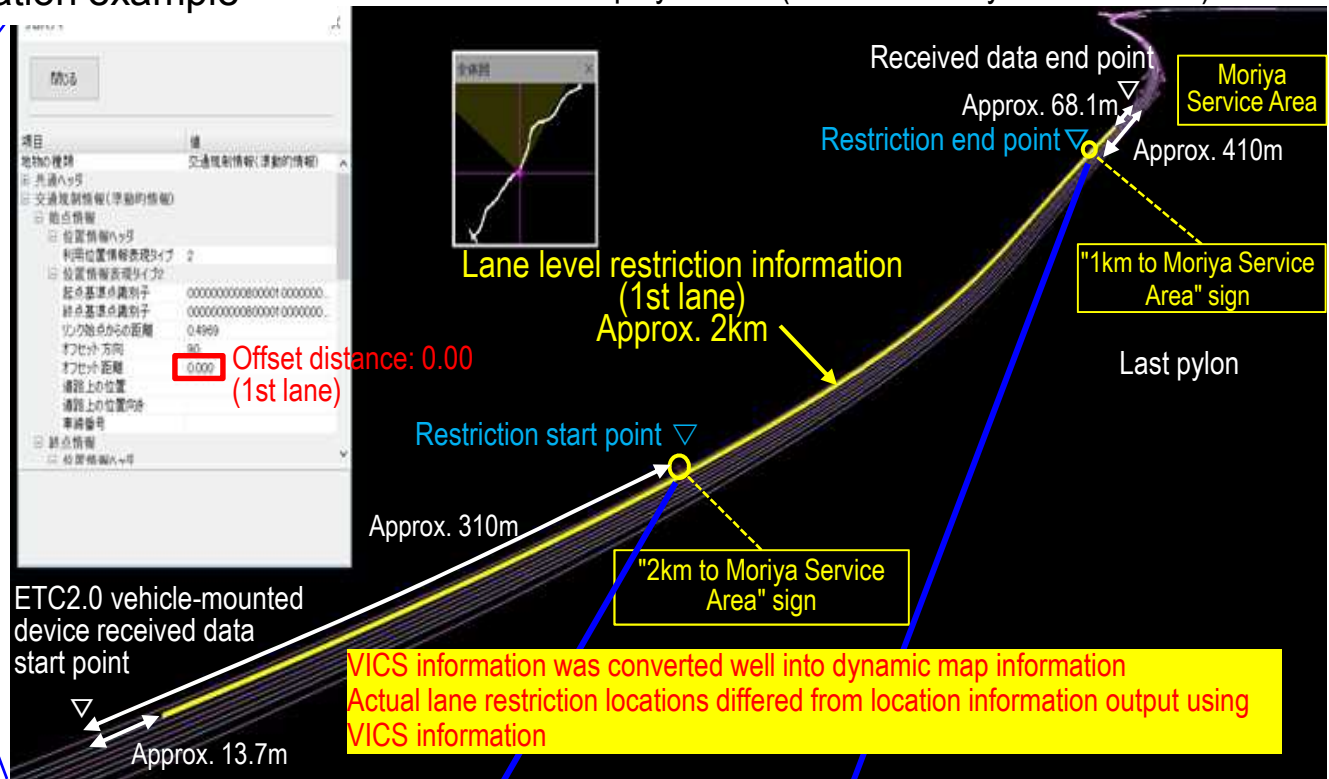
Cautions on Handling
Dynamic Map Field
Operational Test WG

(2) lane level restriction information example

Traffic restriction information
(Source: JARTIC)

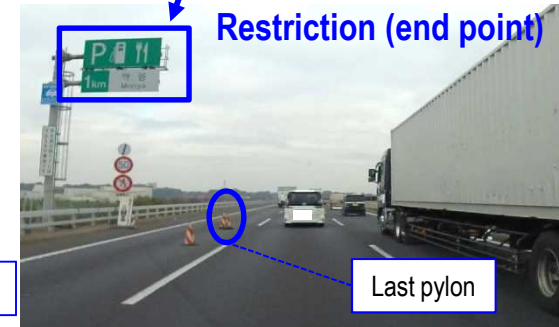


Joban Expressway, in front of the Moriya Service Area, approx. 13:55 on Nov. 26, 2018



[Verification results]

The data received via ETC2.0 vehicle-mounted device was confirmed to closely match the location of the post-conversion lane level traffic restriction information. (the actual restriction start and end points differed)



6.3 Semi-dynamic information (lane level traffic restriction information) evaluation results

(3) Results of restriction information evaluation by test participants

- Many participants indicated that the [restriction \(construction/traffic\) information could be used to supplement information from autonomous vehicle sensors.](#)
- All companies indicated that [they wanted lane level restriction information to be distributed for highways](#) outside the test area as well.

Automated driving level	Lane-level restriction information
Level 1	(○)
Level 2	○
Level 3	○
Level 4	○
Level 5	○

6.3 Semi-dynamic information (lane level traffic restriction information) evaluation results

Cautions on Handling
Dynamic Map Field
Operational Test WG

(4) Verification of accuracy of conversion locations of restriction information 1/2

→ Restriction information (received data)
→ Semi-dynamic information (conversion data)

	Interchange name	End point horizontal deviation	Start point horizontal deviation	Interchange name
(1) November 2, 2018 12:05	Kashiwa Interchange	15.4m	2300m passing lane construction restriction 78.0m	Moriya Service Area
(2) November 6, 2018 11:37	Yatabe Interchange	33.0m	2700m passing lane construction restriction 24.0m	Moriya Service Area
(3) November 6, 2018 11:43	Kashiwa Interchange	11.9m	4000m passing lane construction restriction 21.4m	Nagareyama Interchange
(4) November 6, 2018 12:24	Yawara Interchange	36.2m	2700m passing lane construction restriction 17.1m	Yatabe Interchange
(5) November 9, 2018 13:33	Kashiwa Interchange	11.3m	4000m 1st cruising lane construction restriction 20.8m	Nagareyama Interchange
(6) November 14, 2018 13:03	Misato Junction	Area outside of scope	4200m passing lane construction restriction From Misato toll booth 7.1m	Kashiwa Interchange
(7) November 14, 2018 13:14	Tokyo Interchange	39.6m	800m 1st cruising lane construction restriction 45.6m	Tomei Kawasaki Interchange
(8) November 15, 2018 18:03	Nagareyama Interchange	23.8m	3500m passing lane construction restriction 37.6m	Kashiwa Interchange

6.3 Semi-dynamic information (lane level traffic restriction information) evaluation results

Cautions on Handling
Dynamic Map Field
Operational Test WG

(4) Verification of accuracy of conversion locations of restriction information 2/2

Verification was performed based on traffic restriction information (total of 31 start and end points) obtained in November for 17 sections

→The maximum deviation was 78 m and the average deviation was 29.4 m. For the majority of the points, the deviation was 10 m to 30 m or less.

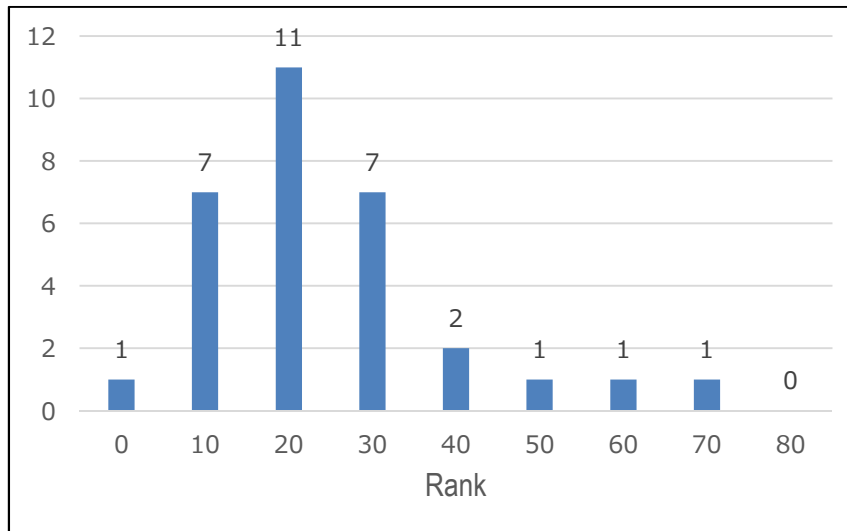
Conversion location deviation for 31 points

No.	Deviation (m)	Rank
1	7.115	0
2	11.272	10
3	11.878	10
4	12.588	10
5	13.178	10
6	13.680	10
7	15.373	10
8	17.104	10
9	20.780	20
10	21.386	20
11	23.287	20
12	23.694	20
13	23.694	20
14	23.753	20
15	23.753	20
16	23.938	20
17	24.041	20
18	25.682	20
19	27.074	20
20	31.332	30
21	32.979	30
22	36.212	30
23	37.601	30
24	38.783	30
25	39.327	30
26	39.640	30
27	45.553	40
28	49.404	40
29	51.070	50
30	68.249	60
31	78.023	70

Rank
0: 0 m to 10 m or less
10: 10 m to 20 m or less
20: 20 m to 30 m or less
30: 30 m to 40 m or less
40: 40 m to 50 m or less
50: 50 m to 60 m or less
60: 60 m to 70 m or less
70: 70 m to 80 m or less

	Deviation (m)
Maximum	78.023
Average	29.401
Minimum	7.115

Deviation histogram



6.4 Semi-dynamic information (traffic flow information) evaluation

[Implementation contents]

- Participants verified the reception by vehicles of traffic flow information (road level/lane level) via mobile networks and the linking of this information on the vehicle end to high-accuracy 3D maps.
- Participants evaluated the potential for traffic flow information to be used as supplementary information for sensors in automated driving systems.

[Results]

- When using traffic flow information for automated driving level 3 and above, participants indicated that it would be preferable if the location deviation tolerance were 100m or less and the information were provided at the lane level.
- Many participants indicated that it would be preferable if both the road-level and lane-level traffic flow information update intervals were shorter than the five-minute intervals used in this test.

6.4 Semi-dynamic information (traffic flow information) evaluation and approach

(1) Highway traffic flow information provision area

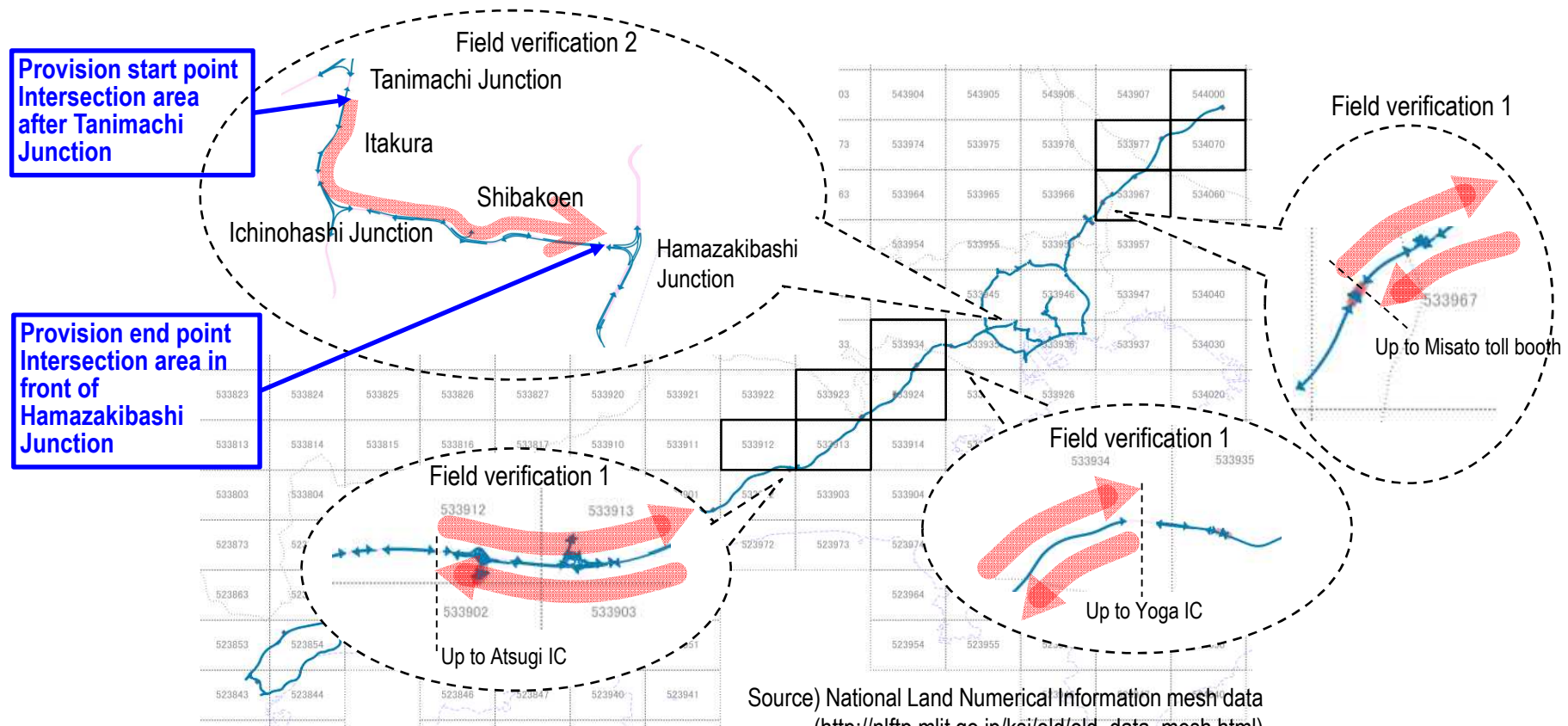
1) Field verification 1 – Road level traffic flow information

East Nippon Expressway Joban Expressway: Misato toll booth – Yatabe Interchange

Central Nippon Expressway Tomei Expressway: Yoga IC – Atsugi Interchange

2) Field verification 2 – Lane level traffic flow information

Metropolitan Expressway: Tanimachi Junction -> Hamazakibashi Junction (one-way)



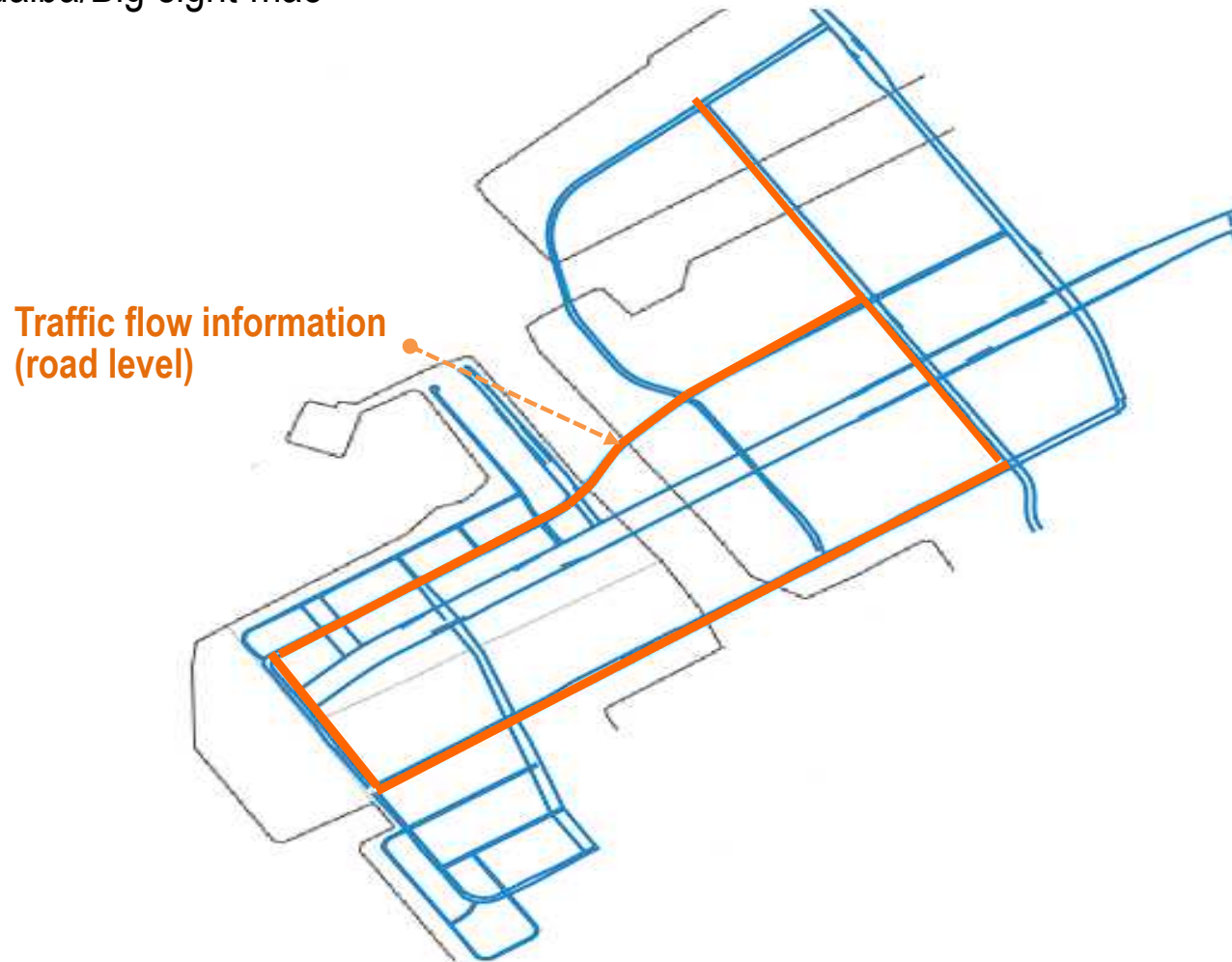
Source) National Land Numerical Information mesh data
(http://nlftp.mlit.go.jp/ksj/old/old_data_mesh.html)

6.4 Semi-dynamic information (traffic flow information) evaluation and approach

Cautions on Handling
Dynamic Map Field
Operational Test WG

(2) Ordinary road traffic flow information provision area

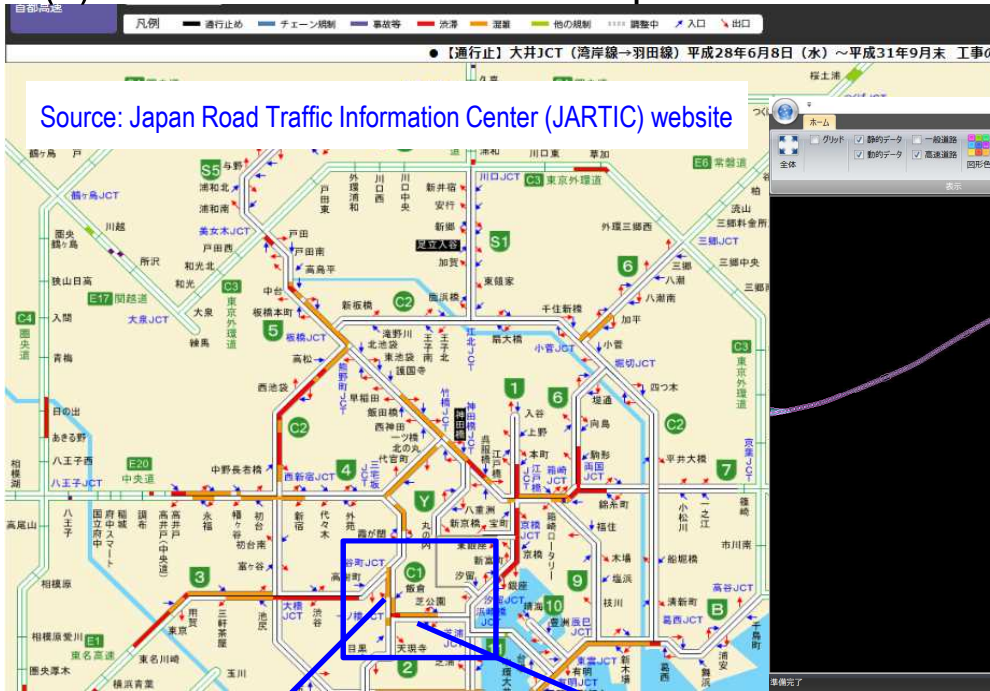
Odaiba/Big sight-mae



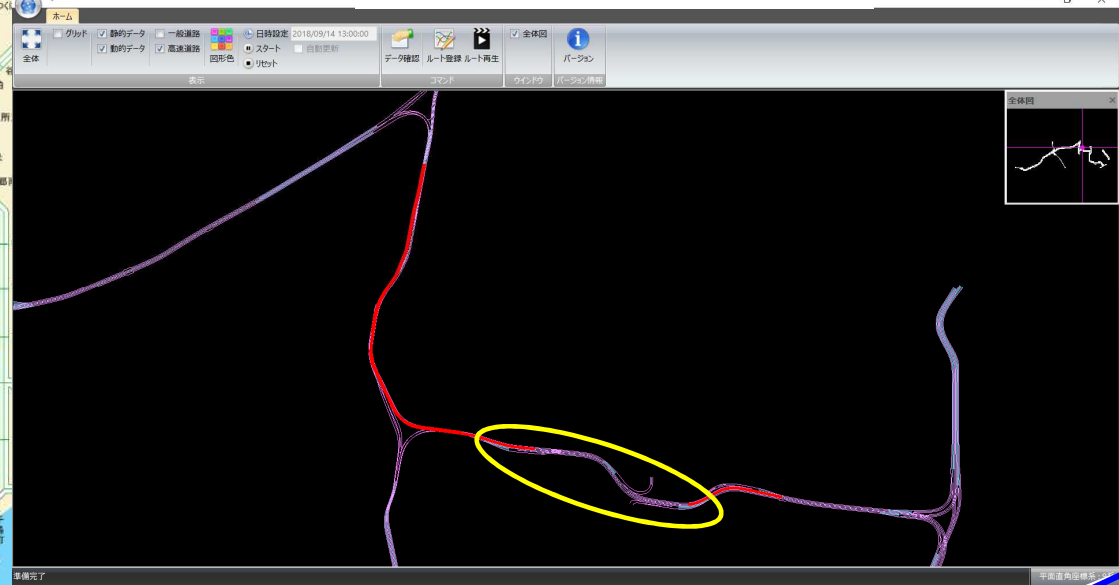
6.4 Semi-dynamic information (traffic flow information) evaluation results

Cautions on Handling
Dynamic Map Field
Operational Test WG

(3) Lane level traffic flow example

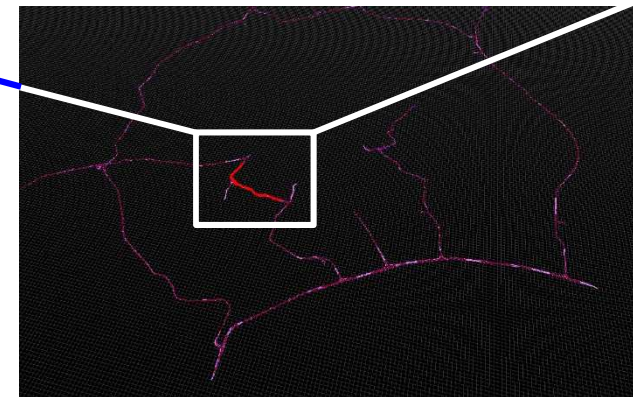


Viewer image



In front of Hamazakibashi Junction

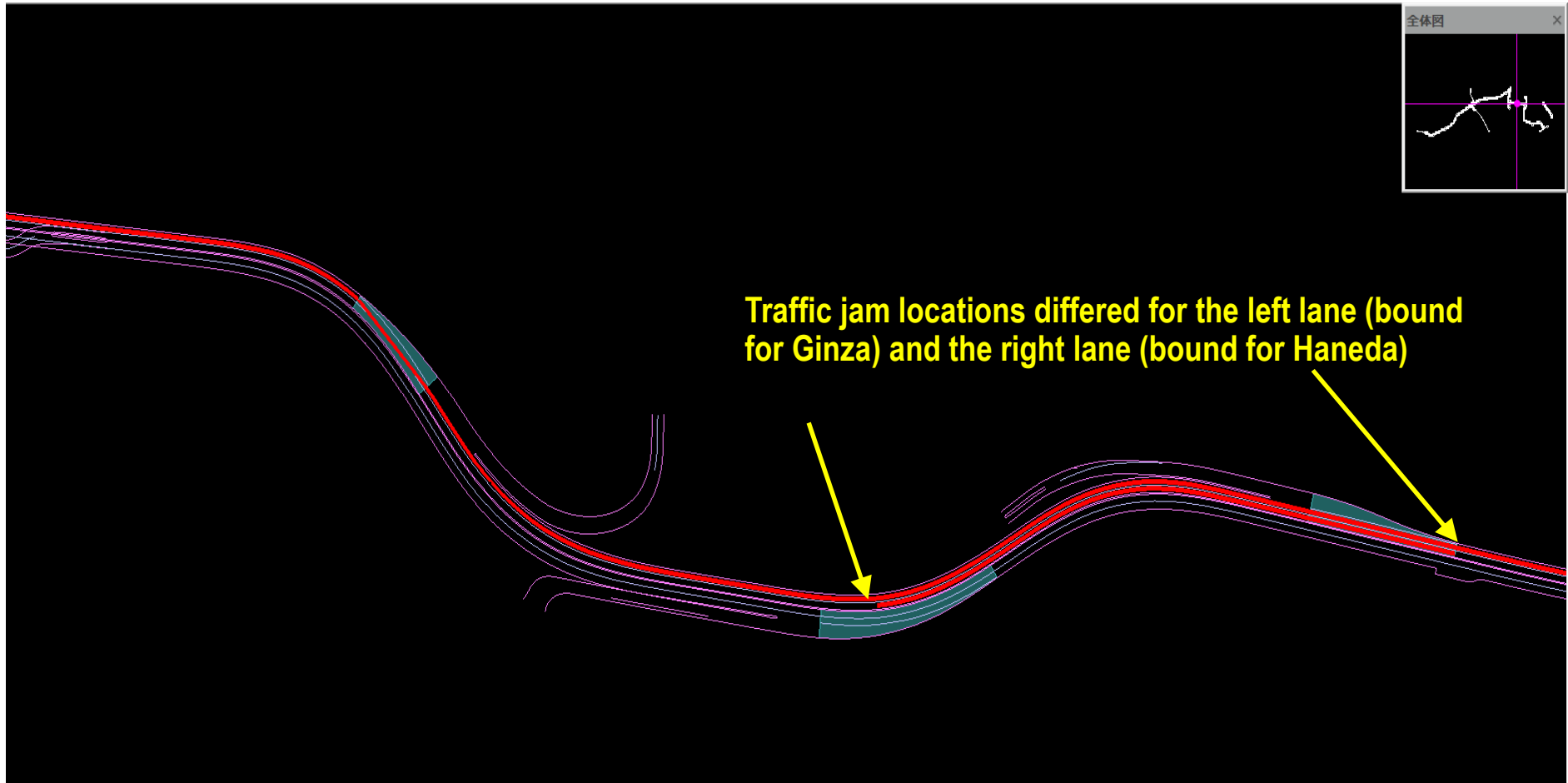
Shibakoen Exit



6.4 Semi-dynamic information (traffic flow information) evaluation results

Cautions on Handling
Dynamic Map Field
Operational Test WG

(3) Lane level traffic flow example



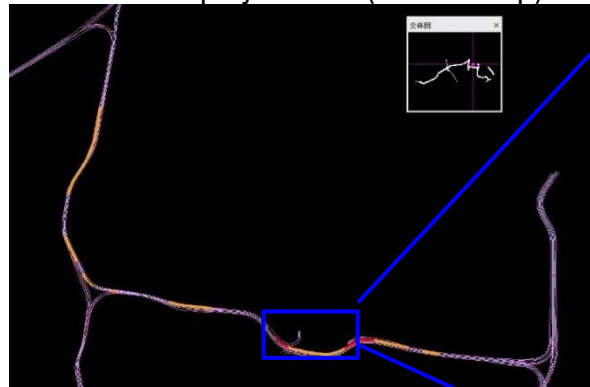
6.4 Semi-dynamic information (traffic flow information) evaluation results

Cautions on Handling
Dynamic Map Field
Operational Test WG

(3) Lane level traffic flow example

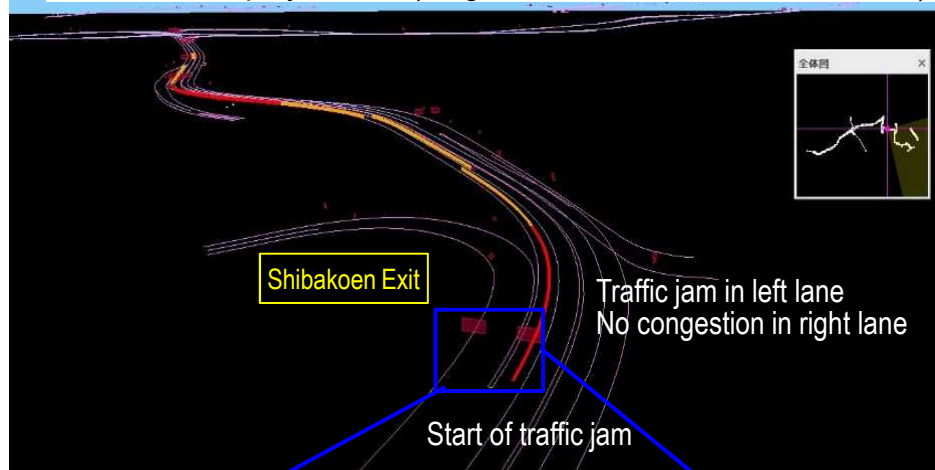
Metropolitan Expressway: Tanimachi Junction – Hamazakibashi Junction, approx. 15:39 on Nov. 27, 2018

Viewer display screen (overall map)

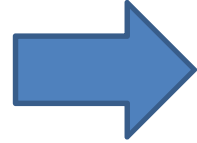


(Traffic congestion start point)

Viewer display screen (magnification of Shibakoen Exit area)



The traffic flow information local
The traffic flow information was
However, traffic flow information
changes with time



The left-side passing lane had
a traffic speed of 20km/h or
below after the Shibakoen Exit
(traffic jam: red). (The display
closely matched)



[Verification results] Converted lane-level traffic flow information and actual conditions were confirmed to closely match.

6.4 Semi-dynamic information (traffic flow information) evaluation results

Cautions on Handling
Dynamic Map Field
Operational Test WG

(4) Results of traffic flow information evaluation by test participants

- Many participants indicated that it would be preferable if both the road-level and lane-level traffic flow information update intervals were shorter than the five-minute intervals used in this test.
- Many participants indicated that when using traffic flow information for automated driving level 3 or above, an acceptable location deviation would be 100m or less and the information were provided at the lane level.

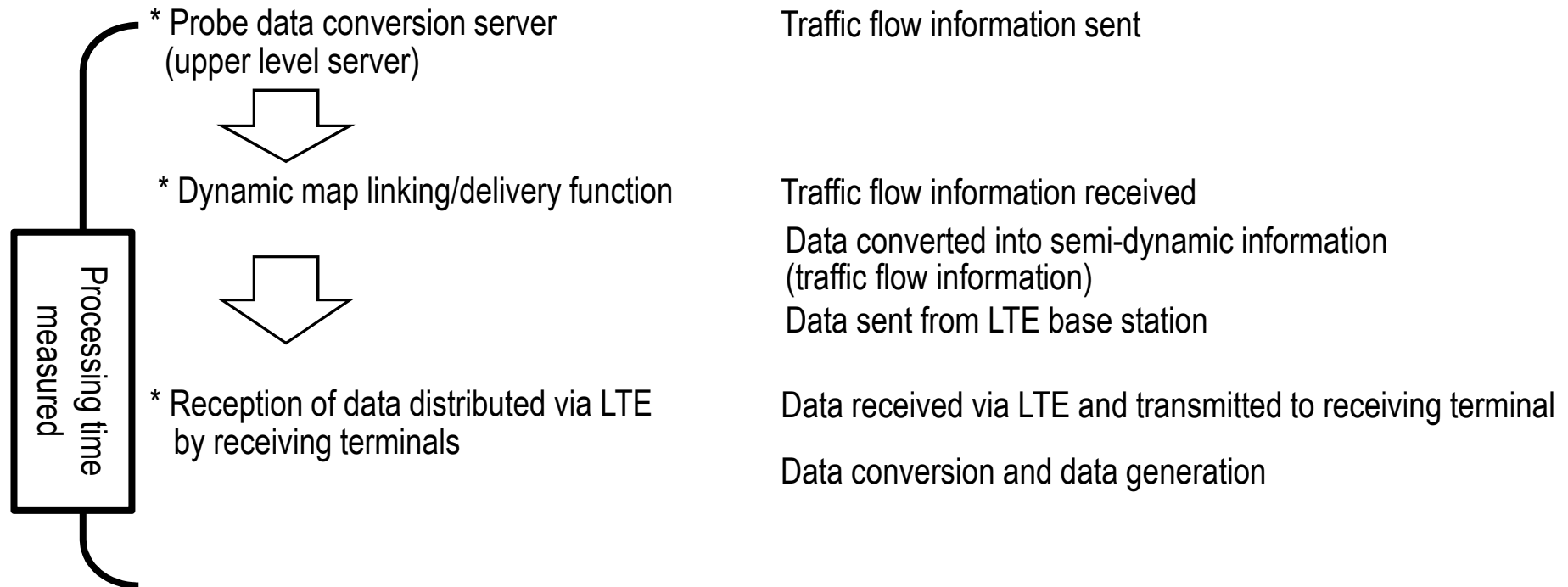
Automated driving level	Road-level traffic flow information	Lane-level traffic flow information
Level 1	○	(○)
Level 2	○	(○)
Level 3	(○)	○
Level 4	(○)	○
Level 5	(○)	○

6.4 Semi-dynamic information (traffic flow information) evaluation results

Cautions on Handling
Dynamic Map Field
Operational Test WG

(5) Results of verification of equipment side connection test

Connection testing was performed as follows:



When 100 items of traffic flow information were generated by a typical single transmission:

Processing time was 90.1 seconds.

Excluding wait time, processing time was approximately 16.2 seconds.

Note: Wait time can be improved in actual operation systems

6.4 Semi-dynamic information (traffic flow information) evaluation results

Cautions on Handling
Dynamic Map Field
Operational Test WG

(5) Results of verification of equipment side connection test

Table 6.4-1 Results of verification of number of items of traffic flow information/processing time (seconds) (connection test)

Device	Processing step	Minimum				Average				Maximum			
		100 items	300 items	600 items	1000 items	100 items	300 items	600 items	1000 items	100 items	300 items	600 items	1000 items
Dynamic map linking /delivery function	Data reception	2.8	8.4	18.0	28.2	3.2	8.5	18.0	29.4	3.8	8.5	19.0	29.5
	Reception completion confirmation (Wait 1: 30 seconds)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
	Conversion and data transfer	11.9	26.6	50.2	83.9	12.5	26.9	50.2	85.0	13.1	27.2	51.6	85.9
Receiving terminal	Wait time (Wait 2: Maximum of 60 seconds)	25.8	4.3	2.0	12.5	42.2	37.9	2.0	12.5	59.4	57.9	29.5	22.4
	Data reception	0.2	0.2	0.2	0.2	0.5	0.2	0.2	0.3	1.3	0.3	0.2	0.4
	Data conversion and data generation	1.6	2.9	7.0	9.0	1.7	4.0	7.0	17.3	1.8	4.9	14.9	66.5
Processing time total (including wait time)		57.1	36.0	33.3	43.4	73.9	69.9	33.3	43.8	91.4	89.9	61.2	54.1
Processing time total (excluding wait time)		15.2	36.4	74.0	120.5	16.2	37.7	74.0	130.7	18.0	38.9	84.0	180.7
Processing time total		72.2	72.4	107.3	163.9	90.1	107.5	107.3	174.5	109.4	128.8	145.2	234.8

6. Large-Scale Field Operational Test (Dynamic Map) Evaluation Results

Cautions on Handling
Dynamic Map Field
Operational Test WG

6.5 Dynamic information (signal/pedestrian/vehicle information) evaluation

[Implementation contents]

- Participants verified the reception of traffic signal information, crosswalk pedestrian detection information, and vehicle detection information distributed by ITS wireless transmission and traffic signal information distributed by advanced infrared beacon, and the linking of this information on the vehicle end to high-accuracy 3D maps.
- Participants evaluated the potential for lane level restriction information to be used as supplementary information for sensors in automated driving systems.

[Results]

- Many participants responded that dynamic information (Odaiba) could generally be used to supplement information from autonomous vehicle sensors for every automated driving level.
- Many respondents indicated that the current ITS wireless dynamic information update frequency (100 ms) would be sufficient for every automated driving level when using the information in autonomous vehicles.

6.5 Dynamic information (signal/pedestrian/vehicle information) evaluation and approach

Cautions on Handling
Dynamic Map Field
Operational Test WG

(1) Dynamic information test area

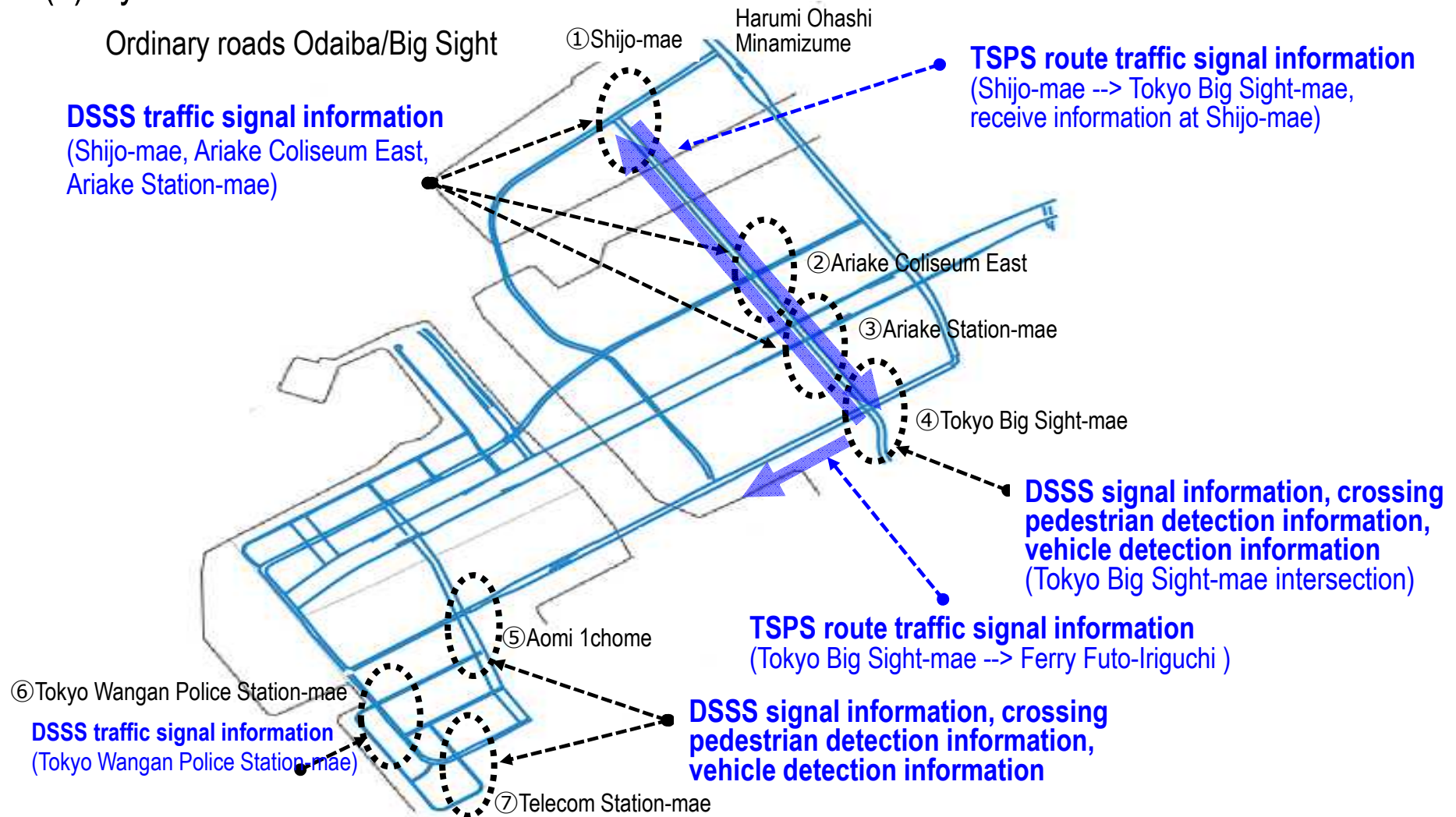
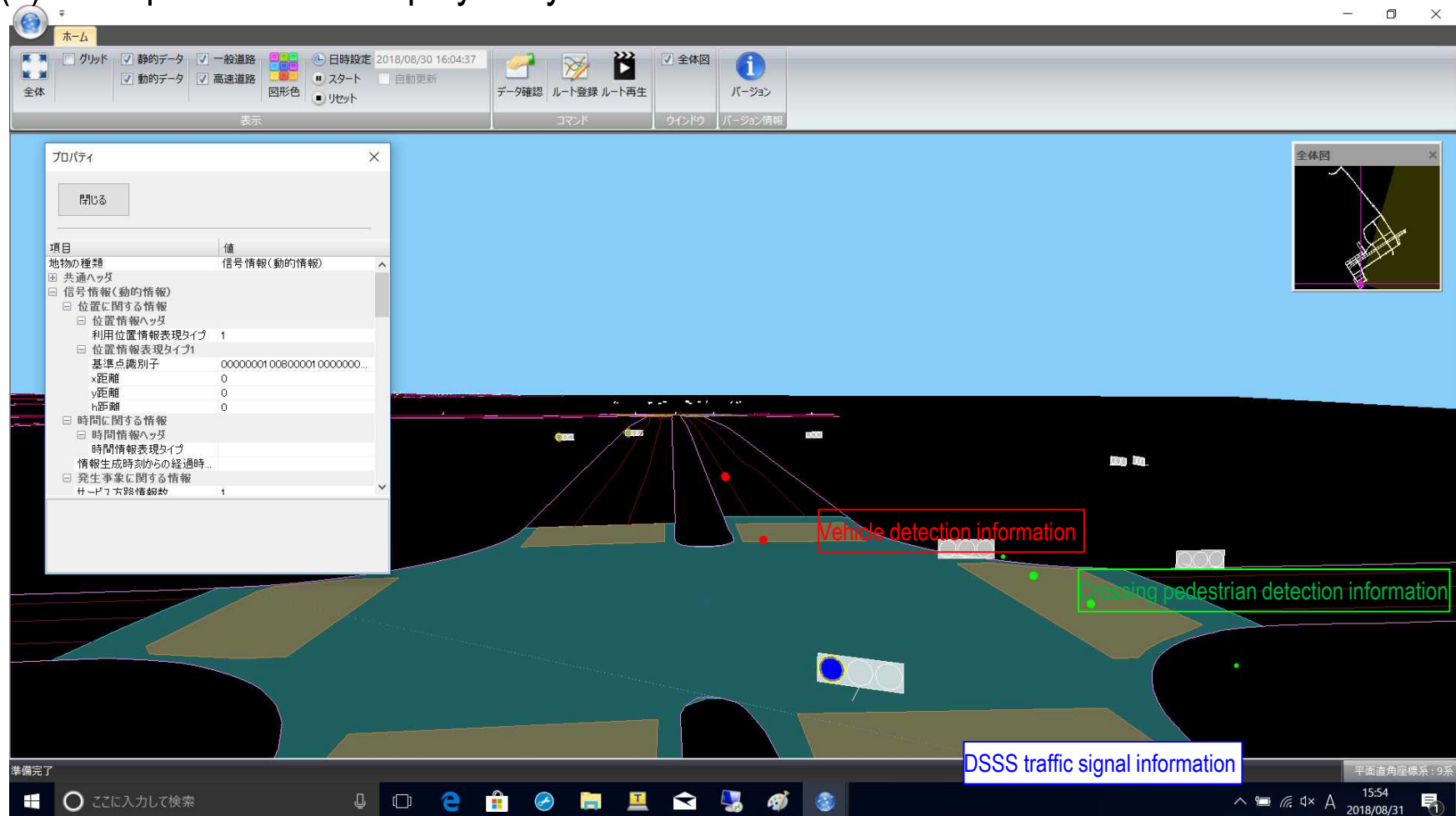


Fig. 6.5-1 Dynamic information (signal information, crosswalk pedestrian information, vehicle information) evaluation area

6.5 Dynamic information (traffic signal/pedestrian/vehicle information) evaluation and approach

Cautions on Handling
Dynamic Map Field
Operational Test WG

(2) Example of viewer display of dynamic information

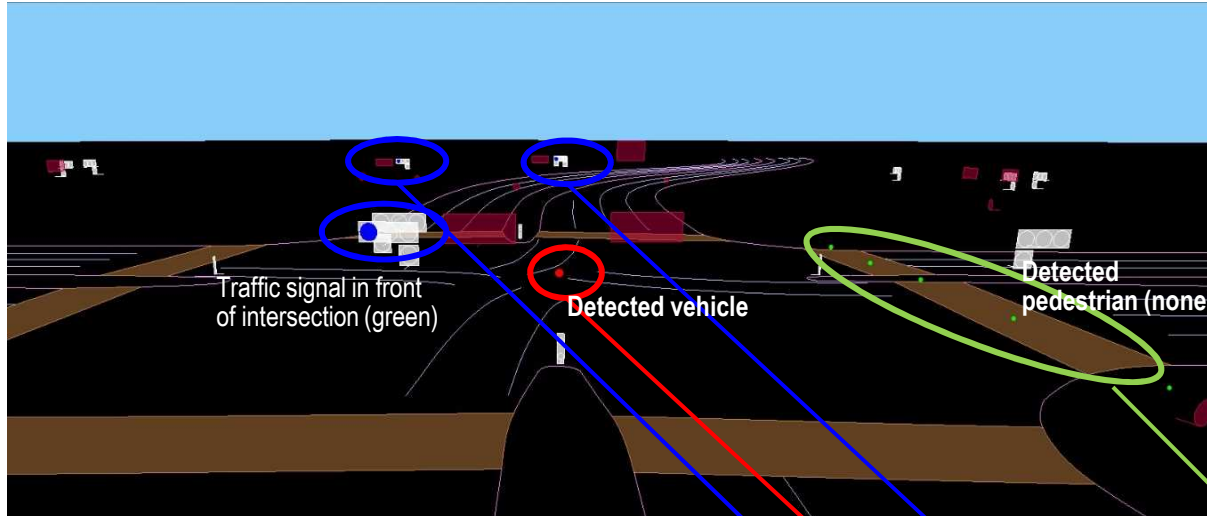


Example of viewer display of DSSS traffic signal information, crosswalk pedestrian detection information, and vehicle detection information (in front of Telecom Station)

6.5 Dynamic information (traffic signal/pedestrian/vehicle information) evaluation and approach

Cautions on Handling
Dynamic Map Field
Operational Test WG

(3) Comparison of dynamic information viewer display and actual conditions



Odaiba: Tokyo Big Sight-mae, 13:54:41 Nov. 26, 2018

Information displayed in viewer

White: Traffic signal

Red: Vehicle detection information

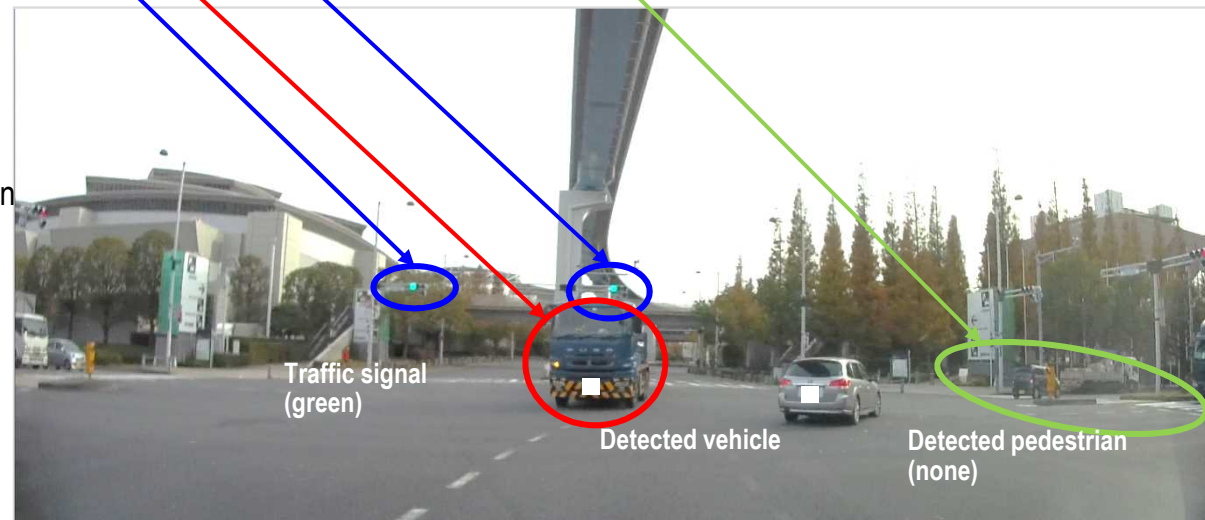
Yellow: Crossing pedestrian detection information

Brown: Pedestrian crossing

Pink: Road sign

[Verification results]

The traffic signal information, vehicle detection information, and crosswalk pedestrian detection information displayed in the viewer was confirmed to closely match the actual situation.



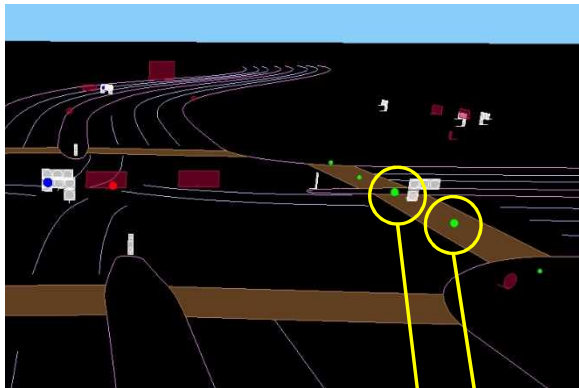
6.5 Dynamic information (traffic signal/pedestrian/vehicle information) evaluation and approach

Cautions on Handling
Dynamic Map Field
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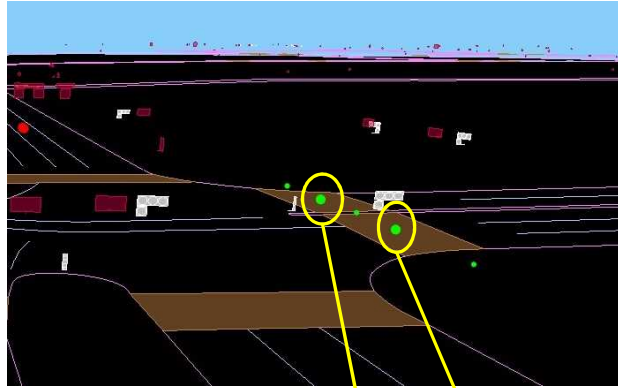
(3) Comparison of dynamic information viewer display and actual conditions

Confirmation of crossing pedestrian detection information

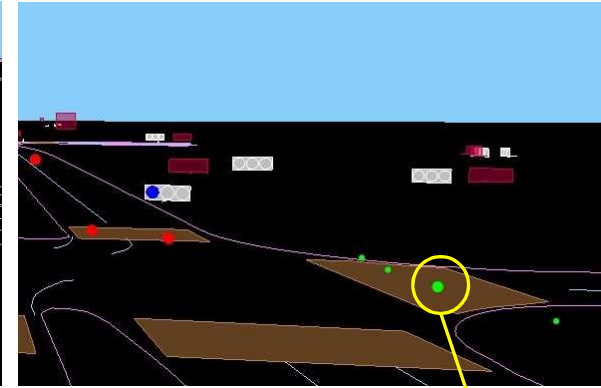
Tokyo Big Sight-mae
(Nov. 18, 2018)



Aomi Ichome
(Oct. 18, 2018)



Telecom Station
(Nov. 28, 2018)



E139° 47' 42.129" 2018/10/18 10:51:39 000km/h



08° 2018/10/18 13:23:24 000km/h



E139° 46' 40.757" 2018/11/28 12:27:11 004km/h

[Verification results] Crossing pedestrian detection information displayed in the viewer was confirmed to match actual conditions.

6.5 Dynamic information (signal/pedestrian/vehicle information) evaluation results

Cautions on Handling
Dynamic Map Field
Operational Test WG

(4) Results of dynamic information evaluation by test participants

- Many participants responded that [dynamic information](#) (Odaiba) [could generally be used](#) to supplement information from autonomous vehicle sensors [for every automated driving level](#).
- Many respondents indicated that the current [dynamic information update frequency \(100 ms\)](#) [would be sufficient for every automated driving level](#) when using the information in autonomous vehicles.

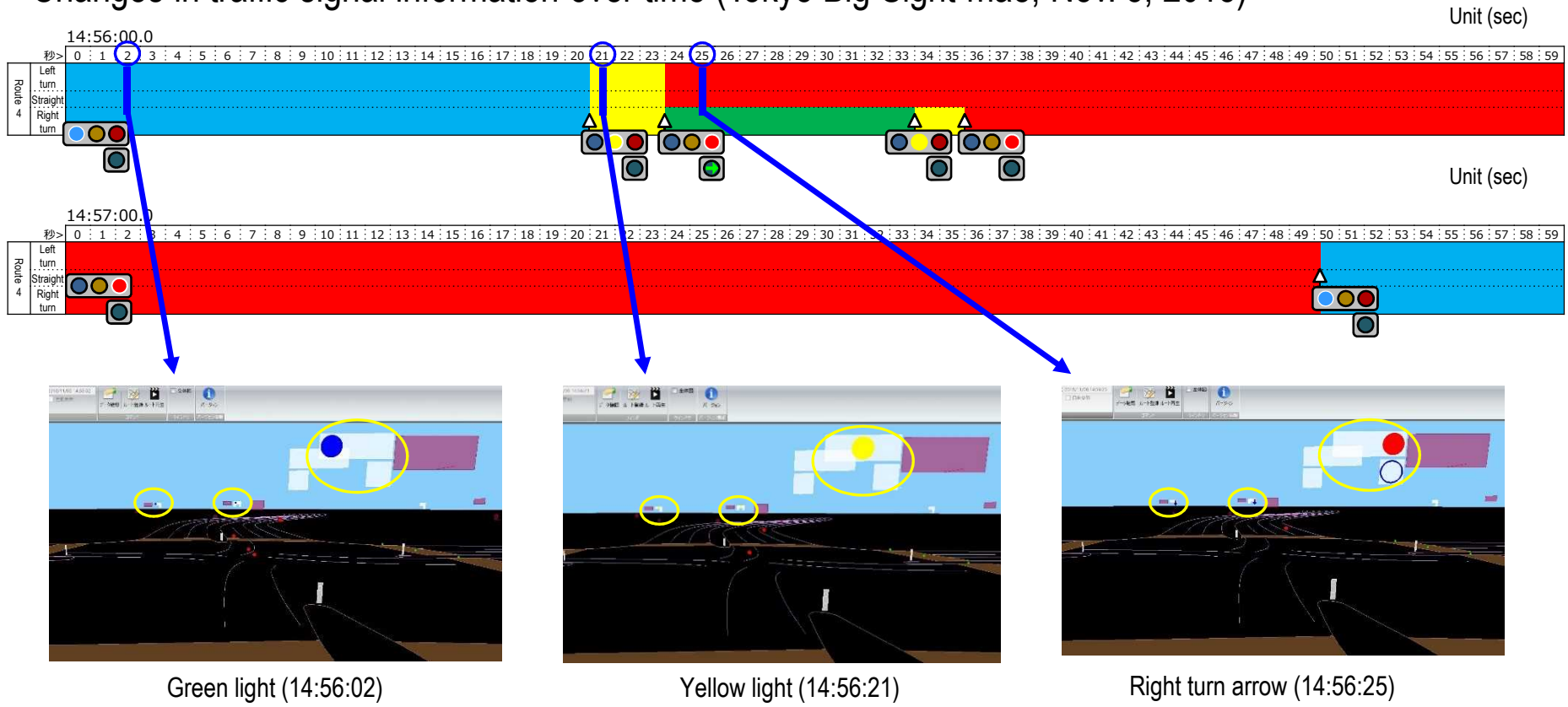
Automated driving level	Traffic signal information	Crossing pedestrian information	Right turn oncoming vehicle information
Level 1	○	(○)	(○)
Level 2	○	(○)	(○)
Level 3	○	○	○
Level 4	○	○	○
Level 5	○	○	○

6.5 Dynamic information (traffic signal/pedestrian/vehicle information) evaluation results

Cautions on Handling
Dynamic Map Field
Operational Test WG

(5) Results of verification of equipment side connection test

Changes in traffic signal information over time (Tokyo Big Sight-mae, Nov. 8, 2018)



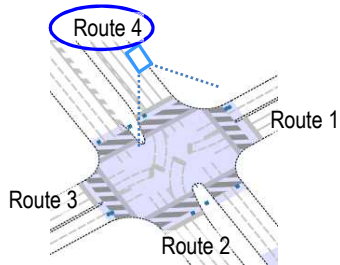
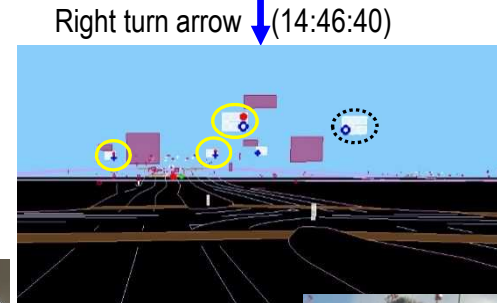
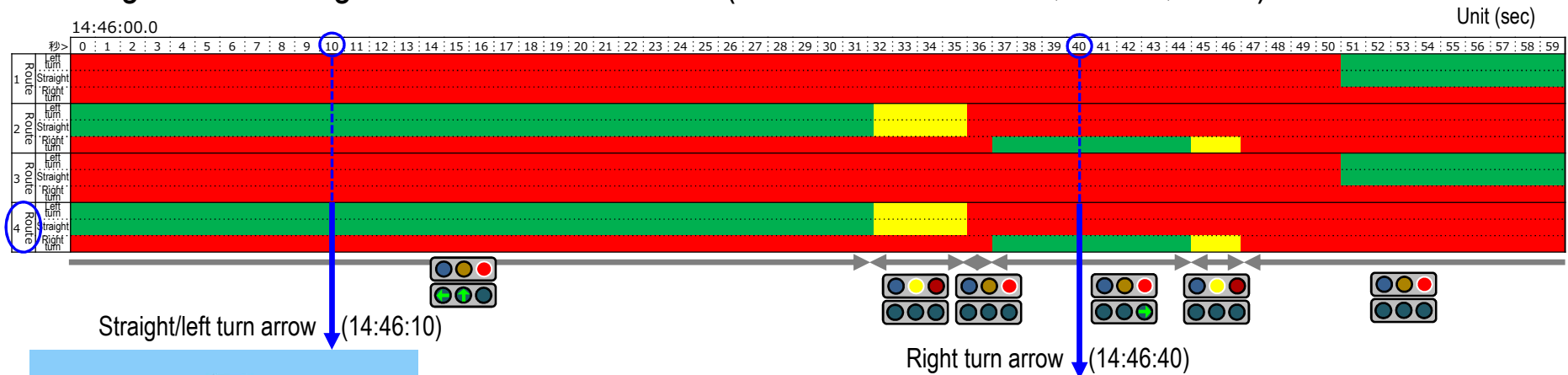
[Verification results] The traffic signal information was confirmed to change without gaps.

6.5 Dynamic information (traffic signal/pedestrian/vehicle information) evaluation results

Cautions on Handling
Dynamic Map Field
Operational Test WG

(5) Results of verification of equipment side connection test

Changes in traffic signal information over time (Ariake Coliseum East, Nov. 8, 2018)



[Verification results] The traffic signal information was confirmed to change without gaps.

7. Evaluation summary

Cautions on Handling
Dynamic Map Field
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Verification item		Verification contents	Verification results	
Dynamic map data provision and evaluation	Static high-accuracy 3D map data	Static high-accuracy 3D map data (entire test area) * Static high-accuracy 3D map data specifications * Features	1) Consensus regarding specifications reached by all 20 test participants (domestic and foreign OEMs, suppliers, etc.) (de facto standard development)	
		Static high-accuracy 3D map update data * Feature changes * Feature update frequency	1) Definitions of map updates, points to note when creating update data →Map update guidelines 2) Verification of method of updating autonomous vehicle dynamic maps after shipping (including rental vehicles and used vehicles)	
	Semi-dynamic information	Semi-dynamic information * lane level restriction information * Road level traffic flow information * lane level traffic flow information	Deliberation by SIP-adus + ISO standard development * Maps that use CRPs (Common Reference Points) in static high-accuracy 3D map data and information linking * Applicability to automated driving systems	1) Total number of test participants (domestic and foreign OEMs, suppliers, etc.): 20 It was confirmed that semi-dynamic information and dynamic information could be used as supplementary information for autonomous vehicle sensors by linking the information to high-accuracy 3D map data.
	Dynamic information	Dynamic information * Traffic signal information * Crossing pedestrian information * Vehicle detection information * Route signal information	Deliberation by SIP-adus + ISO standard development * Maps that use CRPs (Common Reference Points) in static high-accuracy 3D map data and information linking * Applicability to automated driving systems	2) On the equipment side, CRPs proposed to ISO were used to confirm that maps and information could be linked.

The results experimentally demonstrated that the dynamic map concept deliberated by SIP-adus contributes to practical implementation

Reference 1: Main inquiries from test participants and number of inquiries

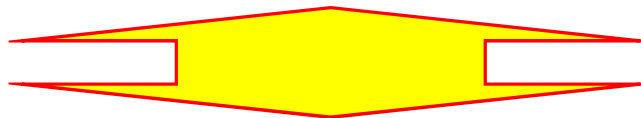
Cautions on Handling
Dynamic Map Field
Operational Test WG

Main inquiries from test participants from September 15, 2017, to December 31, 2018.
All inquiries were responded to.

Category	No. of inquiries*
1: Requests and proposals regarding conducting of test	36
2: Requests and proposals regarding test contents and evaluation	16
3: Requests and proposals regarding map data and specifications	75
4: Requests and proposals regarding data distribution system	64
5: Requests and proposals regarding administrative procedures	293
6: Requests and proposals regarding viewer	48
7: Requests and proposals regarding API	32
Total	564

As of December 31, 2018

* When single request or inquiry emails contained content regarding multiple categories, they were counted for each corresponding category.



Test participants and the Consortium are maintaining close communications while conducting testing

Reference 2: Feedback from dynamic map field operational test working group meetings (1/2)

Cautions on Handling
Dynamic Map Field
Operational Test WG

2nd WG meeting	Confirmed that high-accuracy 3D maps could be used for autonomous driving.	Saitama Institute of Technology
	Road changes after measurement produced differences in road signs and road markings between high-accuracy 3D maps and actual roads.	Results of evaluations by individual companies
4th WG meeting	Road sign design rules differ from those of Europe, so localization must be performed for Japan, and signage is unaccommodating for foreign drivers. Example: Auxiliary signs indicating restriction sections ("from here," "to here," "throughout city," etc.)	Mercedes-Benz
	Converted SIP dynamic map to company's own format. Confirmed that high-accuracy 3D maps closely match sensor data as well as actual roads.	Continental
5th WG meeting	There is unnecessary data that can be deleted and there are features for which accuracy can be reduced. Techniques need to be developed for drawing lane center lines in areas without carriageway lines.	Nissan
	Rubber poles and deceleration lanes should be prepared.	Honda
6th WG meeting	When restriction speeds differ from actual conditions during testing (such as when construction work or accident handling have been completed but speed reduction restrictions are still in place), the gaps between information and actual speeds can present dangers.	VW
	The center coordinates of roads in high-accuracy 3D maps closely matched vehicle-mounted GPS coordinates. However, road shapes (curvature) did not match expectations.	Subaru
	Confirmed that driving could be achieved even on snowy streets where vehicle-mounted cameras are difficult to use by combining high-accuracy maps with satellite measurement.	Mitsubishi Electric

Reference 2: Feedback from dynamic map field operational test working group meetings (2/2)

Cautions on Handling
Dynamic Map Field
Operational Test WG

7th WG meeting	Experimental testing of intersection merging arbitration using real-time edge computing as the next step for dynamic maps	Nagoya University
	For the most part, the level of accuracy is sufficient, but there was distance deviation for some sections.	Bosch
8th WG meeting	There were some differences between traffic congestion information and actual road environments. The timing of receiving traffic signal information was valid, but there was a delay of 0.3 to 0.7 seconds (average of 0.5 seconds) between the viewer display and the vehicle-mounted camera. Information non-delivery also occurred frequently, and needs to be addressed. Proposed viewer improvements (linkage with own vehicle locations, greater drawing stability, improved operability) and LTE connectivity improvements for the testing environment.	Toyota
	Proposed addition of auxiliary signs indicating restriction sections ("from here," "to here," "throughout city," etc.) to map data. There are multiple transmission media (ITS wireless, ETC2.0, advanced infrared beacons, experimental LTE), so the number of media should be reduced.	BMW
	Requested reflection of actual features on virtual features in high-accuracy 3D maps. ITS wireless dynamic information can be used as supplementary information for sensors, but Mazda requested improvements to oncoming vehicle detection reliability and to crosswalk pedestrian detection areas.	Mazda

Reference 3

Future Suggestions

- **From Inquiries and Questionnaire Responses –
(Notes for SIP Phase Two)**

Suggestions regarding devices and data [1/2]

- Below are comments and requests to the Dynamic Map Field Operational Test Secretariat regarding devices and data that relate to future efforts.
- There were an especially large number of requests regarding device provision timing and handling explanations. There were numerous inquiries regarding sample data, etc., before the first working group meeting, so it appears that it is necessary during the participant recruitment process to sufficiently explain to participants what issues can and cannot be handled.

Category	No.	Comments and requests regarding devices and data	Current handling status
Provision/ return	1	"We would like the data to be lent out until the end of the test."	As a general rule, participants were made to return data.
	2	"We would like to use the devices and data even after the end of the test."	— (Indicated that this should be coordinated with NEDO)
	3	"The ETC2.0 vehicle-mounted devices and 760MHz receivers were supplied later than they should be. They were not supplied in time for the heavy construction on the Tomei Expressway. We would like the transmission test period to be given due consideration."	—
	4	"There was not enough time between when the 760MHz receivers were supplied and the submission deadline for evaluation sheets."	—
	5	"The semi-dynamic information specifications and sample data were supplied later than they should have been, which affected development plans."	—
	6	"We would like for the timing of the ETC2.0 vehicle-mounted device set up period to be coordinated after conducting interviews with test participants."	—
Functions	7	"We would like to be able to change the perspectives and angles, etc. of the viewer simulation function."	—
	8	"We would like to be able to load multiple routes into the viewer."	—
Evaluation and analysis	9	"We would like to know the purpose of submitting evaluation sheets."	Explained in working group meeting
	10	"We would like to import distributed data from the lent computer to perform analysis."	— (The distributed information was VICS information, so it cannot be imported from the lent computer)
	11	"We would like to connect the receiving terminals (computers) to the internet." (to use Google Earth, etc.)	— (Not possible due to security considerations)

* Comments and requests regarding devices and data that were addressed during the course of the field operational test have been omitted.

Suggestions regarding devices and data [2/2]

Cautions on Handling
Dynamic Map Field
Operational Test WG

Category	No.	Comments and requests regarding devices and data	Current handling status
Operation explanation	12	"We do not know how to use the devices, and would like to be able to consult regarding operation by phone."	Handled by development personnel by phone.
	13	"We do not know how to use the devices, and would like to be able to consult regarding operation in person."	Handled by development personnel in person.
	14	"We would like if time were taken to explain the installation process during the demonstration."	—
	15	"After the instruction manual was distributed, numerous revisions were made, creating confusion."	—
	16	"The device explanation was easy to understand, but the explanations of the viewer and the data were hard to understand, so we had to request additional, separate explanations."	—
	17	"There were too many distributed materials. We would rather if the installation manual, instruction manual, and function explanation documents were collected into a single manual."	—
	18	"The receiving terminal settings were confusing."	Handled through inquiries by individual participants.
License agreement	19	"Submitting separate license agreements for each device and data was time-consuming and inconvenient. We would appreciate if a single agreement were made for participants and the contractor."	—
Other (requests received before first WG meeting)	20	"We would like the specifications of the sample data supplied after recruiting participants to be revised."	— (The specifications and adaptations of specifications were created by another organization, so they will not be changed)
	21	"We would like to receive materials regarding the specifications of the CSV files distributed by the dynamic map distribution center to receiving terminals, the transmission protocols used, and other related information."	— (Confidential)
	22	"We would like to be able to directly access the dynamic map distribution center, without using the provided receiving terminals."	—

* Comments and requests regarding devices and data that were addressed during the course of the field operational test have been omitted.

Suggestions regarding Secretariat operations [1/2]

Cautions on Handling
Dynamic Map Field
Operational Test WG

- Below are comments and requests to the Dynamic Map Field Operational Test Secretariat regarding Secretariat operations that relate to future efforts.

Category	No.	Comments and requests regarding Secretariat operations	Current handling status
Contact	1	"We would like to register multiple contact persons."	One person is registered as a contact representative, but a mailing list can be used for contact personnel email addresses.
	2	"When sending large files, for security reasons we cannot use file transfer services."	Use compressed file attachment segmentation function.
	3	"We would like the Secretariat to organize the documents that are to be submitted, and the deadlines for submission, when contacting us."	Attached a domestic administrative notice list, containing document submission plans, deadlines, formats, and the like, to submission request emails.
	4	"It would be more convenient if domestic administrative notices used chronological order by submission deadline."	—
	5	"We would like a web system that could be used to manage submission material formats and submission status."	—
Working group meetings	6	"We would like to coordinate who will attend meetings, so we would like an agenda to be provided in advance."	Include the agenda in working group meeting attendance confirmation emails.
	7	"We come to the meetings from far away by shinkansen, so we would like the meetings to be scheduled such that we do not have to arrive the night before."	Meetings were held in conference rooms in the Tokyo Station area, and, as a rule, started at 2:00 p.m.

Suggestions regarding Secretariat operations [2/2]

Cautions on Handling
Dynamic Map Field
Operational Test WG

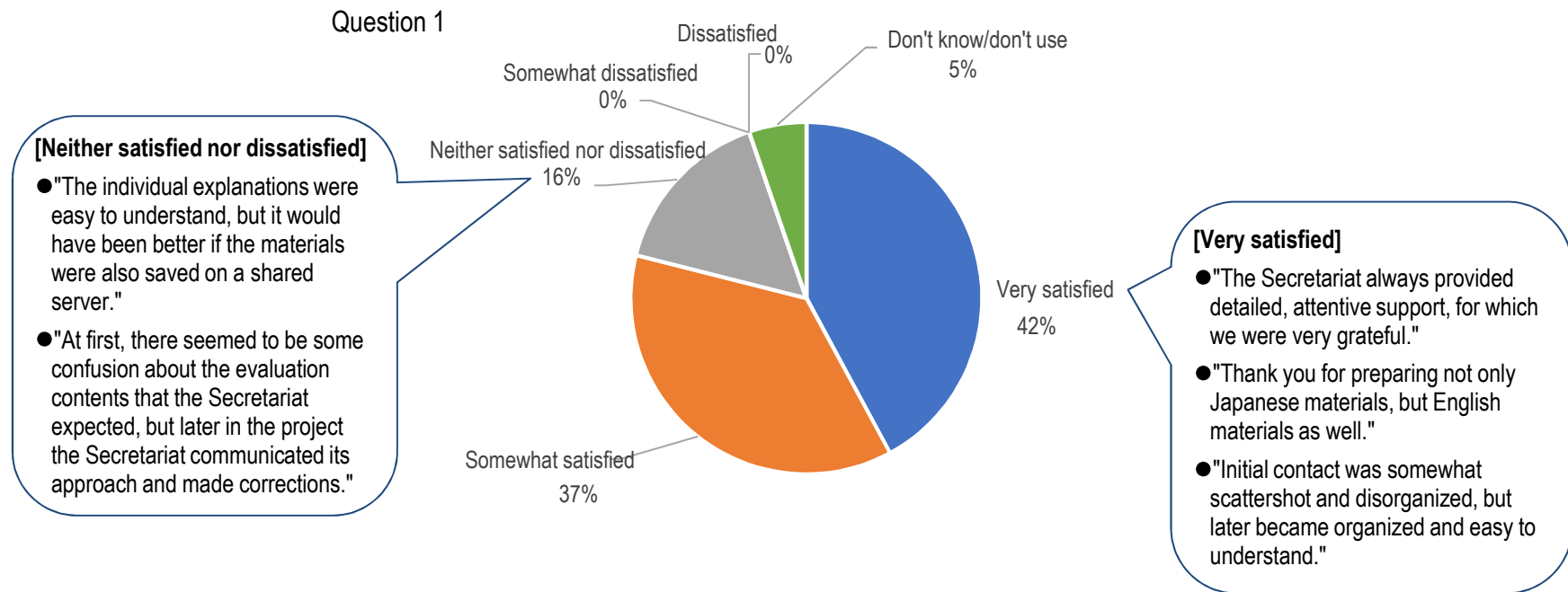
Category	No.	Comments and requests regarding Secretariat operations	Current handling status
English translations	8	"We would like to be provided with English translations of materials."	English translations are provided roughly one month after the finalization of Japanese versions of decided items and working group materials. Materials which are still being coordinated are not translated.
	9	"It takes a long time for English-language versions to be provided."	—
	10	"We are happy that it was possible to field English language inquiries from technical personnel in our home country."	—
Other	11	"We would have liked if there were opportunities for freer discussion and information-sharing between the Secretariat and test participants, and between participants."	—
	12	"We believe that implementing automated driving will require collaboration between the public and private sector, but we didn't feel that there was enough collaboration with road management companies or traffic information providers."	—
	13	"There was extremely little time between the November 13, 2017, media handling request and the deadline, which created a lot of problems."	—

Results of the Questionnaire Regarding Dynamic Map Field Operational Test Secretariat Operation

Questionnaire results

Cautions on Handling
Dynamic Map Field
Operational Test WG

Question 1 Clarity of the contents of notifications and requests from the Secretariat



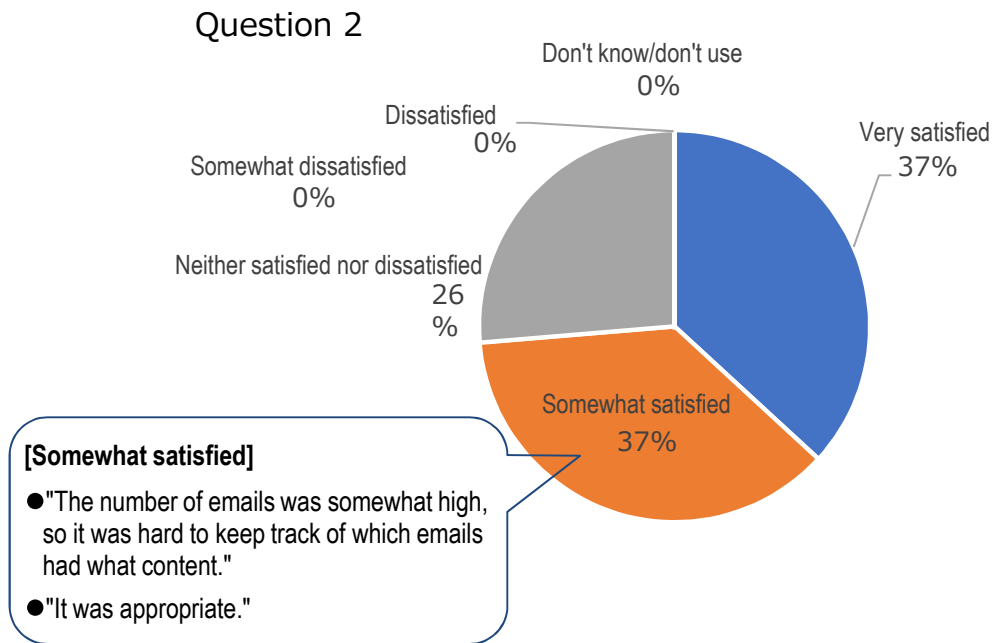
Suggestions for the future

Establish a dedicated telephone number for the Secretariat and assign dedicated staff, centralizing contact for the project.

Questionnaire results

Cautions on Handling
Dynamic Map Field
Operational Test WG

Question 2 Timing of notifications and requests from the Secretariat



Suggestions for the future

Perform Secretariat contact beforehand. Specifically, in the case of submission materials with distant deadlines (questionnaires, evaluation sheets, etc.), or notifications of breaks, contact multiple times (three months in advance, one month in advance, one week in advance, etc.).
Perform working group meeting attendance confirmation roughly three weeks in advance.

Questionnaire results

Cautions on Handling
Dynamic Map Field
Operational Test WG

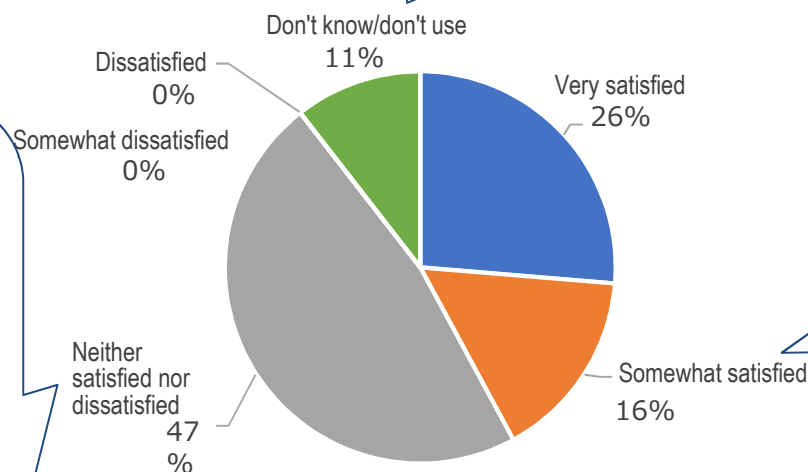
Question 3

Usefulness of the domestic administrative notices to test participants provided via email and working group materials

Question 3

[Don't know/don't use]

- "The Secretariat always provided detailed, attentive support, for which we were very grateful."



[Neither satisfied nor dissatisfied]

- "The information was arranged in the order of delivery, but participants are focused on submission deadlines, so the notices sometimes felt somewhat hard to read. It wasn't clear where to look, and the notices often required scrolling. I think the grayed out items could be collapsed."
- "Sorry, but we didn't use them much."
- "Even for notices in which the email text itself was the main content, a separate password email was always sent, making email transfers within our organization somewhat bothersome."

[Somewhat satisfied]

- "They made it clear what had been requested and what had not been requested, which was very helpful. The font was somewhat small and hard to read, though."

Suggestions for the future

Submission material request status and future plans must be managed and relayed in lists. The lists must be provided in order of submission deadline, and web-based notification methods need to be established.

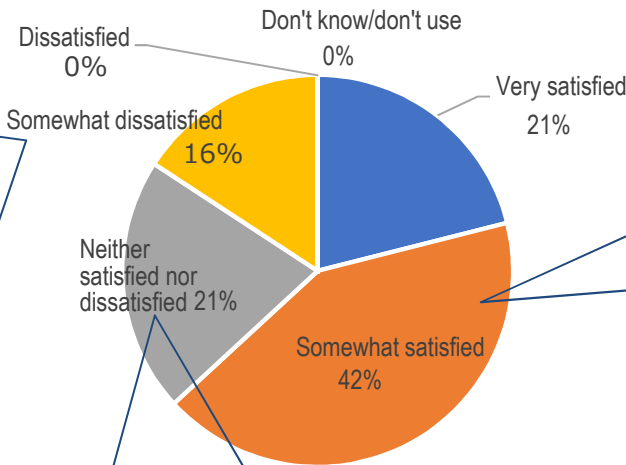
Questionnaire results

Cautions on Handling
Dynamic Map Field
Operational Test WG

Question 4

Time between requests and submission/confirmation deadlines (One month or longer was provided for submission of evaluation sheets and roughly one week was provided for confirmation of meeting minutes, etc.)

Question 4



[Somewhat dissatisfied]

- "There was only one participant-side contact person, so issues had to be handled in a rush when email couldn't be checked due to the person being on a business trip, etc. We would like there will be two contact people."
- "Having only one month between receiving the 760MHz receiver and submitting the evaluation questionnaire results was a bit tight. It might be sufficient if it were equipment we were familiar with, but when using equipment for the first time, after receiving the equipment we needed to first install the driver, mount the equipment in the vehicle, confirm that it operated correctly, etc. These preparations took time, as did answering the questionnaire, so there were only two weeks or so for the test itself. For companies like ours, working from distant locations, it is no easy matter to go out into the field again if problems are discovered, so we would have appreciated more time."
- "There was not sufficient evaluation time for some of the dynamic and semi-dynamic data evaluation sheets. Other than those, there was sufficient time."

[Somewhat satisfied]

- "Enough time was given, but unfortunately we submitted items late nonetheless, for which we apologize."
- "Deadlines did include some time to spare."

[Neither satisfied nor dissatisfied]

- "It would have been of tremendous assistance if the English-language versions of the evaluation sheets were provided at the same time as the Japanese-language versions, or if they were translated and provided before other meeting materials."

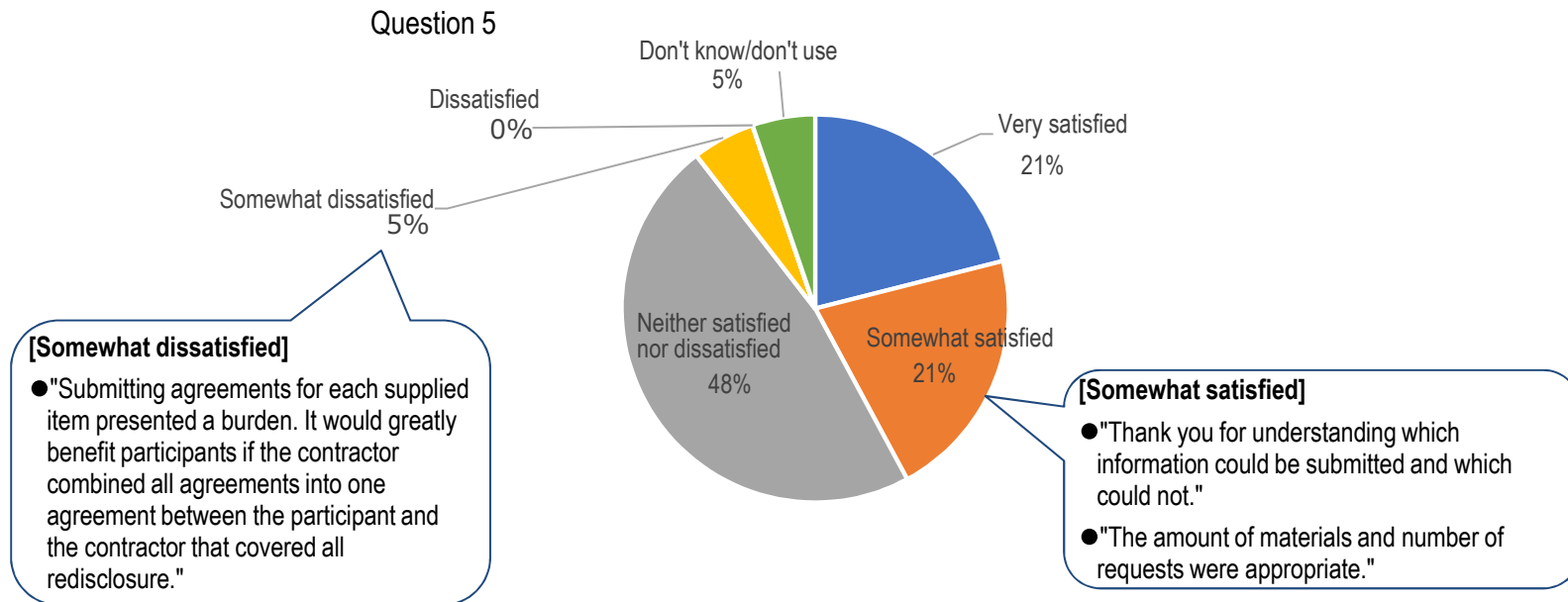
Suggestions for the future

One month or longer should be allotted for evaluation sheets, etc., which take some time to answer. Submission/confirmation deadlines of roughly one week would be sufficient for other materials (meeting minute confirmation, etc.). Participants hope that, in the future, devices are provided earlier when evaluation sheet responses require testing to be performed.

Questionnaire results

Cautions on Handling
Dynamic Map Field
Operational Test WG

Question 5 Amount of materials to submit and number of requests received



Suggestions for the future

The number of documents that must be submitted by test participants must be minimized by, for example, combining all equipment and data usage agreements into a single usage agreement.

Questionnaire results

Cautions on Handling
Dynamic Map Field
Operational Test WG

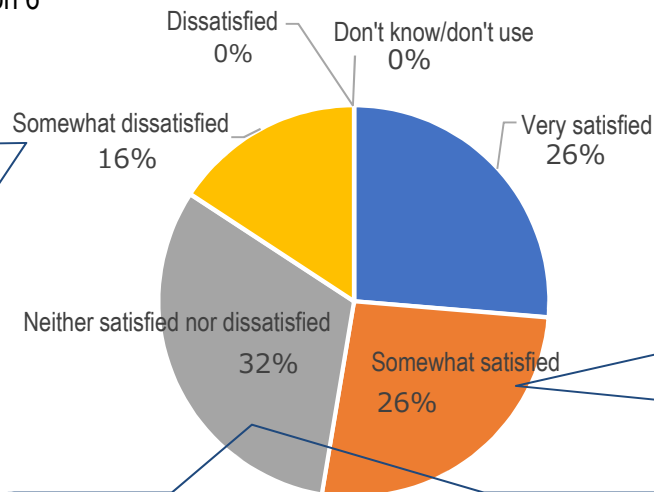
Question 6

Organization and clarity of explanations regarding data, devices, etc. (Operation manuals were provided and demonstrations were conducted, etc.)

Question 6

[Somewhat dissatisfied]

- "Instruction manuals: Corrected versions were distributed afterwards. Demonstrations: The explanations of how to use the software were sufficient, but the installation explanations seemed somewhat lacking."
- "There were some difficult to understand aspects of configuring the data reception systems lent out for the test. However, when we asked about them, we received prompt and appropriate responses, so they did not present any major difficulties."
- "There were a large number of distributed materials, so it took a long time to find the information we were looking for."



[Somewhat satisfied]

- "We were able to perform set up by following the instruction manual."
- "We also received a direct explanation, which was very helpful."

[Neither satisfied nor dissatisfied]

- "The device explanations were easy to understand, but the Viewer and data manuals were hard to understand, and there were many items which only become clear after asking follow-up questions."
- "The installation manuals, instruction manuals, and function explanation documents were all separate documents, and it took some time to get used to working with them."
- "There were some terminology problems. What was provided this time was not an API (Application-Program Interface), but a UI (User Interface). When announcing this information to outside parties, you should be prepared for issues like being pointed out by people involved in IT."

Suggestions for the future

To avoid confusing test participants, devices and device instruction manuals should be thoroughly checked in advance. When distributing devices and data, it would be best to give demonstrations and to share the locations of the latest versions of instruction manuals.

Questionnaire results

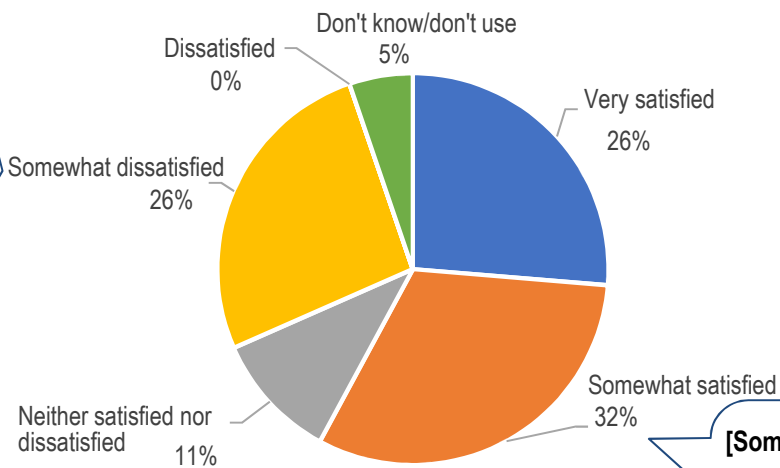
Cautions on Handling
Dynamic Map Field
Operational Test WG

Question 7 Timing of the provision of data and devices

[Somewhat dissatisfied]

- "It took too long to provide the participants with the dynamic data receivers."
- "The semi-dynamic information specifications and sample data were provided too late, affecting our development plans. We would have preferred if we had been supplied with tentative specifications, with clear indications of what items were still undecided. We created test plans meant to coincide with the heavy construction planned for the Tomei Expressway, but because of how late the ETC drivers were provided, we were unable to implement those test plans. This problem could have been avoided by planning a transmission test before the main test."
- "We wish the devices were sent out as soon as they were ready, even if that were ahead of schedule. We found the timing of the 760MHz receivers to be particularly late."
- "We wrote about the 760MHz receivers in Question 4."
- "The 760MHz receivers were provided too late in the test period (but that is still better than removing them from the test completely)."

Question 7



[Somewhat satisfied]

- "We wish the 760MHz receivers had been sent with more time to spare."
- "We wish the 760MHz devices had been sent sooner."

Suggestions for the future

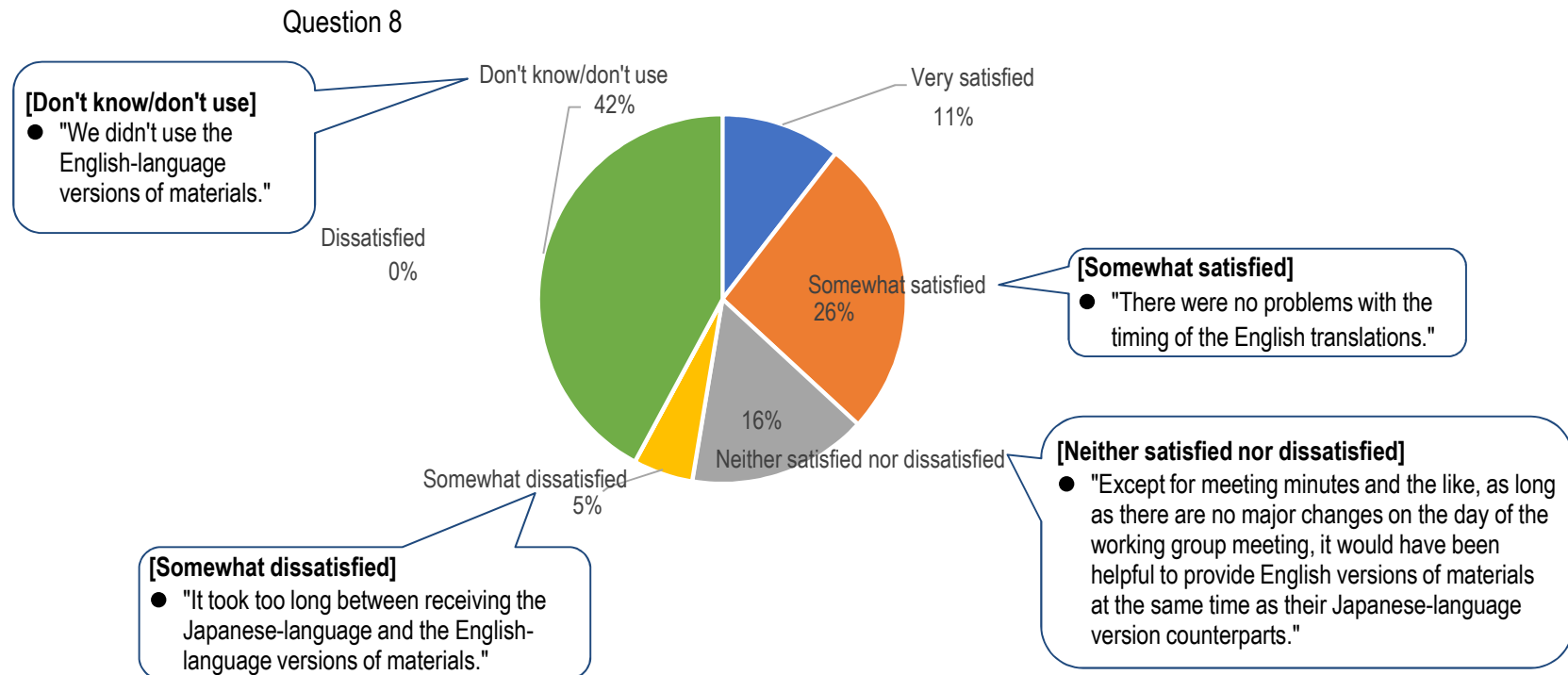
Sample data and specifications related to evaluation sheet submission should be provided as early as possible. Test devices related to the submission of evaluation sheets need to be supplied at least one month in advance.

Questionnaire results

Cautions on Handling
Dynamic Map Field
Operational Test WG

Question 8

Amount of time taken to supply English translations of materials
(In order to accelerate the information sharing process, Japanese materials were sent first, and then English materials were sent once they had been translated.)



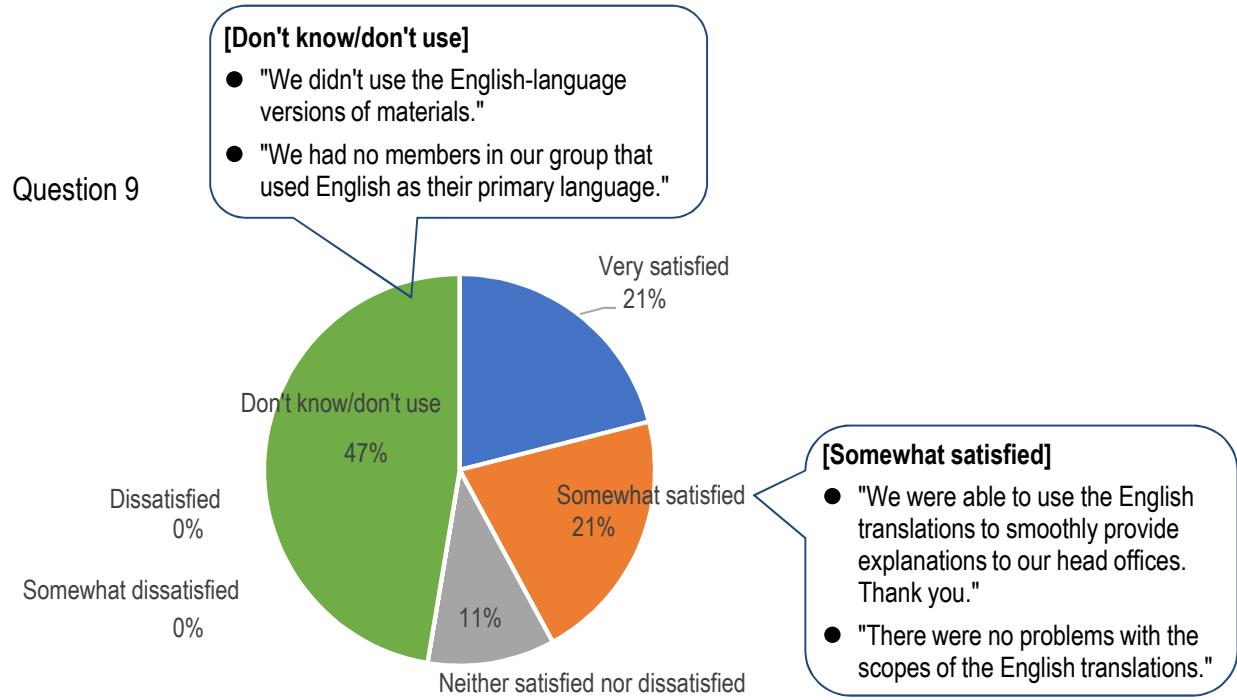
Suggestions for the future

English-language versions of working group materials and specifications should be provided soon after Japanese-language versions.

Questionnaire results

Cautions on Handling
Dynamic Map Field
Operational Test WG

Question 9 Scope of the English translations of materials

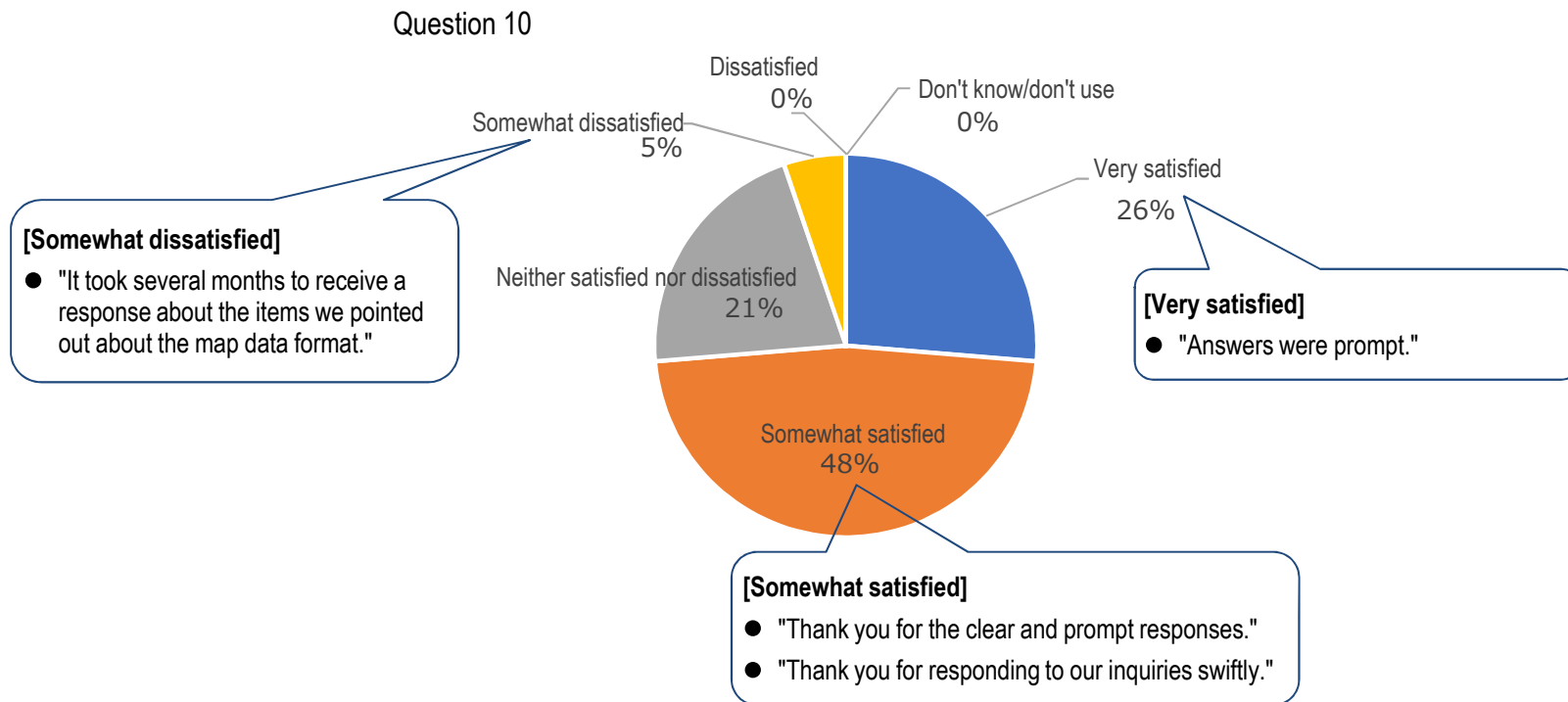


Suggestions for the future The current approach of providing English-language versions of finalized materials is fine.

Questionnaire results

Cautions on Handling
Dynamic Map Field
Operational Test WG

Question 10 Amount of time between inquiries and responses



Suggestions for the future

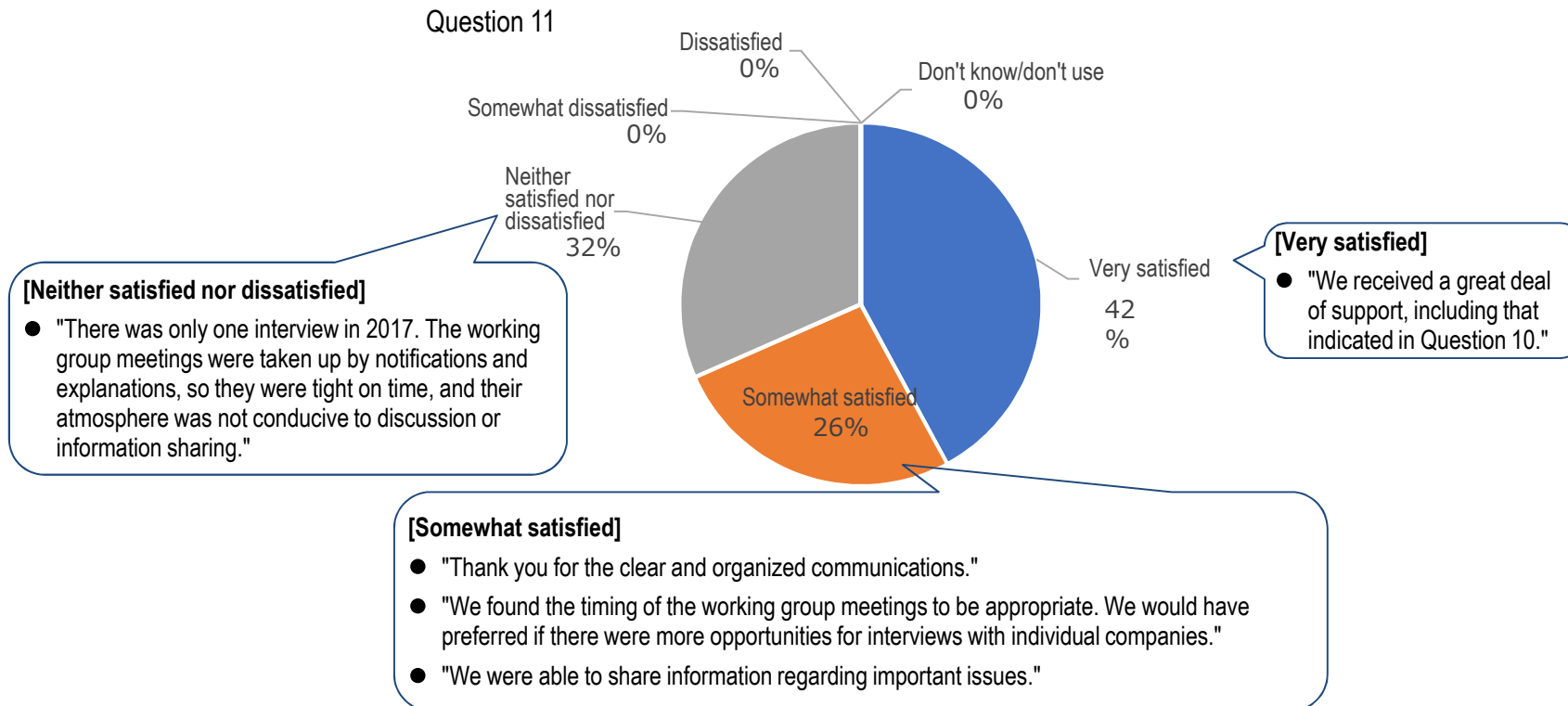
A system needs to be developed for handling all inquiries without fail, such as setting up a dedicated inquiry contact point, creating an escalation system linked to the contents of inquiries, and carefully managing inquiry response status, etc.

Questionnaire results

Cautions on Handling
Dynamic Map Field
Operational Test WG

Question 11

Amount of communications between the Secretariat and test participants (working group meetings, interviews, etc.)



Suggestions for the future

There need to be interviews during the initial stages of the field operational test to align expectations and understanding, and again in the middle stages of the field operational test to address inquiries and requests.

Questionnaire results

Cautions on Handling
Dynamic Map Field
Operational Test WG

Question 12 If you have any other comments, please enter them here.

Contents of free comments
<ul style="list-style-type: none"> "Throughout the FOT period, there were many issues regarding which we had a naïve understanding, so we made numerous inquiries. All of our inquiries were handled with care and sincerity. We would like to take this opportunity to express our gratitude again."
<ul style="list-style-type: none"> "We are not currently carrying out any field operational testing, and we don't know what from this field operational testing could serve of use for the logistics industry, nor how it could be useful. We would like to consider this during the dynamic data testing."
<ul style="list-style-type: none"> "A lot happened over the year and a half of the testing, so some things may have slipped our minds. If this questionnaire had been administered from the start of the test, we might have been able to enter items as we encountered them."
<ul style="list-style-type: none"> "When we could not get the equipment or software to work, we were unsure if the problem was with us or with the equipment/software. We asked the Secretariat, and they were very helpful. We would have liked if there were more opportunities for free discussion and information-sharing between the Secretariat and test participants, and between participants."
<ul style="list-style-type: none"> "We participated primarily for the semi-dynamic information testing, but there were many changes to when specifications were provided, as well as to their restrictions, which made it difficult for us to coordinate our resources and the contents of the testing. We understand that you did your best to coordinate with external organizations, but it would have been very helpful had issues which have a significant impact on test system configuration, such as the inability to export received data, been fixed at an earlier time."
<ul style="list-style-type: none"> "We apologize for not being able to produce any major output. We do not have any comments regarding the Secretariat, but we as we believe that implementing automated driving will require collaboration between the public and private sector, we felt that there wasn't enough collaboration with road management companies or traffic information providers."
<ul style="list-style-type: none"> "We appreciate all of the care that went into creating English translations and answering our questions."
<ul style="list-style-type: none"> "There was extremely little time to respond to the media handling request issued on November 13, 2017, although we understand that this was due in part to the need coordinate with the Cabinet Office. Other than that, information was provided in advance, enabling us to make effective testing plans, for which we are grateful."
<ul style="list-style-type: none"> "The project involved a large amount of information (such as corrected information), and it took a great deal of time to check the required procedures. In particular, for the 760MHz traffic signal information testing, there was very little time between when the devices were supplied and when the evaluation and questionnaire results needed to be submitted. We felt that this issue presented an obstacle to performing thorough testing. On the other hand, the Secretariat provided us with a great deal of support in response to our numerous questions, which helped to ameliorate this issue. We would like to again express our appreciation to the Secretariat."
<ul style="list-style-type: none"> The project was well-organized and managed, and we were able to carry out the verification safely and efficiently. The information that was provided was also valuable."
<ul style="list-style-type: none"> "When we asked about a testing method that was not in the plan, the Secretariat immediately handled our inquiry. Thank you."