Survey Project Regarding Influences and Effects on Traffic Flow for Verification Test in Tokyo Waterfront Area in 2020,

Shown in

Automated Driving (Practical Use of System/Services) in Period#2, Strategic Innovation Promotion Programs (SIP)

Outline of Report

NIPPON KOEI

March, 2019

1. Outline of Survey

(1) Survey/Analysis on Influences/Effects on Traffic Flow

- Formulate the plan on traffic-flow survey in Waterfront/Haneda Area: Conduct survey.
- Conduct the survey on demand by development plan to execute traffic simulation.
- Construct the database of fundamental data for conducting verification test and studying apply of infrastructures based on the above survey:
  e.g., Study for necessity of simulation on changes of influences/effects

(2) Formulation of Verification Plan/Work Schedule, Progress Management (Secretariat Division in Task Force)

- Conduct related secretariat div. by holding Task Force meetings to arrange the work schedule on infrastructure construction: Coordinate with the stakeholders.
- Coordinate the individual meeting dates and inquire about opinions on issue lists (draft)/work schedule (draft) for the preparation of Task Force meetings.

2. Survey/Analysis on Influences/Effects on Traffic Flow (Survey Plan)

◆ Survey Purpose

Verify the impacts on the existing usual traffic flow in introducing necessary infrastructures, new traffic control/regulation system for the automated-driving verification test.

◆ Survey Target/Contents

Tokyo Waterfront City Area: ① 1-Chome, AOMI
② DAIBA
③ Tokyo Keisatsu-Sho Mae
→ Survey of traffic flow/volume, traffic-jam/storage length, and signal indication

Haneda Airport Area : ① Signalized intersection → Survey of traffic flow/volume, traffic-jam/storage length and signal indication
② Diverging/Merging section → Survey of traffic volume
③ Terminal front road → Survey of departure/arrival *Grasp of time/stand-by place
④ Overall route → Survey of travel speed

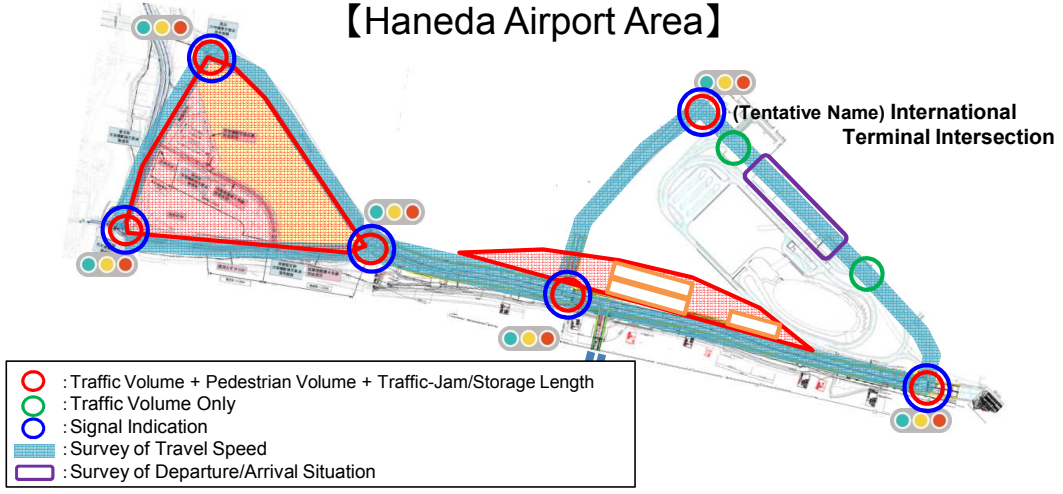
◆ Survey Period

7:00 to 19:00 *Sep. 9th (Sun.) & Sep. 12th (Wed.)

*International Terminal Intersection (tentative name): Survey on a 24-hour basis, until 7:00 on Sep. 10th (Sun.) & Sep.13th (Thurs.)

【Tokyo Waterfront City Area】

【Haneda Airport Area】



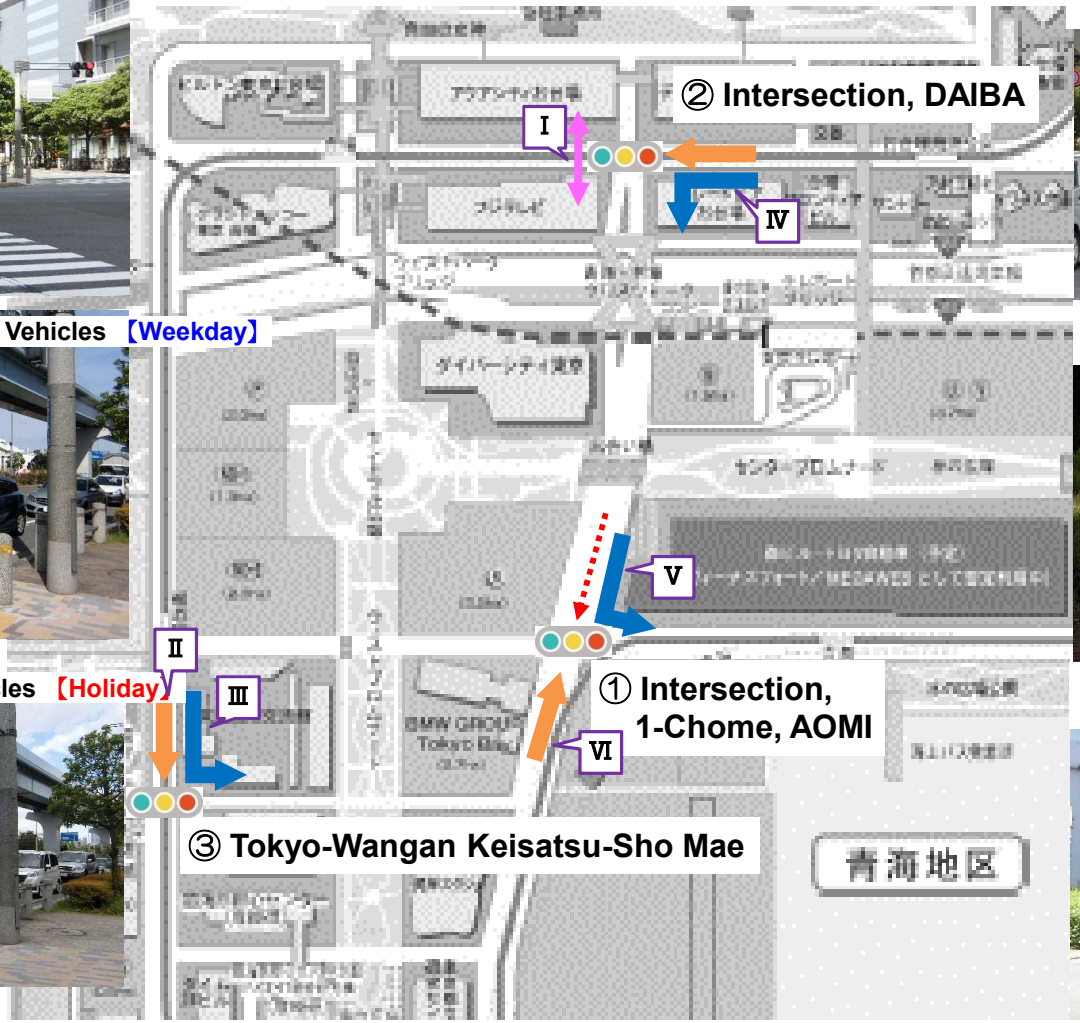
3. Survey/Analysis on Influences/Effects on Traffic Flow
(Survey Result: Tokyo Waterfront City Area)

- **Tokyo Waterfront City Area**: More vehicles/pedestrians on weekdays than holidays, except 1-Chome, AOMI
- **1-Chome, AOMI**: No traffic jams occurred, despite numerous straight-going vehicles to the south on weekdays.
  Temporary traffic jams occurred around 11:00: Numerous left-turn vehicles to the north on holidays.
- **DAIBA:** No traffic jams occurred, despite numerous straight-going/left-turn vehicles to the west on both days.
- **Tokyo-Wangan Keisatsu-Sho Mae:** Numerous vehicles to the west on both days: High percentage of the straight-going vehicles on weekdays, while more left-turn vehicles on holidays

Ⅰ. Many Pedestrians to the South to East 【Holiday】

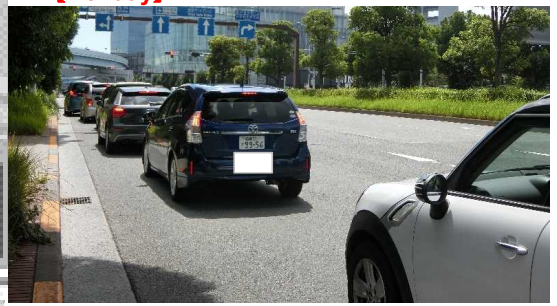
Ⅱ. High Rate of the Straight-Going Vehicles 【Weekday】

Ⅲ. High Rate of the Left-Turn Vehicles 【Holiday】



Ⅳ. High Rate of the Straight-Going/Left-Turn Vehicles 【Weekday】

Ⅴ. Traffic Jam by the Left-Turn Vehicles Masses 【Holiday】



Ⅵ. High Rate of the Straight-Going Vehicles 【Weekday】

3. Survey/Analysis on Influences/Effects on Traffic Flow

(Survey Result: Tokyo Waterfront City Area)

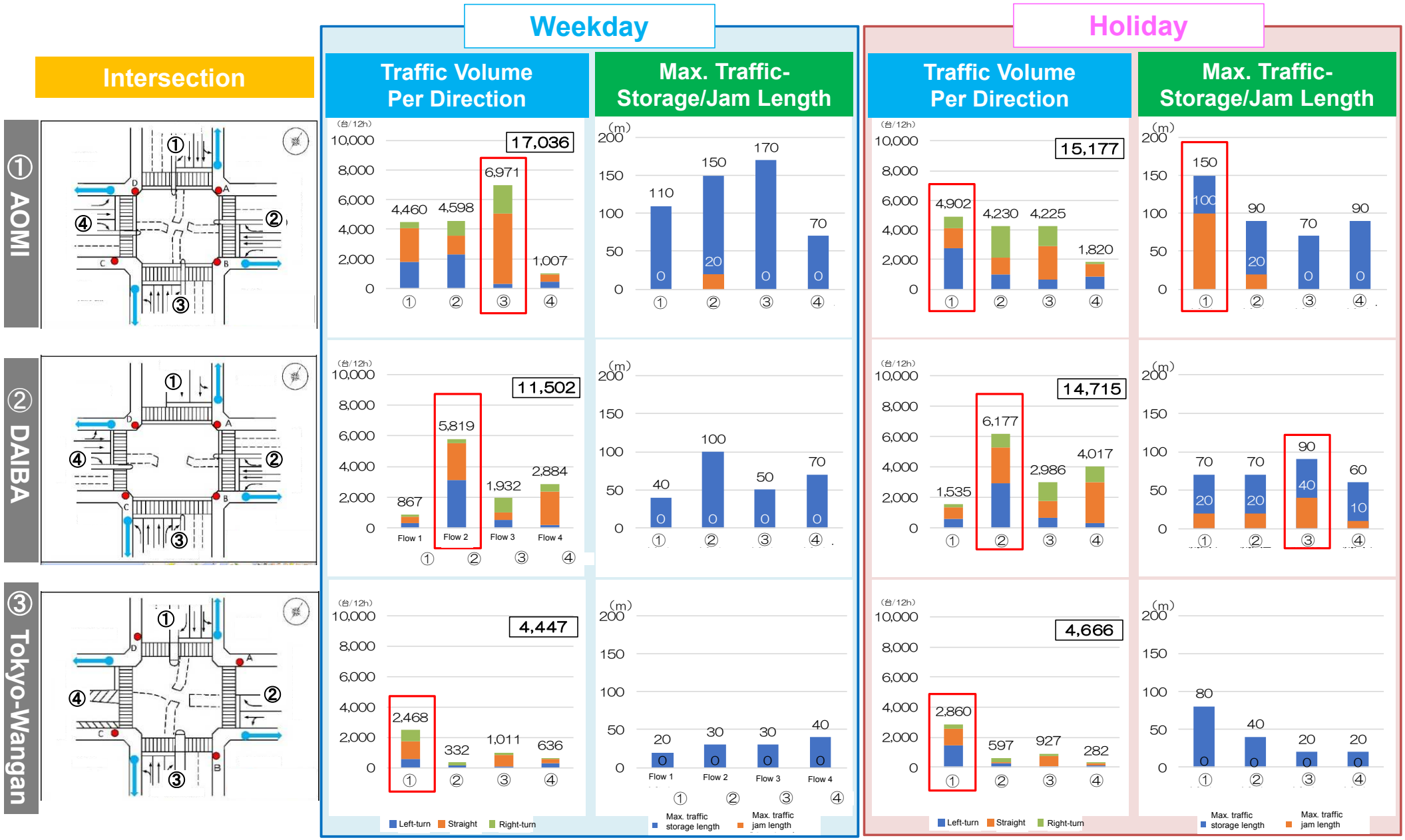


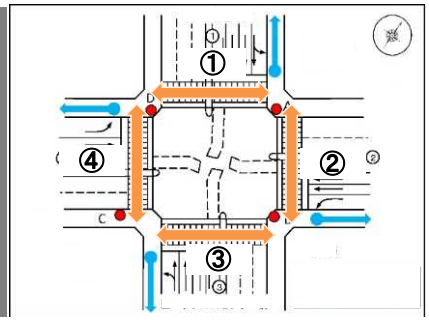
Figure in box: Total traffic volume in intersection

- **Traffic storage occurred:** Almost no traffic jams occurred even on holidays with lots of vehicles/pedestrians except a part of the area.
- **Temporary traffic jams occurred at 1-Chome, AOMI on holidays:** No influences on the neighboring intersections

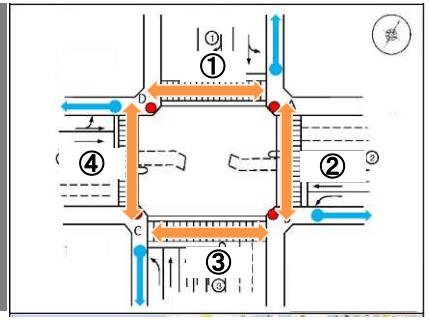
3. Survey/Analysis on Influences/Effects on Traffic Flow
(Survey Result: Tokyo Waterfront City Area)

Intersection

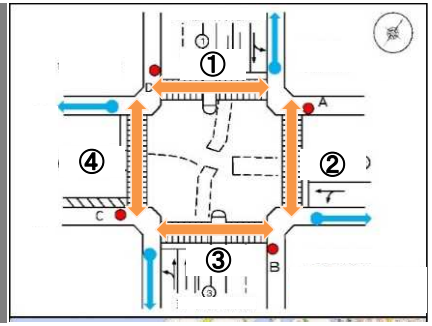
AOMI



DAIBA

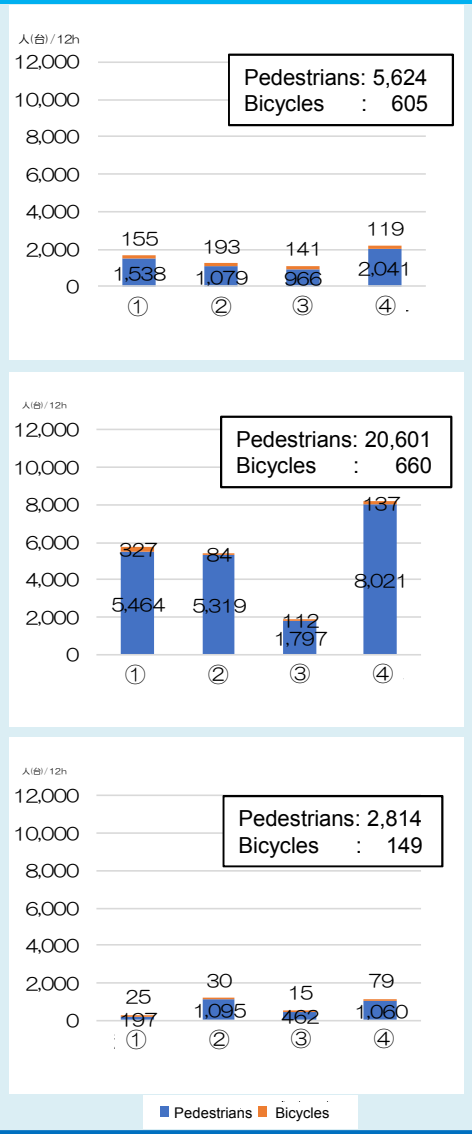


Tokyo-Wangan



Weekday

Vehicle/Pedestrian Volume



Holiday

Vehicle/Pedestrian Volume

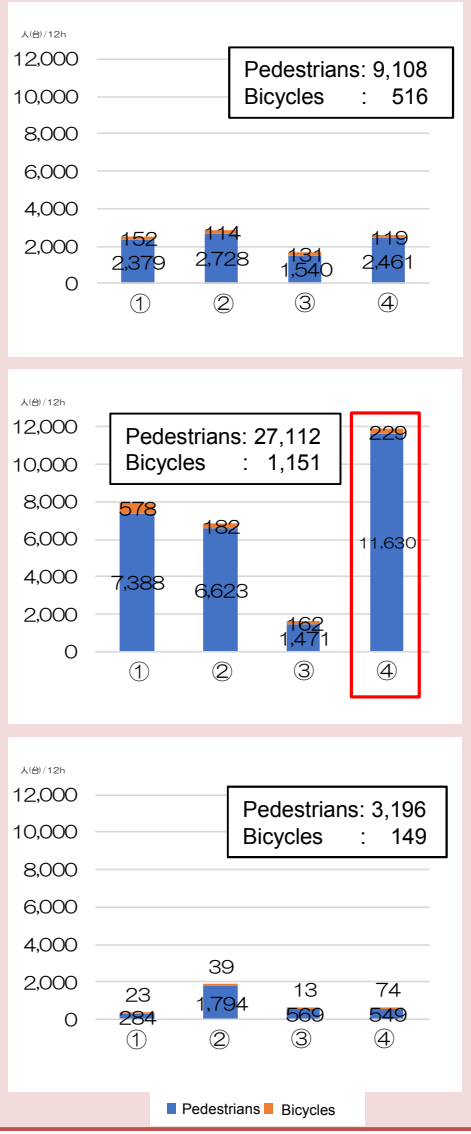
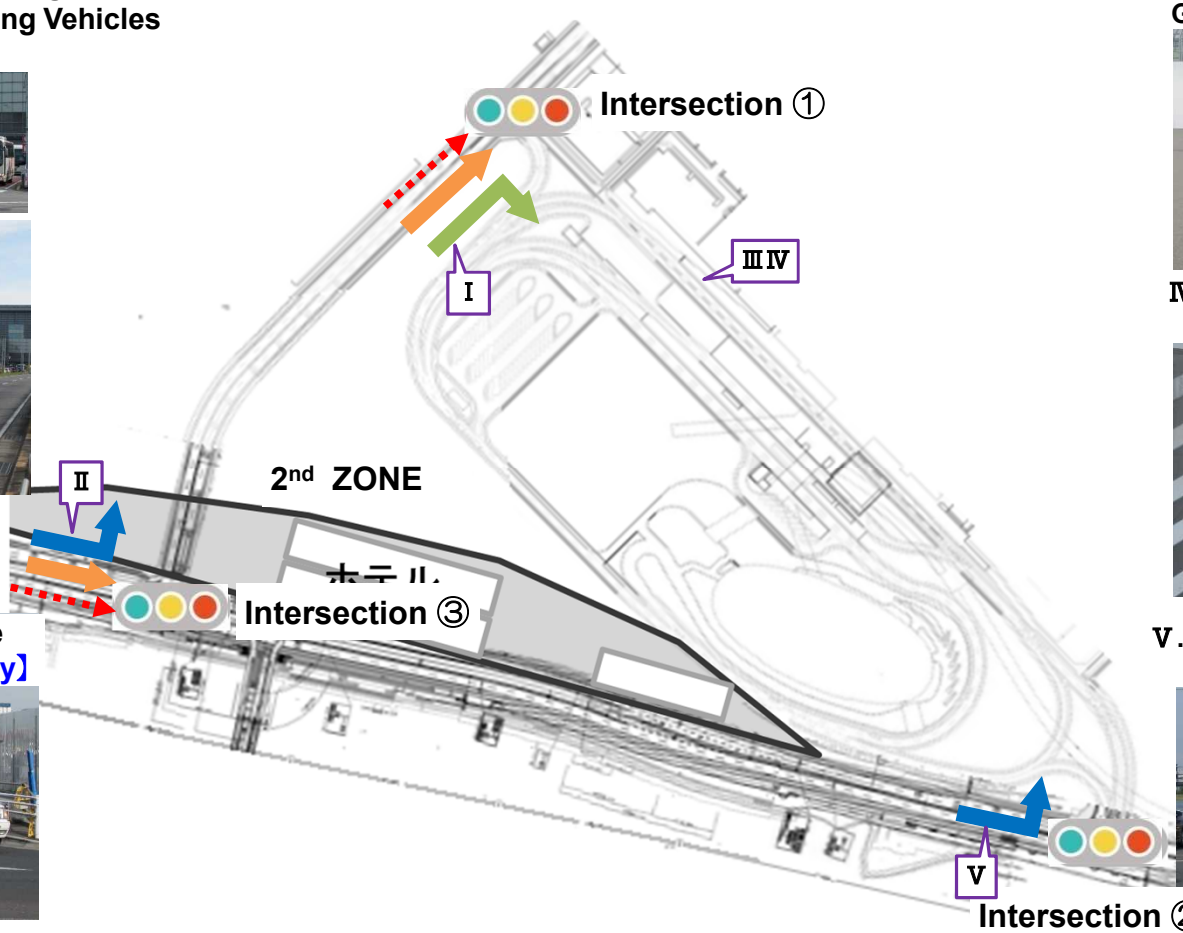


Figure in box: Total traffic volume in intersection

3. Survey/Analysis on Influences/Effects on Traffic Flow
(Survey Result: Haneda Airport Area)

- **Haneda Airport Area:** More traffic volume on weekdays compared with holidays
- **Intersection ①:** Numerous southside right-turn/straight-going vehicles on both days: Temporary traffic jams occurred around 8:00.
- **Intersection ②:** Numerous westside left-turn vehicles on both days: No traffic jams occurred.
- **Intersection ③:** Numerous westside straight-going/left-turn vehicles on both days: Temporary traffic jams occurred around 16:00 on weekdays.

Ⅰ. Traffic Jam by Masses of the Right-Turn/Oncoming-Straight-Going Vehicles 【Weekday】



Ⅱ. Traffic Jam by Masses of the Left-Turn Vehicles 【Weekday】

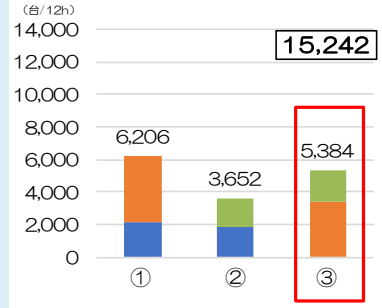
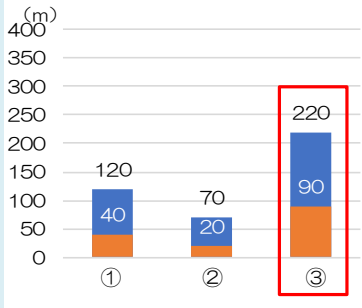
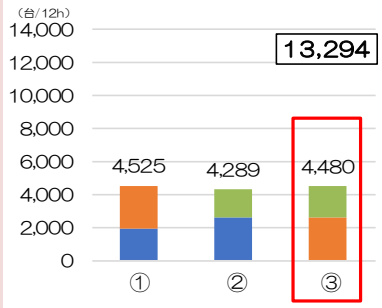
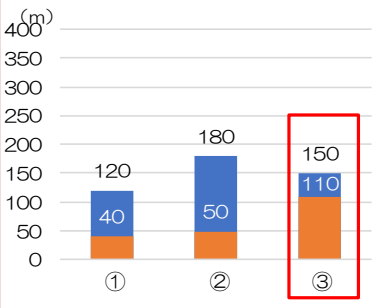
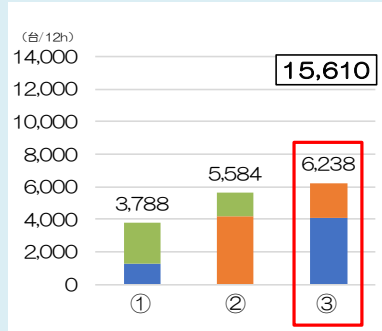
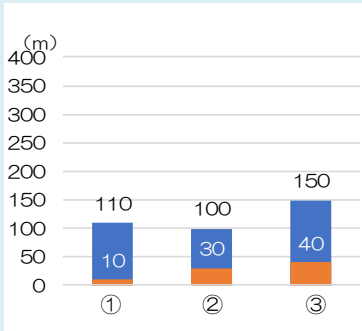
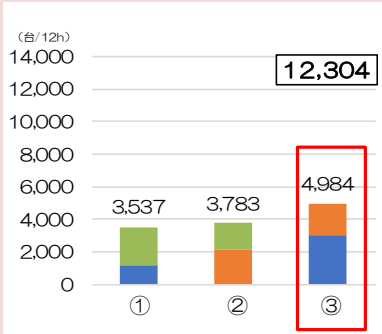
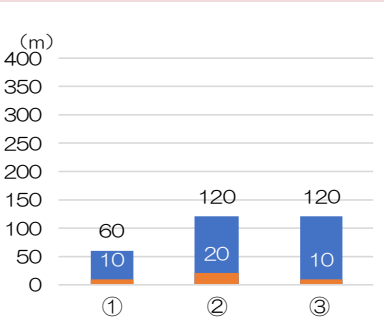
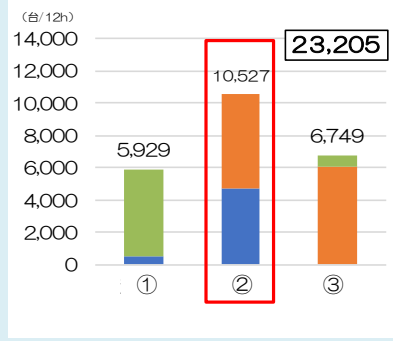
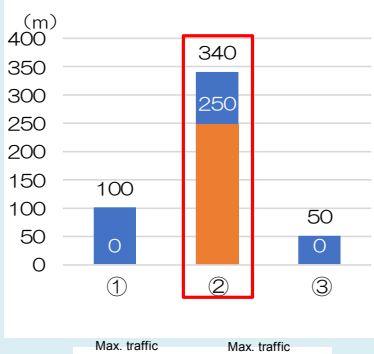
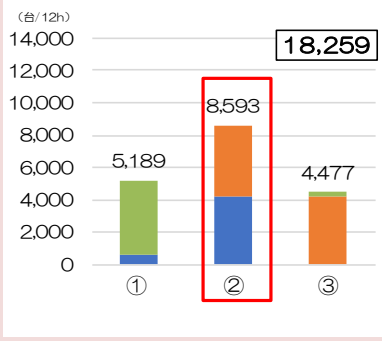
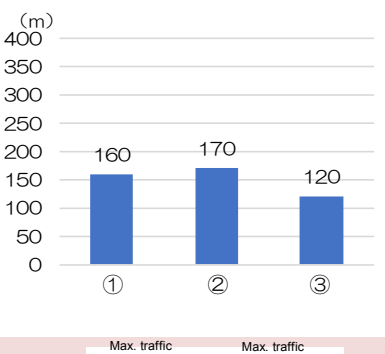
Ⅲ. Many Vehicles at the General-Vehicle Getting In/Out Area 【Holiday】

Ⅳ. Bus Stop at the General-Vehicle Getting In/Out Area 【Weekday】

Ⅴ. High Rate of the Left-Turn Vehicles 【Weekday】

*International Terminal Intersection (tentative name): Survey on a 24-hour basis, considering the influences of night

3. Survey/Analysis on Influences/Effects on Traffic Flow
(Survey Result: Haneda Airport Area)

Intersection	Weekday: Traffic Volume Per Direction	Weekday: Max. Traffic-Storage/Jam Length	Holiday: Traffic Volume Per Direction	Holiday: Max. Traffic-Storage/Jam Length
Intersection ①				
Intersection ②				
Intersection ③				

Left-turn Straight Right-turn — Max. traffic storage length — Max. traffic jam length

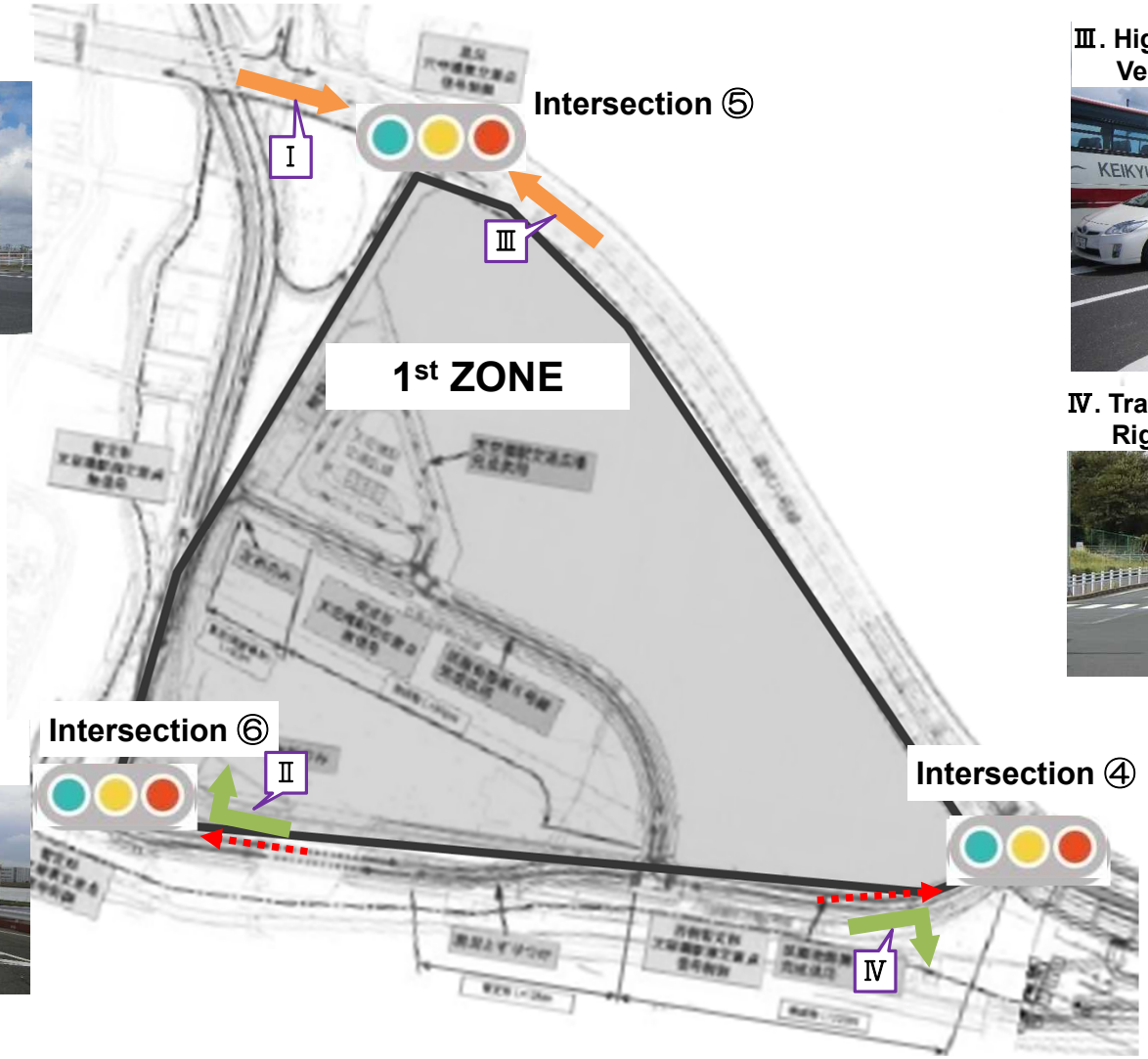
Figure in box: Total traffic volume in intersection

Haneda Airport Area: Temporary traffic jams occurred by masses of the straight-going, right-/left-turn vehicles.

3. Survey/Analysis on Influences/Effects on Traffic Flow
(Survey Result: Haneda Airport Area)

- **Haneda Airport Area:** More vehicles on weekdays compared with holidays
- **Intersection ④:** Numerous westside right-turn vehicles on both days: Temporary traffic jams occurred around 7:00 on weekdays.
- **Intersection ⑤:** Numerous east/westside straight-going vehicles on both days: No traffic jams were observed.
- **Intersection ⑥:** Numerous eastside right-turn vehicles on both days: Temporary traffic jams occurred around 8:00 on weekdays.

Ⅰ. High Rate of the Straight-Going Vehicles 【Holiday】



Ⅲ. High Rate of the Straight-Going Vehicles 【Holiday】

Ⅳ. Traffic Jam by Masses of the Right-Turn Vehicles 【Weekday】

Ⅱ. Traffic Jam by Masses of the Right-Turn Vehicles 【Weekday】

3. Survey/Analysis on Influences/Effects on Traffic Flow
(Survey Result: Haneda Airport Area)

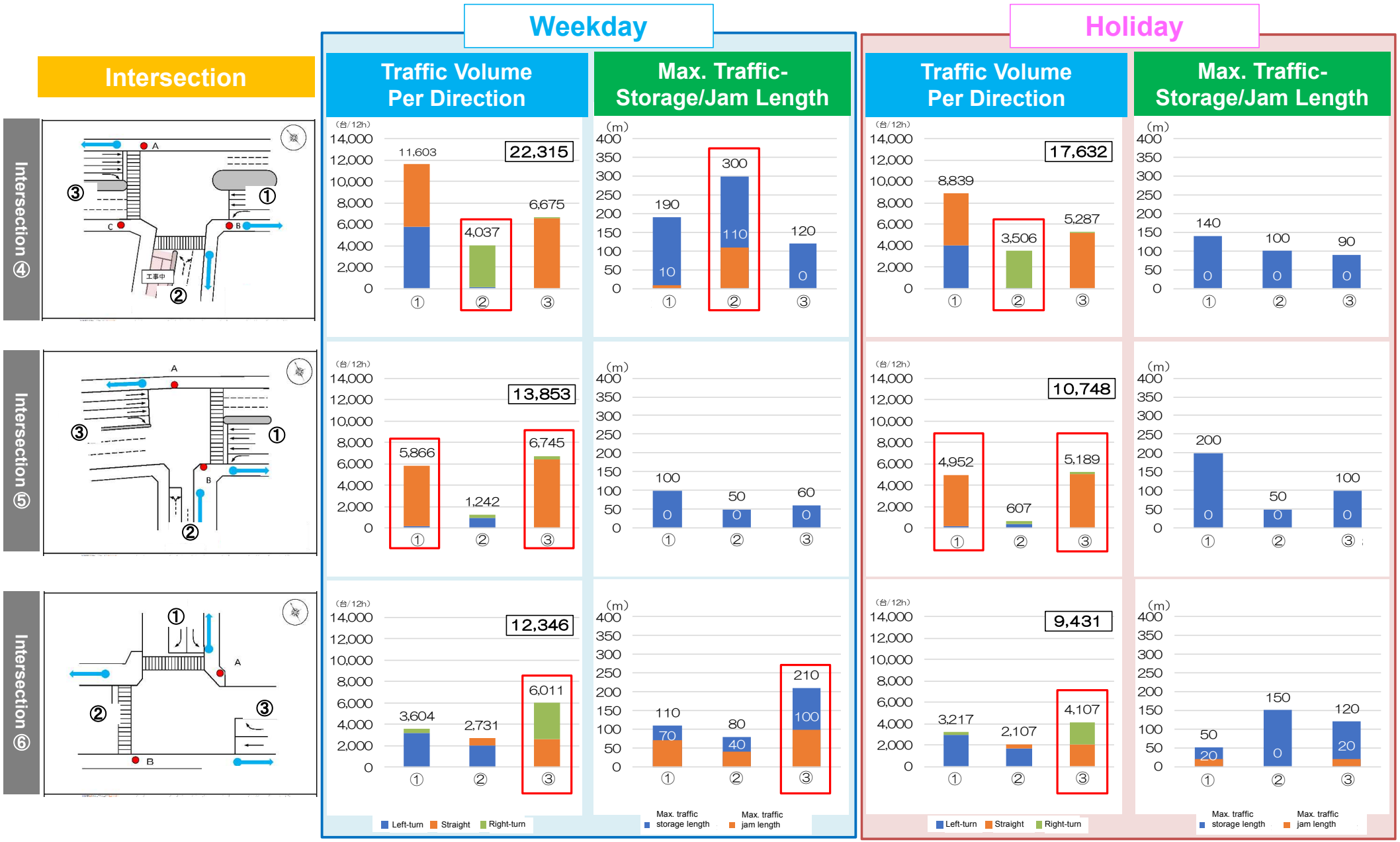


Figure in box: Total traffic volume in intersection

Haneda Airport Area: Temporary traffic jams occurred by masses of the right-turn vehicles.

4. Survey/Analysis on Influences/Effects on Traffic Flow
(Evaluation of Intersection Demand Factor: Calculation Conditions)

◆ **Calculation on the intersection demand factor in two cases of the current (as of Sep 2018) / future (as of verification test conduct ≒ as of Year 2020)**
◆ **Haneda Airport Area:** Calculated based on the future traffic volume to get data on future volume. Traffic capacity ratio was also calculated to verify influences by bus lanes.

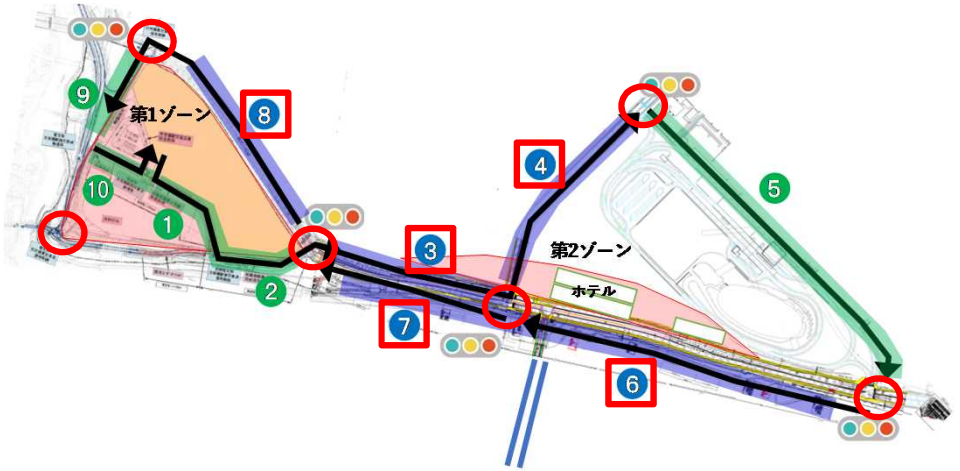
◆ **Main calculation conditions: Table**

Area	Case	Conditions		
		Road Structure	Signal Indication	Traffic Volume
Tokyo Waterfront City	Current	Current	Current	Current
	Future	Same as Current	Partly improved	Current
Haneda Airport	Current	Current	Current	Current
	Future	Time of Haneda Access Road in service: 2020	Partly improved	Future volume in 2030

◆ **Calculation-target locations on intersection demand factor and traffic capacity ratio**

【Tokyo Waterfront City Area：3 Intersections】

【Haneda Airport Are： 6 Intersections: 4 Sections】

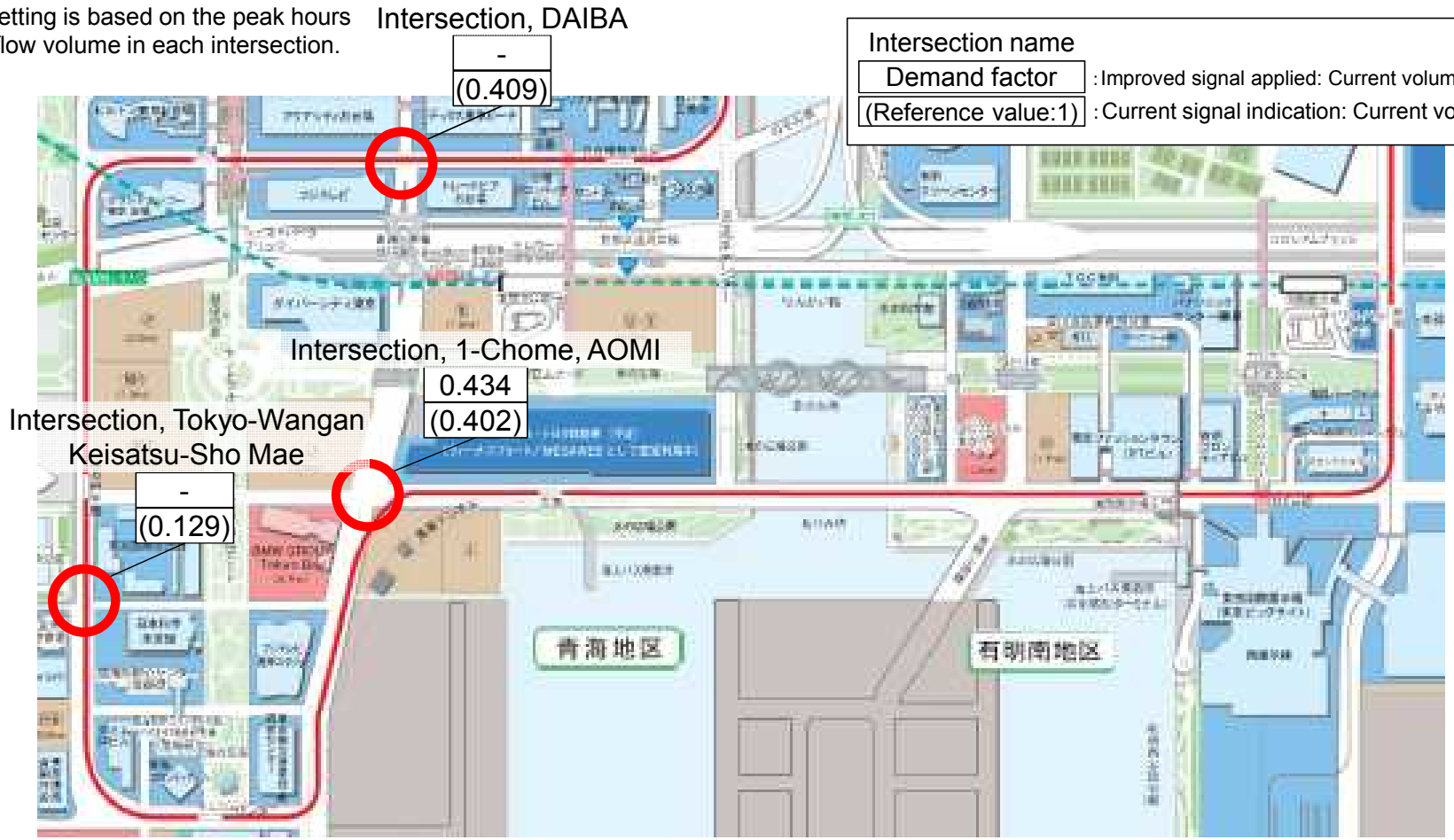


：Intersection Demand Factor calculation location　Traffic Capacity Ratio calculation section

4. Survey/Analysis on Influences/Effects on Traffic Flow
(Evaluation of Intersection Demand Factor: Calculation Conditions)

- **Based on the traffic-volume survey result (= current volume), demand factor in peak hours was calculated.**
- **Intersection, 1-Chome, AOMI:**
  The demand factor was calculated in introducing the right-turn/straight-going separation system as the future case.
- **Intersection demand factor:**
  Less than 0.9, no problems were posed in intersection traffic control in the current/future case

*Peak hours' setting is based on the peak hours in total traffic flow volume in each intersection.

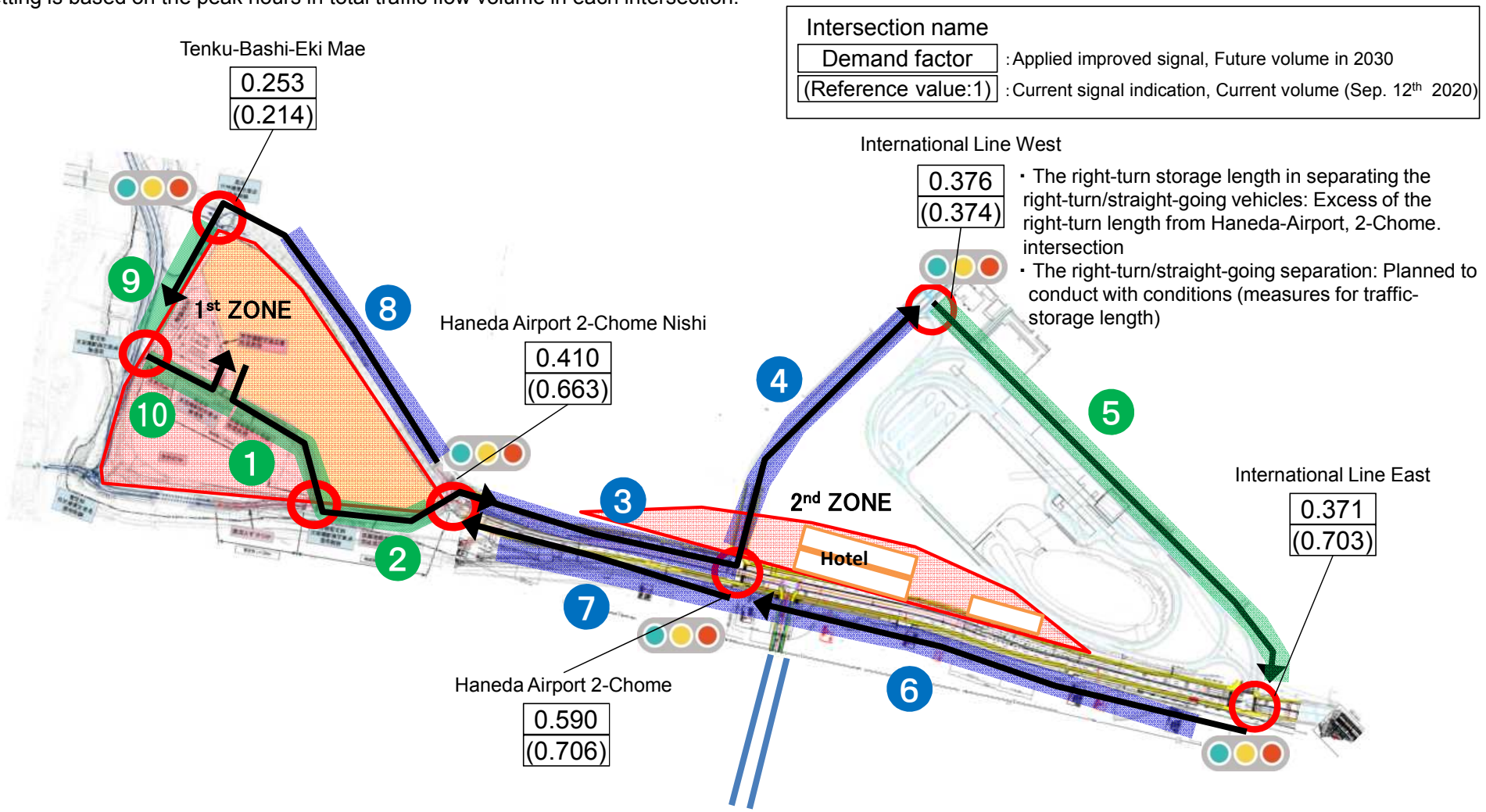


Intersection name
Demand factor : Improved signal applied: Current volume (Sep. 12th 2018)
(Reference value:1) : Current signal indication: Current volume (Sep. 9th 2018)

4. Survey/Analysis on Influences/Effects on Traffic Flow
(Evaluation of Intersection Demand Factor: Calculation Result)

- **Based on the current traffic volume/future volume in 2030, the demand factor in peak hours was calculated.**
- **By applying road structure of Haneda Access Road in service in the future case, demand factor was calculated:** Regarding the intersections at International Line West and at 2-Chome, Nishi, Airport, the demand factor was calculated in introducing the right-turn/straight-going separation system.
- **Intersection demand factor:** Below 0.9, no problems were posed in intersection traffic control in the current/future case.

*Peak hours' setting is based on the peak hours in total traffic flow volume in each intersection.



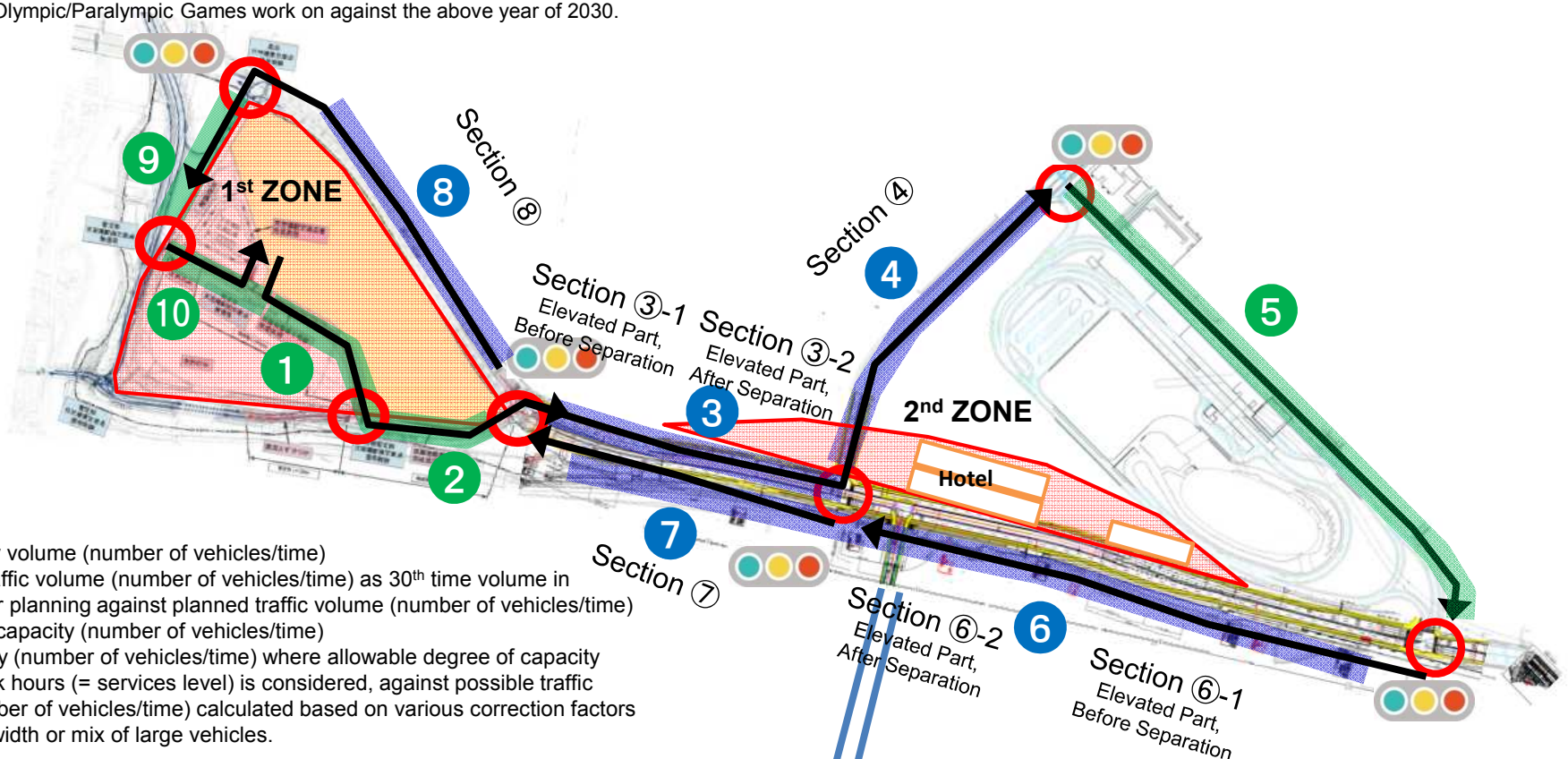
4. Survey/Analysis on Influences/Effects on Traffic Flow
(Evaluation of Intersection Demand Factor: Calculation Result)

◆ **Sections (③ ④ ⑥ ⑦ ⑧) where bus-lane introduction is considered:**
The traffic capacity ratio in the case of one-lane reduction was calculated as the future case.
◆ **Some sections:** The rate was over 1, but most sections: The rate was below 1, assuming TDM.

Traffic capacity ratio = Design hourly volume*1 (number of vehicles/time) ÷ Design traffic capacity*2 (number of vehicles/time)

	Transit Bus only: Running on bus Lane							All Buses (Transit /Chartered/Private): Running on bus Lane						
	Sec. ③-1	Sec. ③-2	Sec. ④	Sec. ⑥-1	Sec. ⑥-2	Sec. ⑦	Sec. ⑧	Sec. ③-1	Sec. ③-2	Sec. ④	Sec. ⑥-1	Sec. ⑥-2	Sec. ⑦	Sec. ⑧
Year: 2030	0.83	0.81	1.00	1.18	0.78	1.07	0.44	0.81	0.79	0.99	1.17	0-.77	1.06	0.43
Assumed 2030: TDM	0.75	0.73	0.90	1.07	0.70	0.97	0.39	0.73	0.71	0.89	1.06	0.70	0.96	0.39

◆ Conditions on streets: The value of 0.90 was always applied due to adequate exclusion of parked/stopped vehicles.
◆ Year 2030: Calculated by values corrected by composition ratio per direction/vehicle type and peak time ration of current traffic-volume-survey result based on future-traffic-volume estimate result.
◆ Assumed Year 2030, TDM: Calculated by flat-reduction value (10%) of traffic volume on the assumption that total of traffic volume is reduced by 10% due to TDM measurements that Organizing Committee of Olympic/Paralympic Games work on against the above year of 2030.



*1: Design hourly volume (number of vehicles/time)
Calculated traffic volume (number of vehicles/time) as 30th time volume in target year for planning against planned traffic volume (number of vehicles/time)

*2: Design traffic capacity (number of vehicles/time)
Traffic capacity (number of vehicles/time) where allowable degree of capacity excess in peak hours (= services level) is considered, against possible traffic capacity (number of vehicles/time) calculated based on various correction factors such as lane width or mix of large vehicles.

5. Formulation of Verification Plan/Work Schedule, Progress Management (Verification-Test Task Force for Tokyo Waterfront Area in 2020)

◆ **Task Force on verification test for Tokyo Waterfront Area in 2020:**
In charge of the secretariat div. for the meetings 8 times in total during August 2018 to March 2019
◆ **Preparing/Updating issue-management lists/work schedules:**
In order to clarify the issues/prep status of each stakeholder
◆ **Conduct of individual coordination meeting with each stakeholder:**
In order to prepare/update the issue-management lists/work schedules

Holding Task Force meetings

NAME	DATE/TIME
#4 Task Force on Verification Test for Tokyo Waterfront Area in 2020	Aug. 22nd (Wed.) in 2018, 10:00 to 12:00
#5 Task Force on Verification Test for Tokyo Waterfront Area in 2020	Sep. 26th (Wed.) in 2018, 10:00 to 12:00
#6 Task Force on Verification Test for Tokyo Waterfront Area in 2020	Oct. 24th (Wed.) in 2018, 10:00 to 12:00
#7 Task Force on Verification Test for Tokyo Waterfront Area in 2020	Nov. 21st (Wed.) in 2018, 10:00 to 12:00
#8 Task Force on Verification Test for Tokyo Waterfront Area in 2020	Dec. 19th (Wed.) in 2018, 10:00 to 12:00
#9 Task Force on Verification Test for Tokyo Waterfront Area in 2020	Jan. 23rd (Wed.) in 2019, 10:00 to 12:00
#1 Task Force on Verification Test for Tokyo Waterfront Area	Feb. 28th (Thurs.) in 2019, 16:00 to 17:00
#2 Task Force on Verification Test for Tokyo Waterfront Area	Mar. 20th (Wed.) in 2019, 10:00 to 11:30

Coordination with each stakeholder

Coordination on infrastructure development was conducted with the main stakeholders below.

◆ **Haneda Airport area** : Civil Aviation Bureau, MLIT; National Police Agency; and Metropolitan Police Department
◆ **Metropolitan Expressway:** Road Bureau, MLIT; NILIM, MLIT; and Metropolitan Expressway Co., Ltd.
◆ **Tokyo Waterfront area** : Tokyo Metropolis, National Police Agency, and Metropolitan Police Department