公益財団法人 国際交通安全学会
International Association of Traffic and Safety Sciences

2019.4.12 Research Survey Report Meeting
At Keidanren Kaikan

1802C
Support for the Implementation of Information-Sharing Type Traffic Safety Measures in Southeast Asia

Project Leader: Hirokazu Akahane

1802C Members (1)

PL Hirokazu Akahane (Professor, Chiba Institute of Technology) Malaysia Team Leader

Atsushi Fukuda (Professor, Nihon University College of Science and Technology) Thailand Team Leader

Takashi Oguchi (Professor, The University of Tokyo Institute of Industrial Science)

Kazuhisa Ogawa (Professor, Tohoku University)

Akihiro Nakamura (Professor, Yokohama City University, Graduate School)

Fumihiko Nakamura (Vice-President, Yokohama National University)

Special Researchers

Kunimichi Takada (Professor Emeritus, Nihon University/ IATSS Advisor)

Michiko Matsumura (Representative, Town Creator/ IATSS Advisor)

Hisao Akiyama (Representative, LLP. Traffic Management Research Institute)

Yuji Ono (Technical Advisor, LLP. Traffic Management Research Institute)

Yusuke Okuyama (Deputy-Manager, Kuroi Industry Co., Ltd. R45・Hinode Driving School)

Toshihiko Chikamatsu (Technical Advisor, DEC Civil Engineering Consultants)

Satoru Kobayakawa (Professor, Nihon University College of Science and Technology)

Seiya Tazawa (Director, Metropolitan Expressway Co., Ltd. Engineering Consulting Department)

Yasushi Nishida (Special Research Fellow & Manger, Institute for Traffic Accident Research and Data Analysis Research Division Research Section I)

Kenta Okutsu (Nihon University College of Science and Technology Master's Program)

1802C Members (2)

Special Research Fellows (Continued)

Addnan B.M. Razali	(Deputy Mayor of Penang)
Rajendran AL P. Anthony	(Director, Penang Civil Engineering Bureau)
Zainuddin B.M. Shariff	(Penang Civil Engineering Bureau)
Yong Woo Soon	(Penang Civil Engineering Bureau)
Mustaqin B. Alpi	(Malaysia State Government)
A. Farhan B.M. Sadullah	(Professor, University Science Malaysia (USM))
Shahrel A. Sundi	(Associate Professor, USM)
Nabilah Naharudin	(USM)
Khairur Rahim B.A. Hilme	(USM)
Thaned Sathiennam	(Associate Professor, Khon Kaen University)

Observers

Shigeki Nambu	(President, Traffic Plus Co., Ltd.)
Tuenjai Fukuda	(Director, Asian Transportation Research Society (ATRANS), Research Fellows at Nihon University College of Science and Technology)
Hiroshi Fukushima	(Ministry of Land, Infrastructure, Transport and Tourism (MLIT))
Kentaro Nakamura	(MLIT)
Tomotaka Homma	(MLIT)

1802C Members (3)

Observers (Continued)

Kenshiro Tanaka (Japan International Cooperation Agency (JICA))
Yohei Kanyama (JICA)
Yukie Kumasawa (JICA)

Secretariat

Sasa, Kawano, Yoshihara, Kaneko

(As of February 18, 2019)

Background and Achievements of the Kamagaya Scheme

- Since FY1997, the Kamagaya Scheme has been implemented at intersections, roads, and areas in Kamagaya City, Chiba Prefecture, resulting in reduced traffic accidents.
  - Received FY2001 support for social implementation experiments from MLIT
  - Received FY2003 support for *Kurashi-no-michi Zone* from MLIT

- Expanded to the cities surrounding Kamagaya City, such as Ichikawa City and Shirai City

→ Application to Penang in Malaysia (2008-2010)

- Number of traffic fatalities per unit population was **approximately five times as large as in Japan**. (The same level at present)

→ Restarted the project (2016-)

→ Merged with a project in Thailand (2017-)

- Number of traffic fatalities per unit population was **the second worst**.

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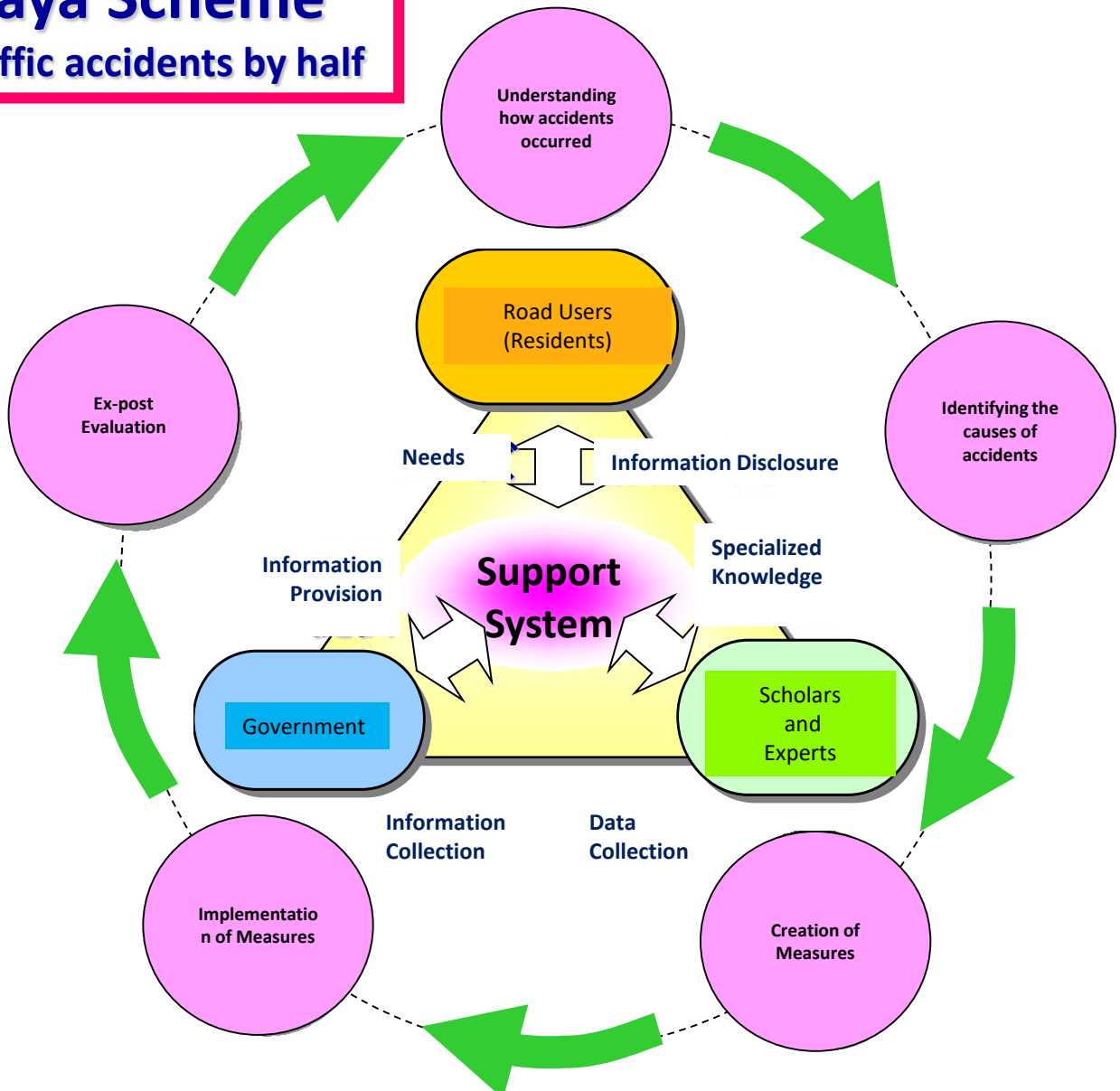
PDCA Cycle in Traffic Safety Management

Kamagaya Scheme
to reduce traffic accidents by half

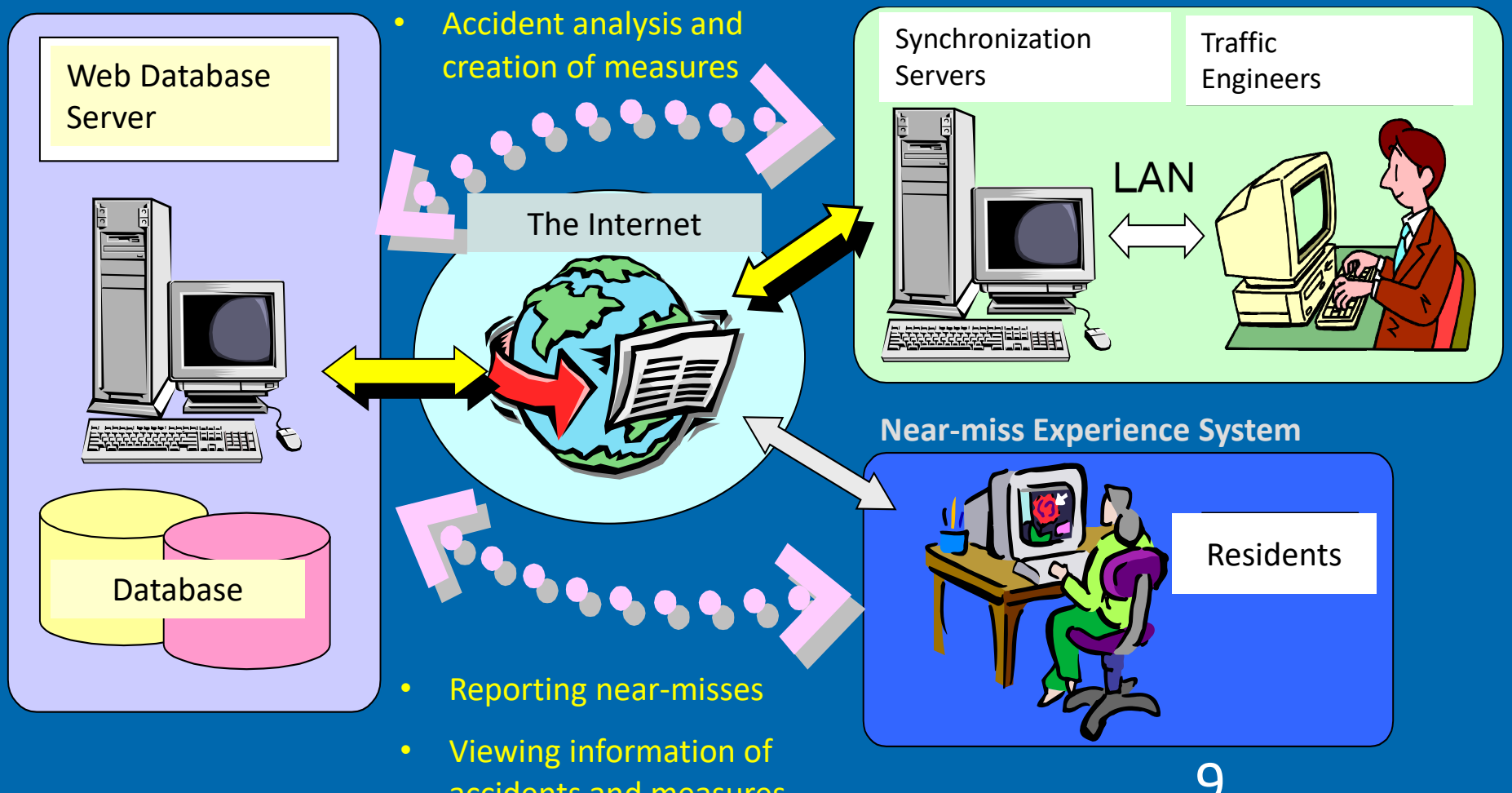


Functions of Traffic Safety Measure Support System (1)

(1) Integrated Management of Data on the Internet and Information Disclosure

- Input of accident data
- Accident analysis and creation of measures

[Measure Support System]



- Reporting near-misses
- Viewing information of accidents and measures

9

Functions of the Traffic Safety Measure Support System (2)

Integrated Management and Analyses of Accidents and Near-miss Data using Geographic Information System (GIS)

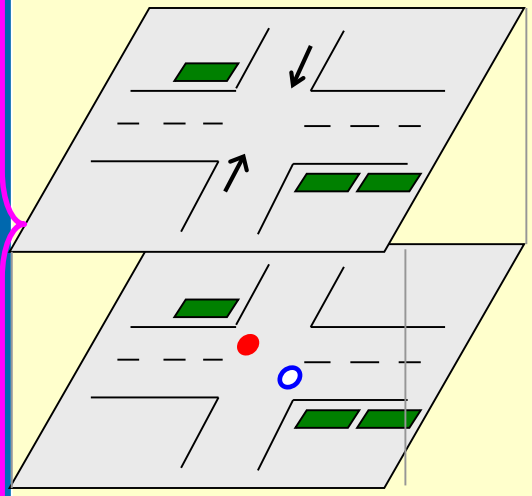
Near-miss Experience Database

Map Database

Traffic Accident Database

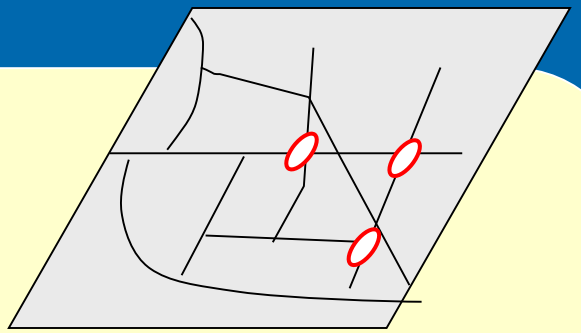
GIS

Indication of near-miss experience data on maps

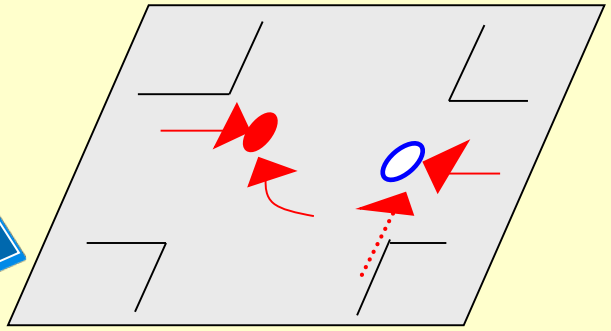


Indication of traffic accident data on maps

Integration of near-miss experience and accident data



Sites where accidents and near-miss frequently occur



Accident patterns at black spots

Effective Use of Near-miss Experience Data

- Integration with accident data→Quick and efficient identification of causes of accidents
- Understanding of residents' evaluations of safety aspects of road traffic services
- Sharing safety information among residents
- For countries that do not have organized accident data, near-miss experience data is useful in selecting candidate locations for implementation of safety measures and acquiring accident data.

- Background of the creation of near-miss maps by IATSS
  - H833 "Proposal for Traffic Safety Measures (Traffic Safety Education) for Seniors by Seniors" (Haruo Suzuki PL, FY1997, Paper-based)
  - H054 "Proposals for Local Governments to Reduce Traffic Accidents by Half in a medium term" (Kunimichi Takada PL, FY1999, Online)
  - 1602A (This project, Use of GPS mobile terminal, Implementation of Community ID)

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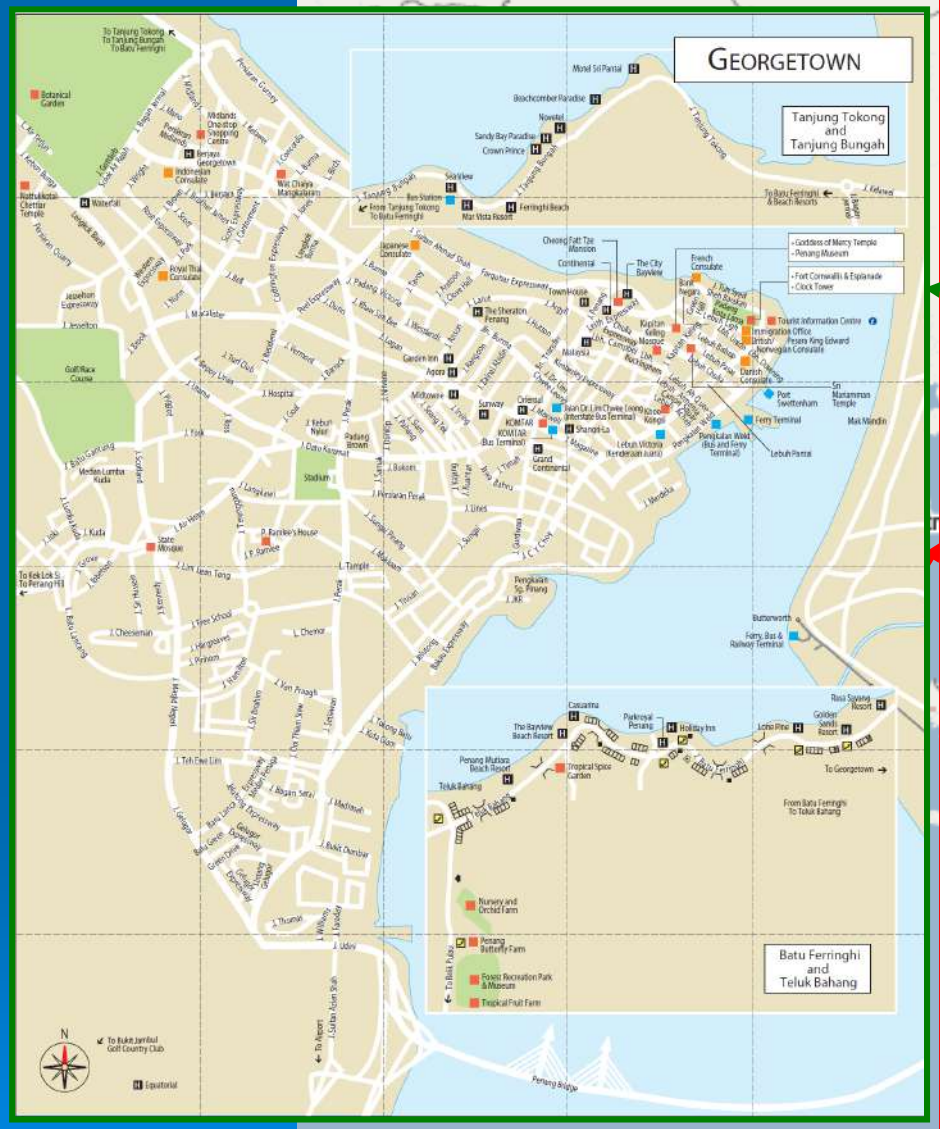
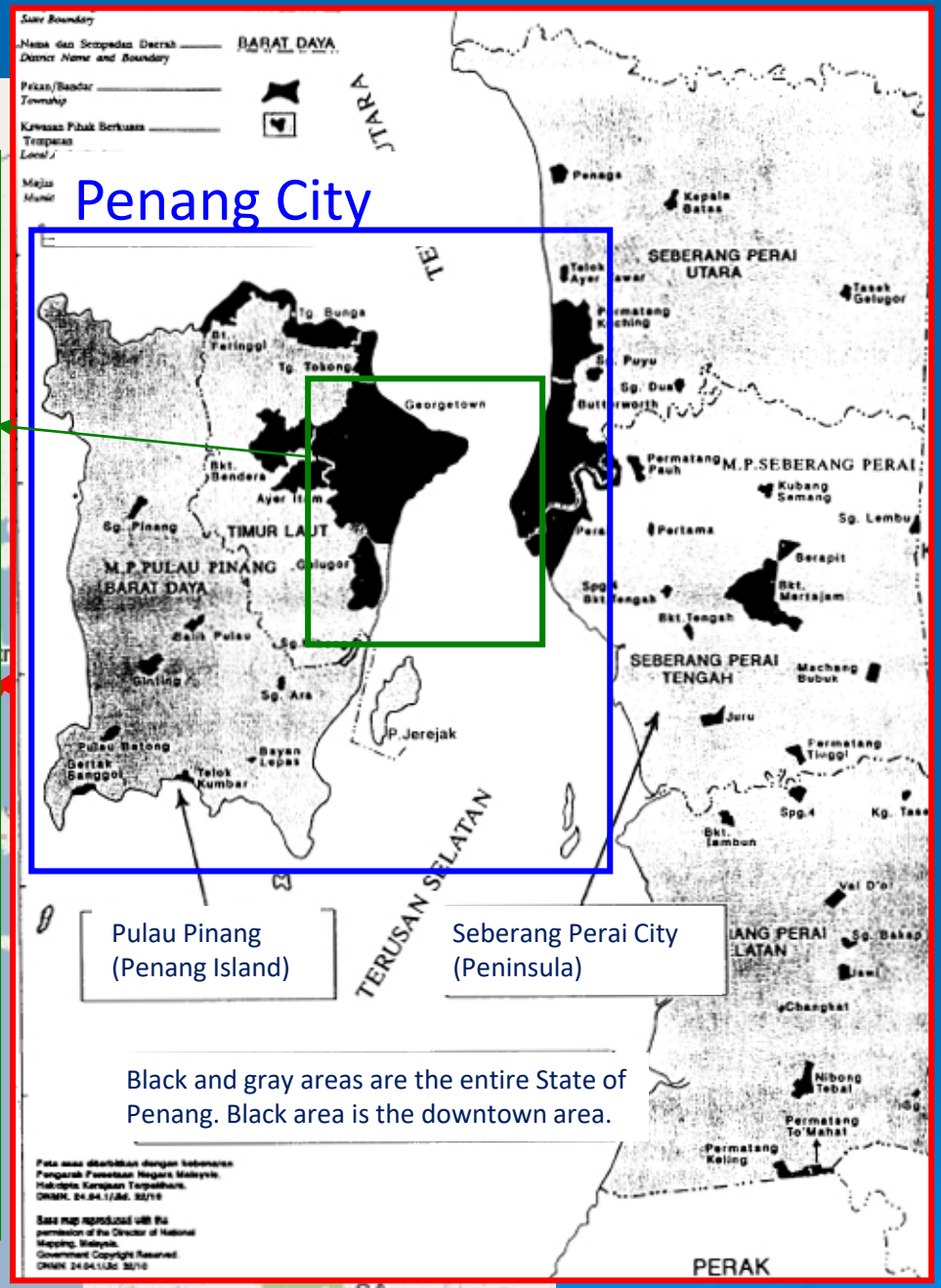
George Town



Penang City



Pulau Pinang (Penang Island)

Seberang Perai City (Peninsula)

Black and gray areas are the entire State of Penang. Black area is the downtown area.

Meetings with Penang City Civil Engineering Bureau 2016.6.27

Roles

Penang City

- Construction under safety and budgetary measures

IATSS

- Development of related systems and training for operations
- Support:
- Surveys on the sites subject to the measures
- Accident cause analyses
- Establishment of safety measures

Explanation to Penang City Council 2016.6.27

Participants: 3 members from the Traffic Infrastructure Standing Committee, 10 members from the Technical Department, 8 members from Traffic Police & related bureaus, and 3 members from IATSS

Content: Results of previous projects, 1st term achievements in Penang City, and purposes and plans of this project

Results: Friendly and positive responses/Expressing the intention to work together

Meetings with Penang City related organizations　2016.6.27

Participation:

3 members from Penang City Civil Engineering Department, 3 members from Penang City Traffic Police, **1 member from Penang State Road Safety Division,** 1 member from Traffic Safety Council, 5 members from Penang City Taxi Association, **2 members from Rapid Penang (bus company),** and 3 members from the Japan team

Content:

Rapid Penang→Potential usefulness of setting the community ID

Penang State Road Safety Division→Wishes to participate in this project, check the translation of message set for the system, the release schedules, etc., contact and response structures of Penang City

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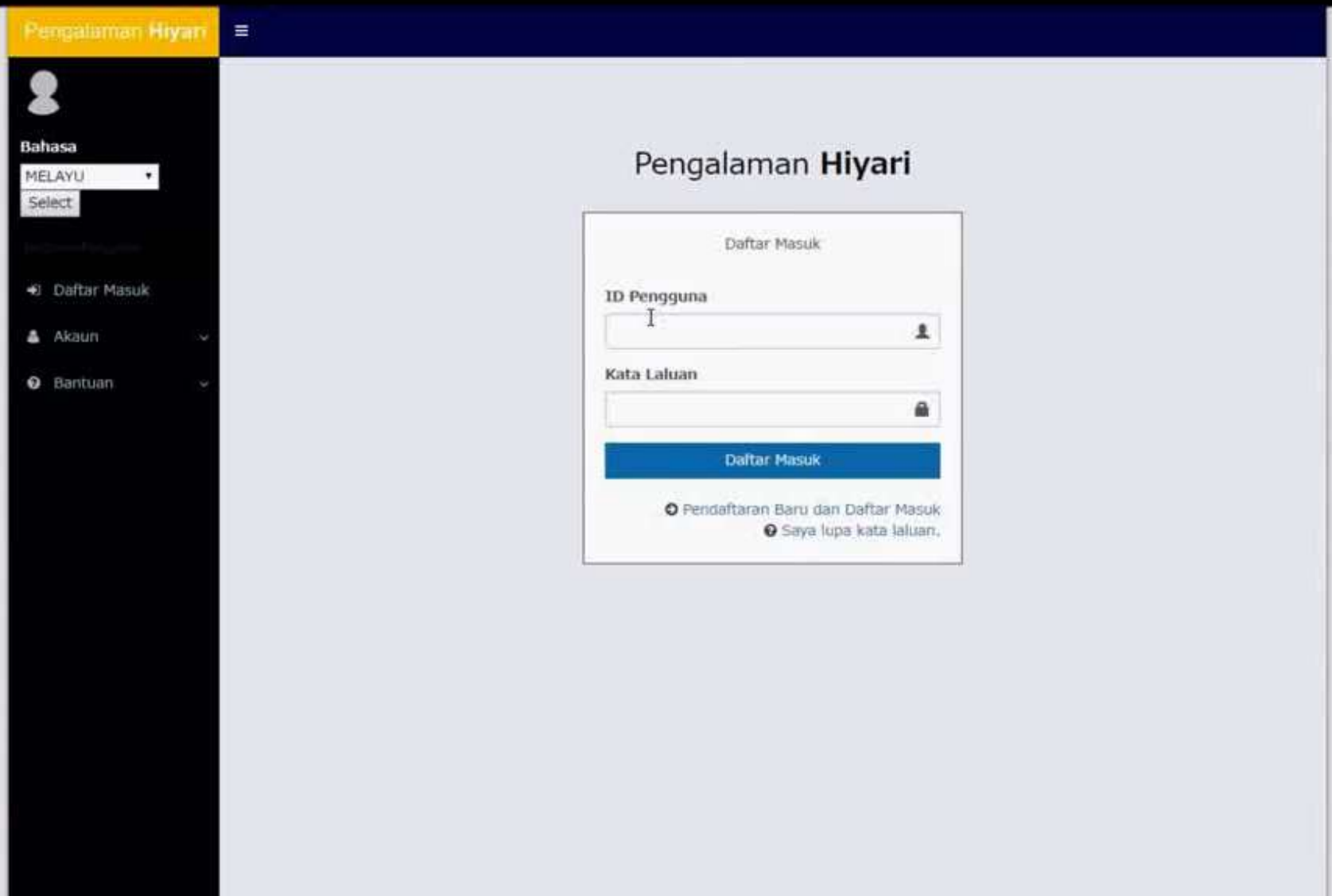
Near-miss Experience System Uploaded on YouTube
Instruction Video - Malay Version -



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State of Collecting Near-miss Experience Data

1. Traffic Safety Campaign (June 2017)

2. Collaboration with University of Science Malaysia (USM)

→1+2＝Approx. 400 samples

3. Collaboration with Rapid Penang (bus company)

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Expanding the GIS Application Technology to University of Science Malaysia (USM)

- Collaboration between traffic engineering specialist team, GIS specialists and specialists in Japan
- Responses to differences in geodetic systems
  - Google Maps: World Geodetic System (WGS84)
  - Maps provide by Malaysia Government: Malaysian's unique geodetic system (?)
- **Development of electronic maps**

→USM team input its own road links and nodes

- Currently expanding more advanced operation technology

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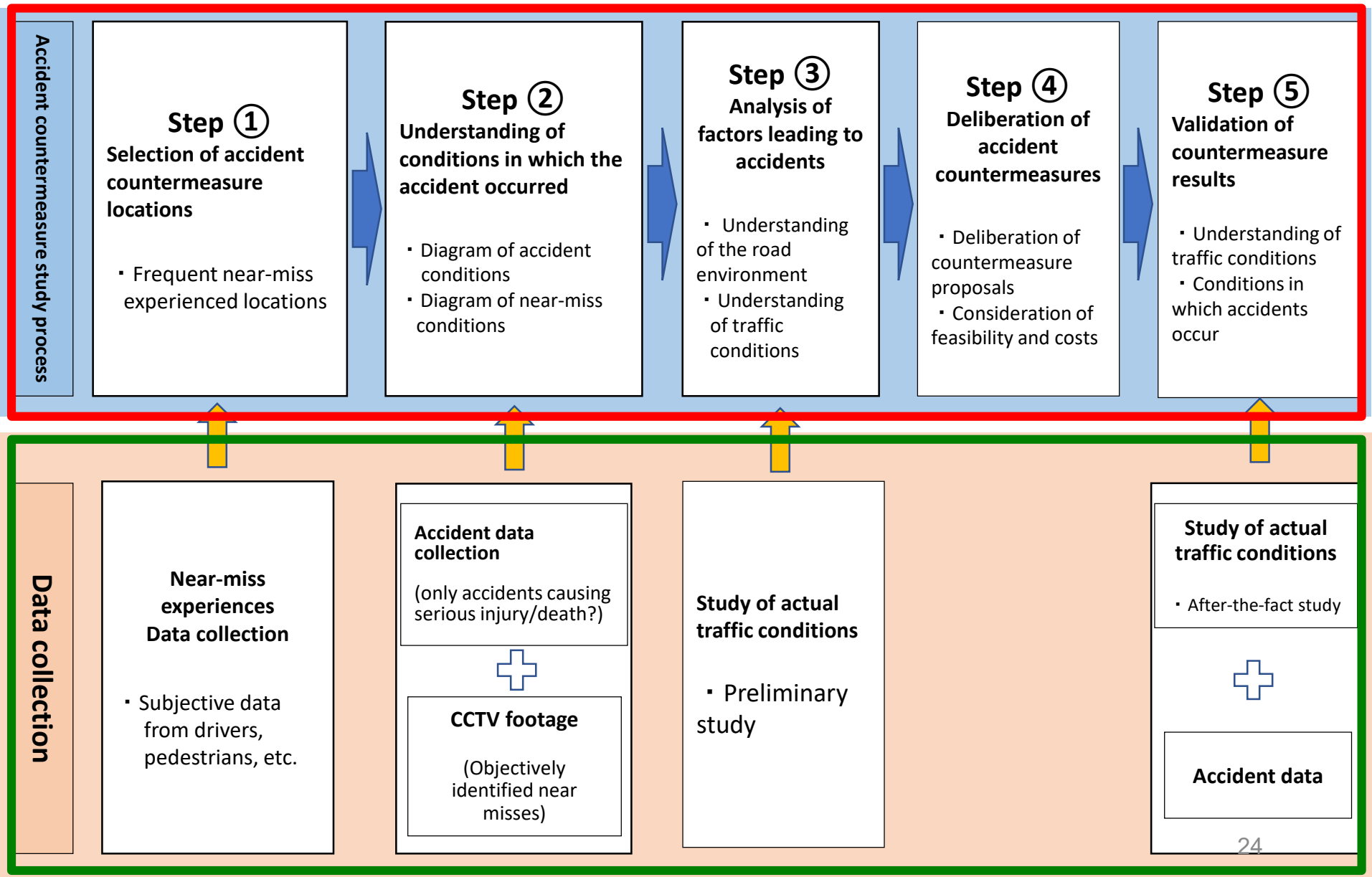
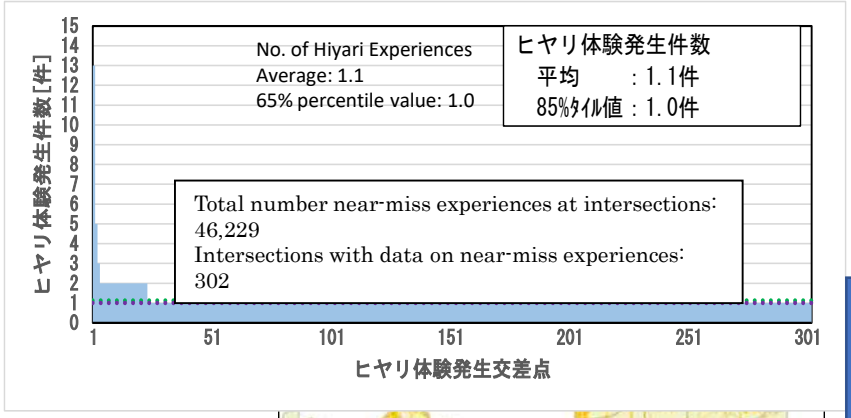
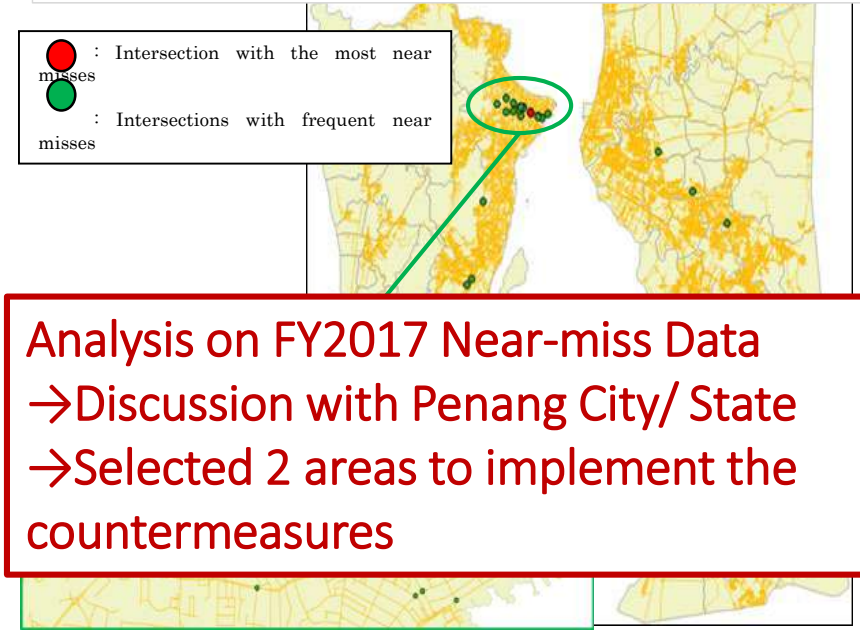
Procedures for Studying Accident Countermeasures (Case Studies: Jalan Penang & Jalan Dato Keramat)



Step 1: Selection of accident countermeasure locations

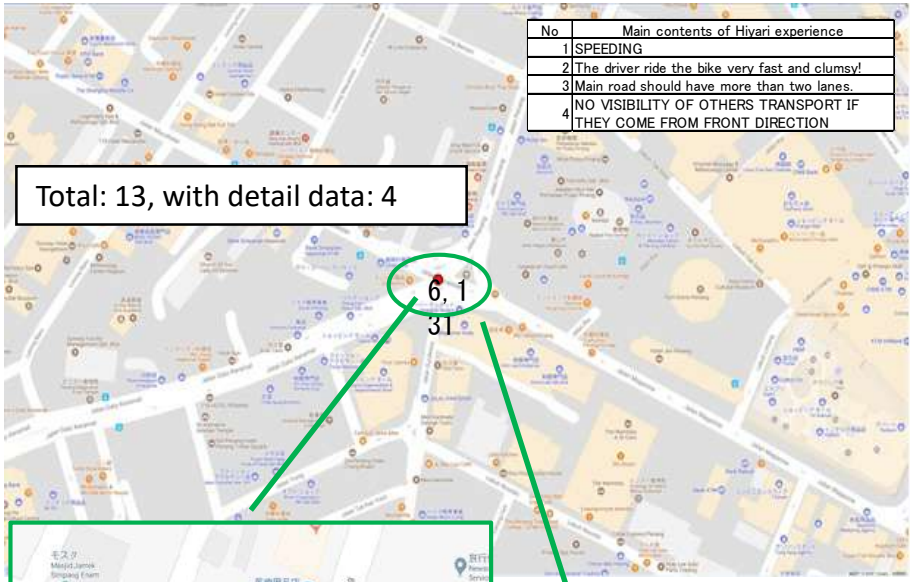
1. Review of near-miss cases with data available (Subjective hazard information)





Analysis on FY2017 Near-miss Data
→Discussion with Penang City/ State
→Selected 2 areas to implement the countermeasures

2. Street/ intersection with the most frequent near-miss experiences (Selection for accident countermeasures)



Hiyari experience data		
Legend	First party	Second Party
car	←	←
motorcycle	◄	◄
bicycle	◁	◁
walk	◁	◁
Parking car	☒	☒

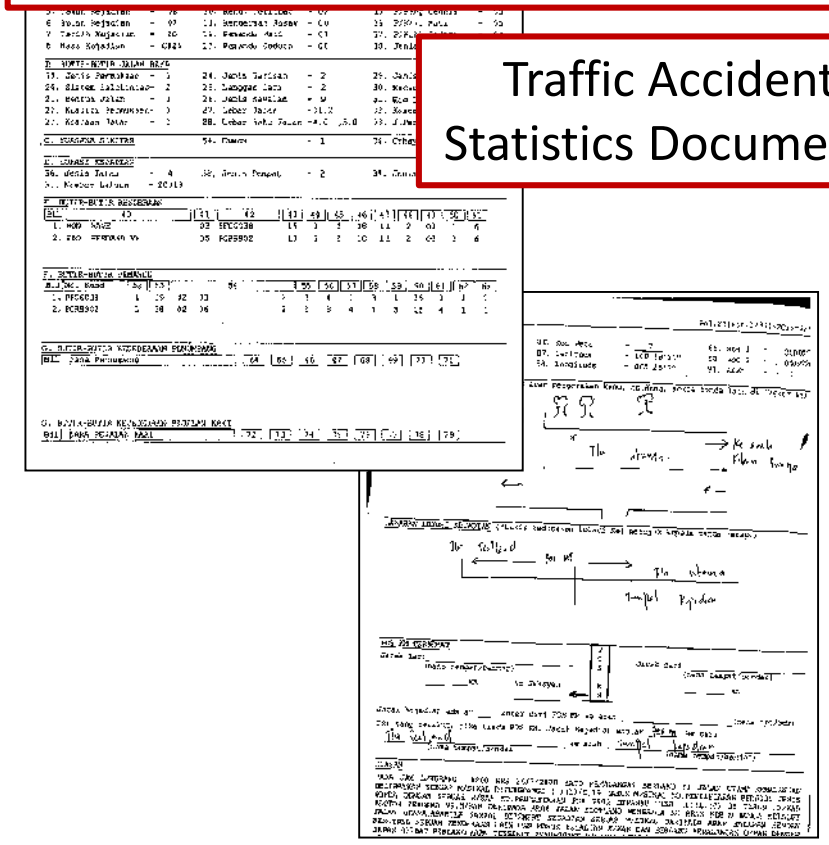
Step 2: Understanding of conditions in which accidents occurred (from accident data collection)

Plan: Acquire data of accidents that occurred at the sections selected based on near-miss data→ Analyze

Result: It has become increasingly difficult to acquire accident data.

←→Indicate the effects of accident data analysis→ Expand ways to disclose accident data to take measures

Traffic Accident Statistics Documents



Penang accident record

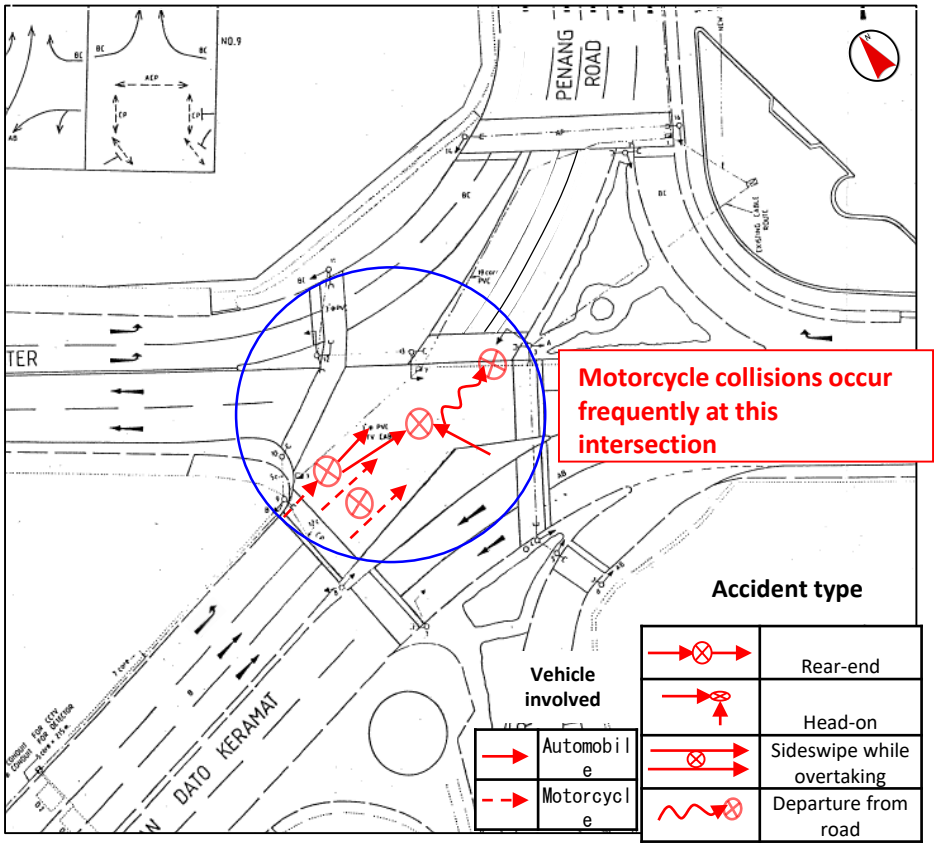


Diagram of accident conditions

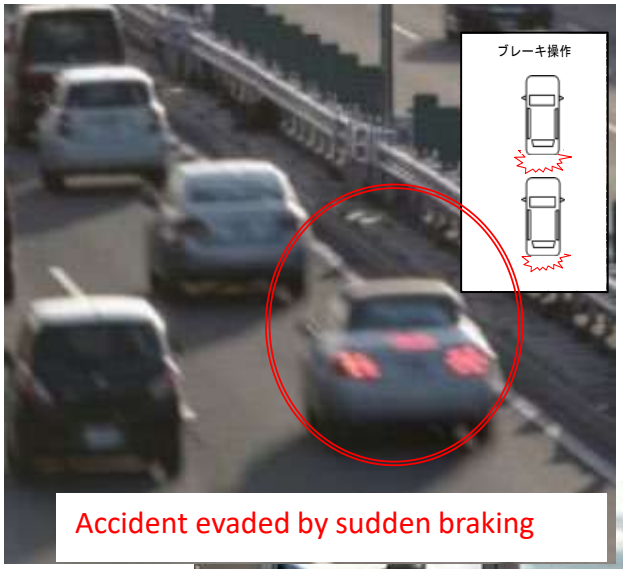
Step 2: Understanding of conditions in which the accident occurred (from CCTV footage)

Extract and analyze near-miss data from images taken by approx. 650 CCTV cameras
→ down the viewpoints of Step ③ Ex-ante Survey on Traffic Conditions
→ Application of automatic detection function to accidents, etc. (social implementation from 2019-?)

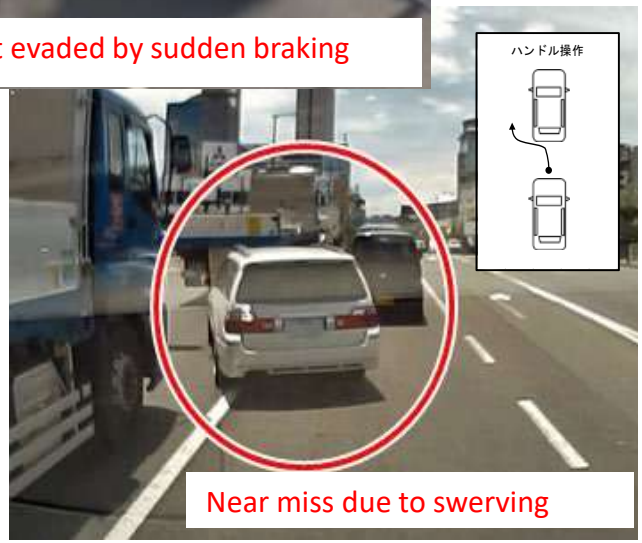
Step 2: Understanding of conditions in which the accident occurred (from CCTV footage)

1. CCTV video footage collection

Take one week (min. one day, 24 hours) of CCTV footage of the location being studied and check for sudden braking or swerving



Accident evaded by sudden braking



Near miss due to swerving

2. Understanding of near-miss conditions

Gain detailed information on conditions in which drivers take evasive action such as sudden braking or swerving

- Time (peak time, day/night, etc.)
- Location
- Type of accident evaded (rear-end, head-on, right-turn accident, etc.)
- Vehicles involved (large vehicle, small vehicle, motorcycle, etc.)
- Other (traffic violations etc.)

Sector A	Braking	Steering	Total
Automobile	5	2	7
Motorcycles	5	2	7
Total	10	4	14

Sector B	Braking	Steering	Total
Automobile	5	2	7
Motorcycles	10	5	15
Total	15	7	22

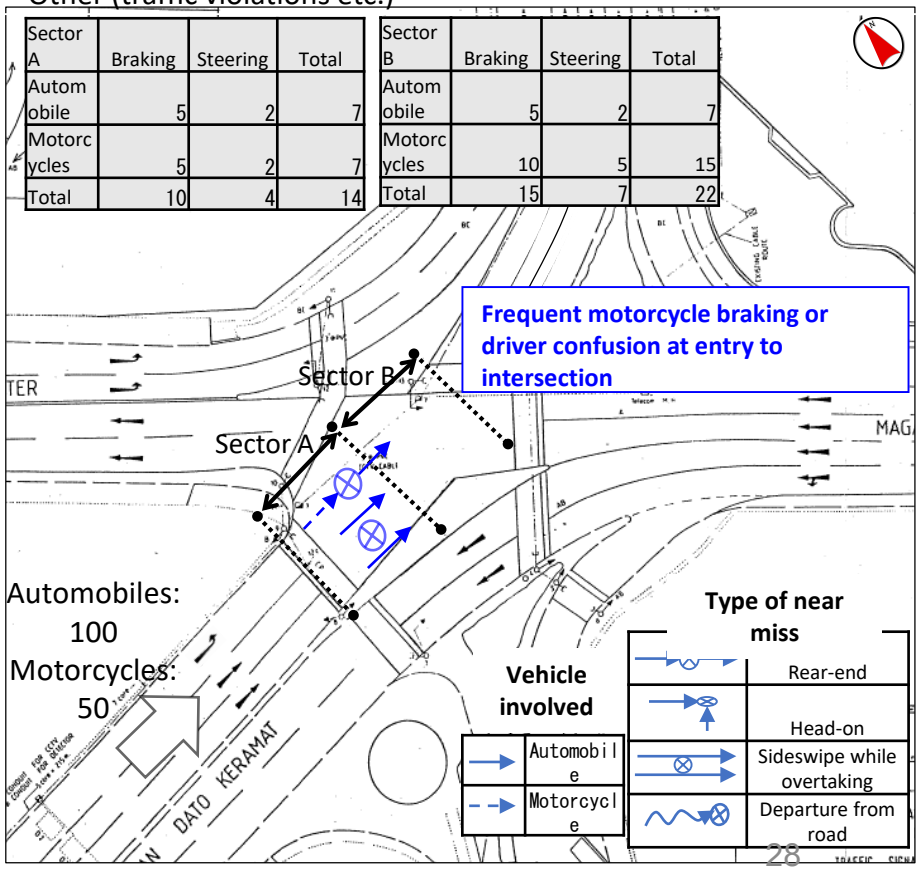


Diagram of near-miss conditions

Content of Dangerous Actions of Vehicles Detected at Intersections (Name of Intersection: Jalan Macalister × Jalan Penang)

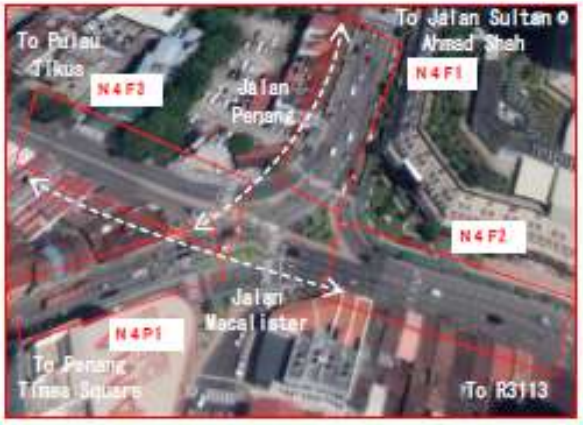
(1) Video angles and reading range

画角N4F1

Set sections inside the intersection, and count danger-avoidance actions of vehicles (braking and steering) within each section and driving lane by type of vehicle and time.

画角N4F2

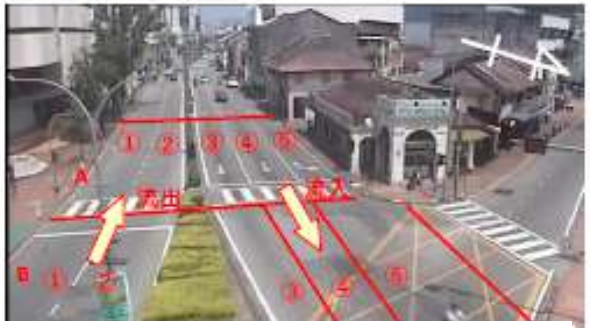
Count vehicles driving parallel to each other in the straight and left-turn lane with vehicles right-turn lane at the inflow section of the intersection, and forcibly entering in the same lane to turn right by type of vehicle and time.
Set sections inside the intersection, and count danger-avoidance actions of vehicles (braking and steering) within each section and driving lane by type of vehicle and time.



画角N4F3

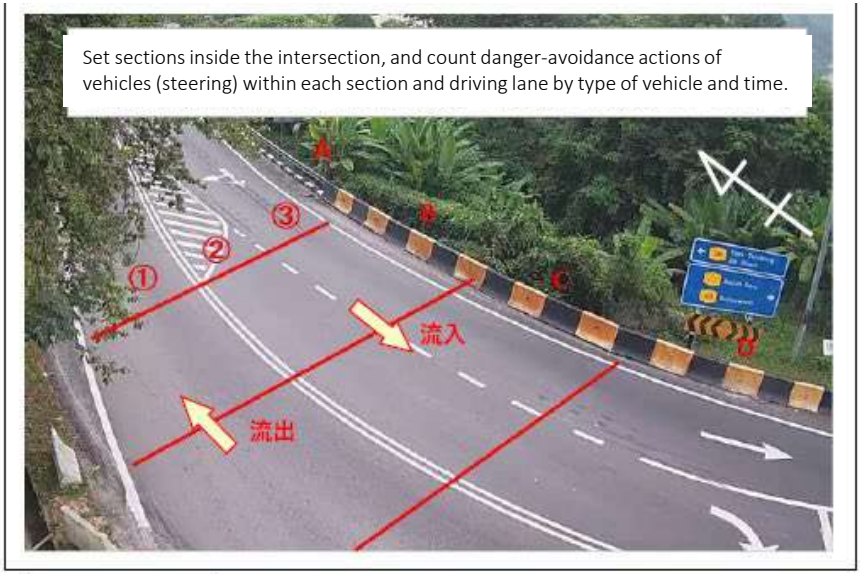
Set sections inside the intersection, and count danger-avoidance actions of vehicles (braking and steering) within each section and driving lane by type of vehicle and time. Also count pedestrians and bicycles roughly crossing the intersection by section, direction and time.

画角N4P1



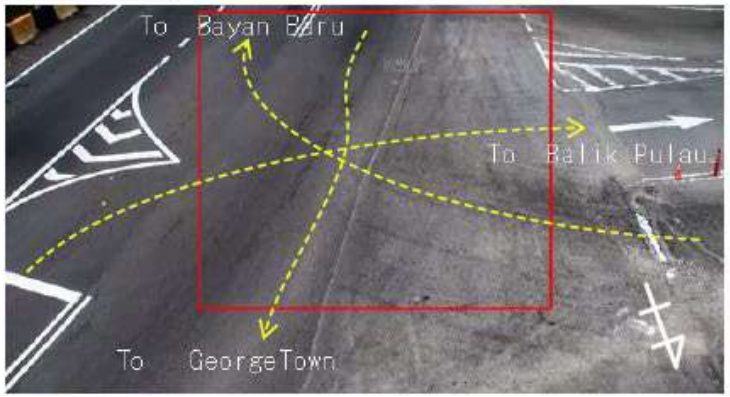
Set sections inside the intersection, and count danger-avoidance actions of vehicles (braking and steering) within each section and driving lane by type of vehicle and time.

Content of Dangerous Actions of Vehicles Detected at Intersections (Name of Intersection: Jalan Tun Sardon × Jalan Paya Terubong)



画角T1F2

画角T1P1



Count danger-avoidance actions (steering) at the intersection shown in the red frame by time.

(1) The vehicle driving straight from Bayan Baru avoided the vehicle turning right from Balik Pulau
(2) The vehicle driving straight from Bayan Baru avoided the vehicle turning right from Georgetown
(3) The vehicle driving straight from Balik Pulau avoided the vehicle turning right from Georgetown

Step 3: Study of actual traffic conditions (Ex-ante Survey on Traffic Conditions)

1. Study of traffic fact-finding survey plan

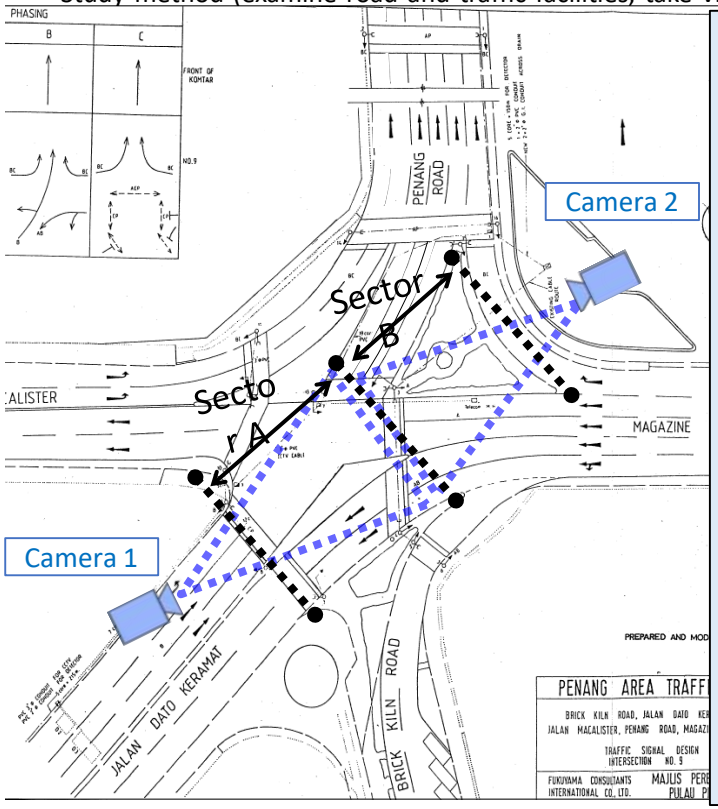
2. Monitoring of actual traffic conditions

Management: Penang City→USM (Traffic, Information Engineering, Consulting Departments)

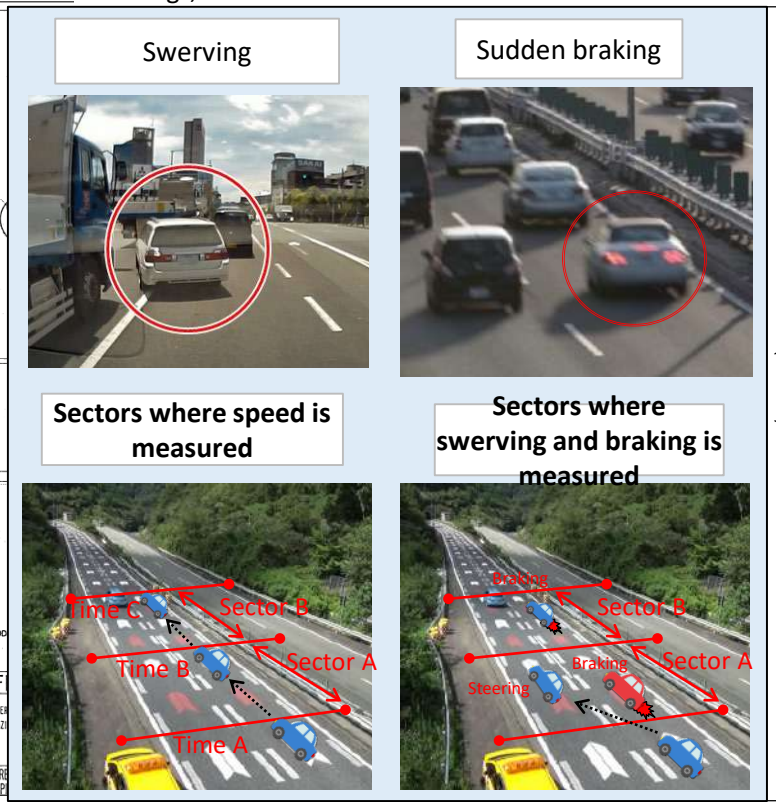
＊Accumulation of Technology + Expansion to other areas in Malaysia

- Locations to study (locations where accidents occur)
- Items to study
  (traffic volume, speed, distance between vehicles, lane changes, braking, etc.)
- Study method (examine road and traffic facilities, take video recordings,

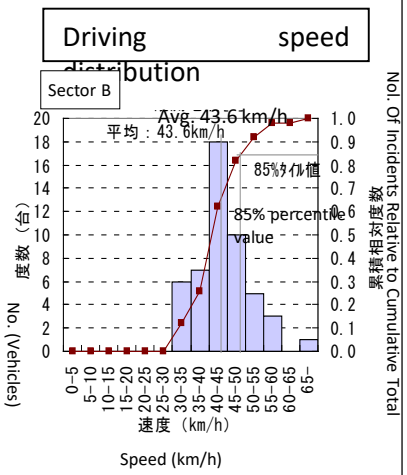
- Traffic facilities (traffic light sequence, guard rails, etc.)
- Traffic volume by kind of vehicle
- Traffic speed, space between vehicles (by lane, by type of vehicle)
- Lane changes, braking



Survey method



Items to study

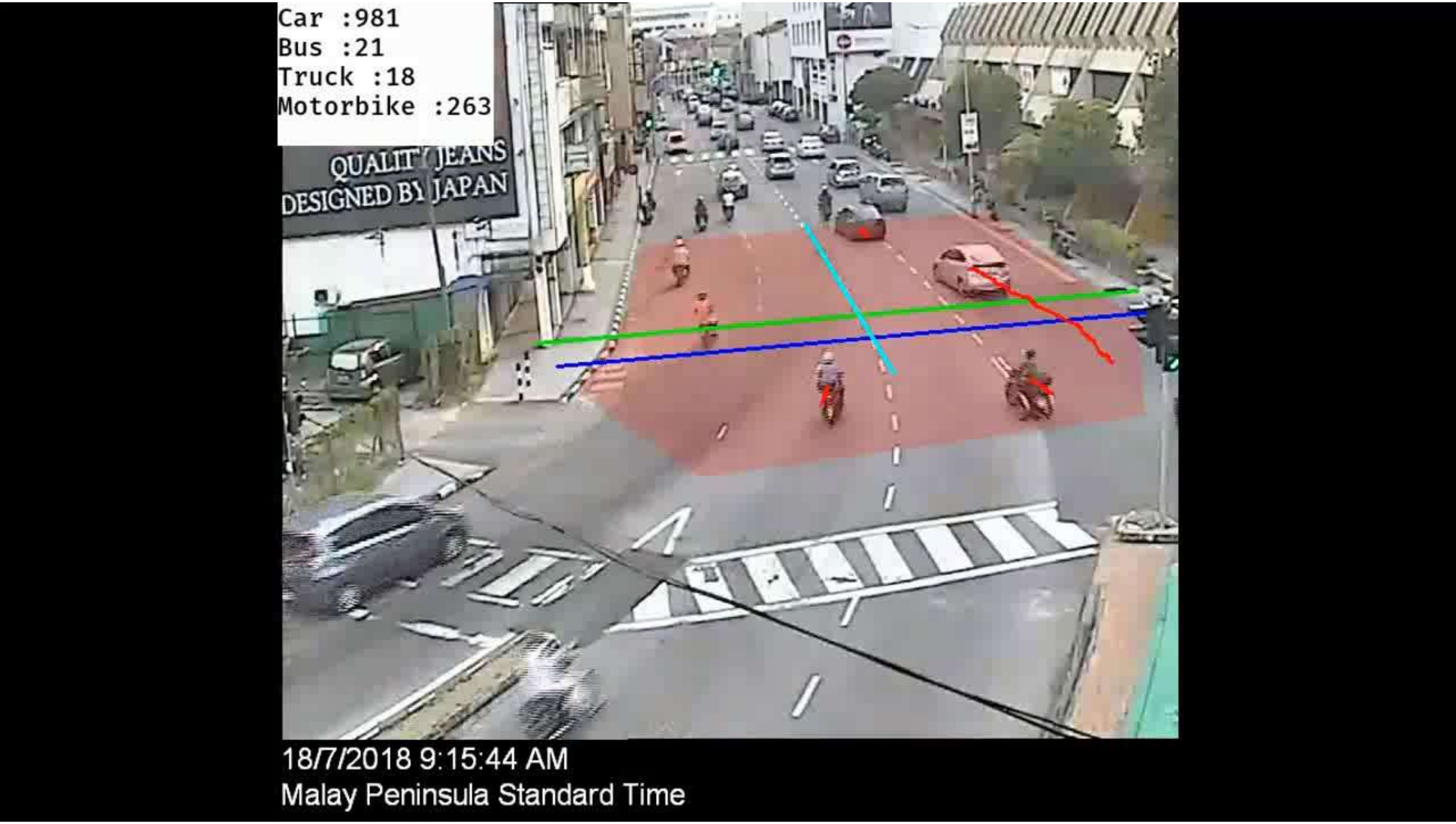


Near-miss conditions

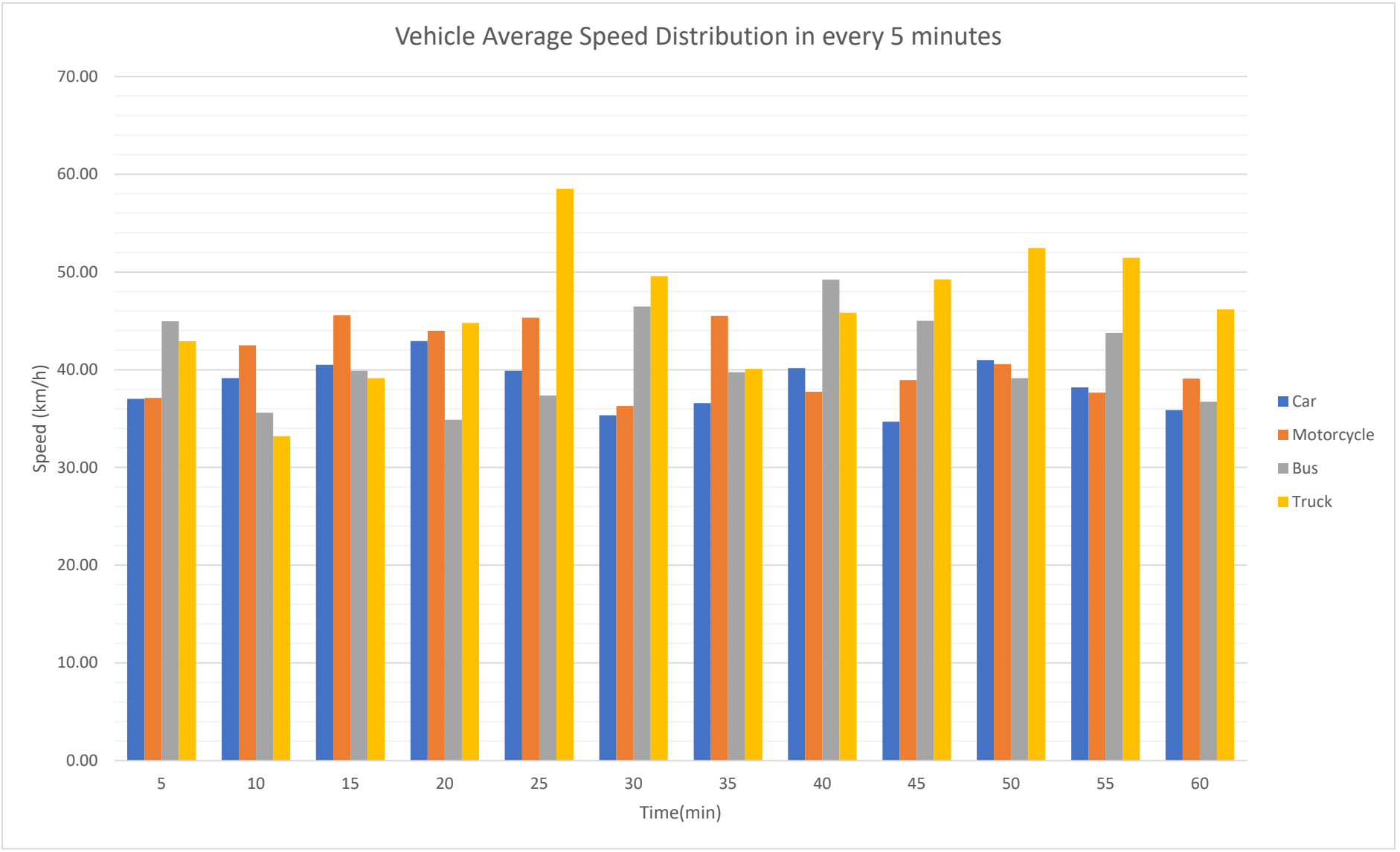
Sector B	Braking	Steering	Total
Automobile	10	5	15
Motorcycles	10	5	15
Total	20	10	30

Data analysis

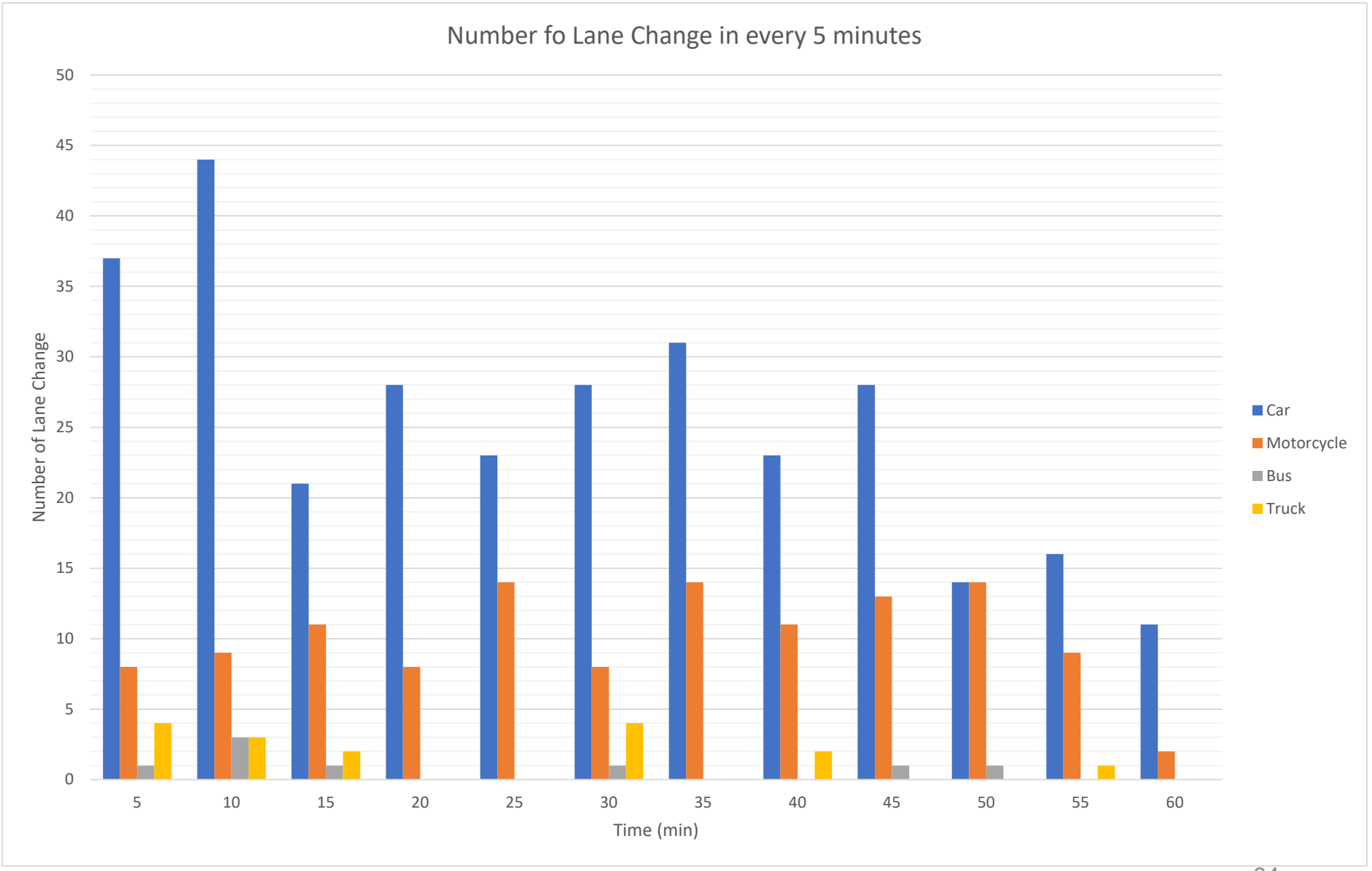
Example of Automatic Processing of CCTV Video (USM)



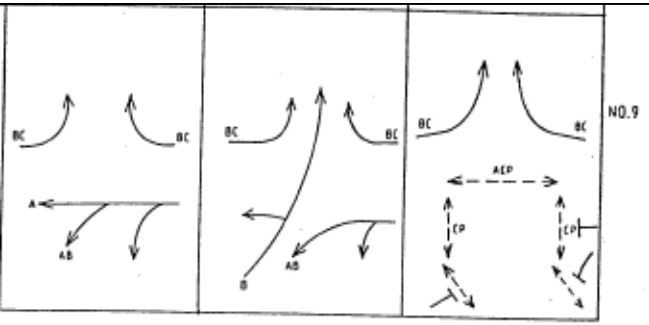
Example of Automatic Output Processing of CCTV Video (1) (USM)



Example of Automatic Output Processing of CCTV Video (2) (USM)



Step 3: Accident factor analysis (understanding problems with the road/intersection environment)



Use fact-finding survey results of accidents, near misses and traffic conditions to analyze road and traffic factors leading to accidents.

- Motorcycle stopped in the left turn lane proceeds straight forward
- Frequent incidents between 2 motorcycles or motorcycle and automobile due to driver confusion

- Expansive intersection
- Lines within the intersection are curved ; intersection entry and exit areas are not directly opposing
- The intersection entry and exit have different numbers of lanes

JALAN MACALISTER

MAGAZINE ROAD

High average speed within the intersection: 40

PREPARED AND MODIFIED BY :-
T. OYA
JICA

Step 4: Study of accident countermeasures

1. Plan accident countermeasures based on analysis of f

・Co
etc.)

2. Decide what to implement

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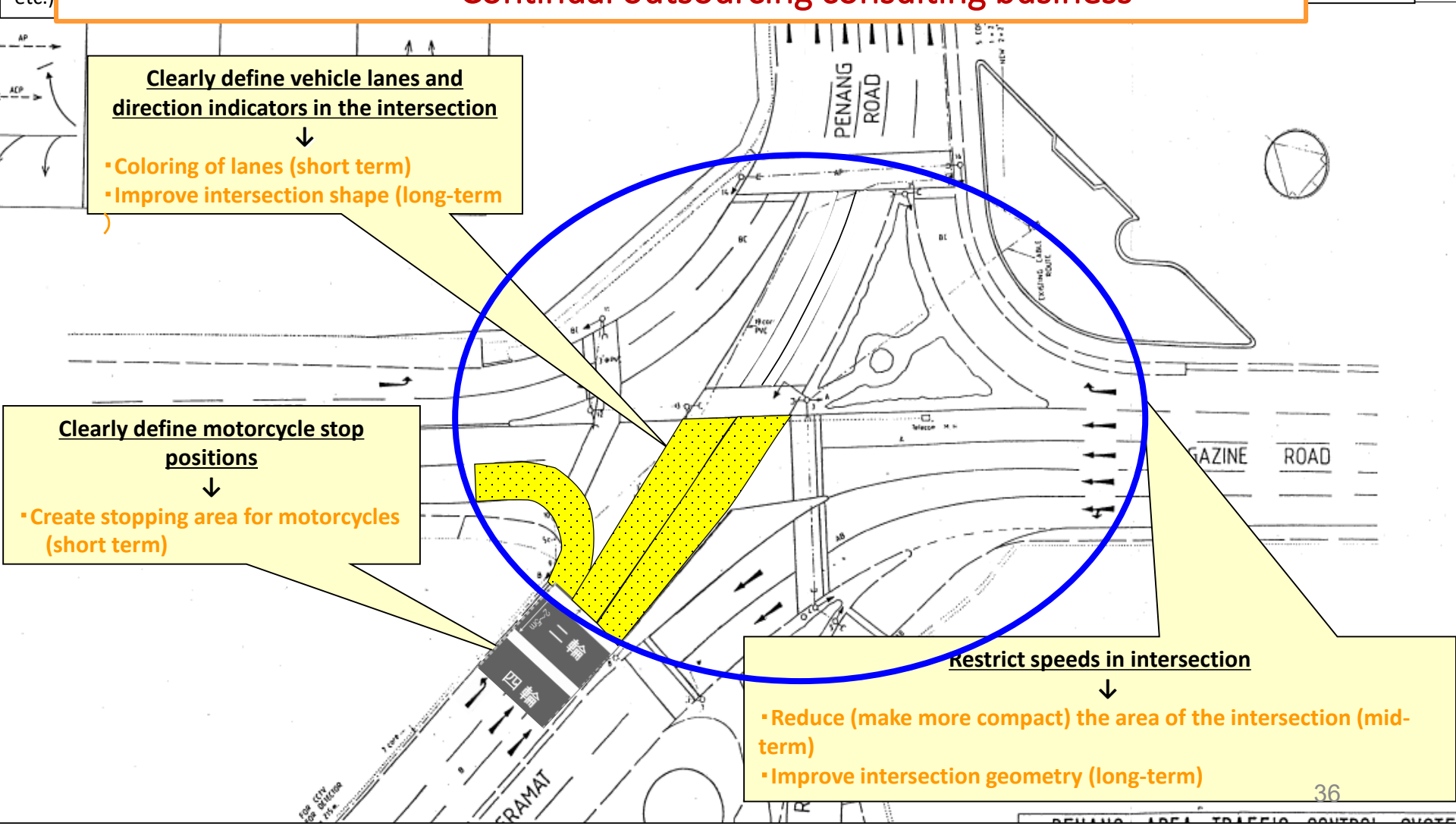
et,

Joint Proposals for Measures: IATSS & USM → Penang City/ State

✱ Continual outsourcing consulting business



Clearly define vehicle lanes and direction indicators in the intersection

↓

- Coloring of lanes (short term)
- Improve intersection shape (long-term

Clearly define motorcycle stop positions

↓

- Create stopping area for motorcycles (short term)

Restrict speeds in intersection

↓

- Reduce (make more compact) the area of the intersection (mid-term)
- Improve intersection geometry (long-term)

Overall Project Composition

		Kamagaya City (Japan)	Penang (Malaysia)	Suphan Buri & Khon Kaen (Thailand)
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Themes		Formation of agreement on community road measures	1. Motorcycle accidents 2. Geometric structure of intersections and traffic control	1. Motorcycle accidents 2. Geometric structure of intersections and the traffic control
Development and Operation of Information Systems	Development	Traffic Safety Measure Support System (TSMSS)	TSMSS is available in English, Malay, and Chinese	3. Splitting communities by arterial roads Road safety map application
	Near-miss Experiences	1. Input by residents via the internet 2. Responses to paper-based questionnaires uploaded to the internet	1. Traffic safety campaign 2. Collaboration with a university(USM) 3. Collaboration with a bus company (Rapid Penang)	Workshops with the participation of local residents
	Traffic Accidents	Included latitude and longitude information in the Traffic Accident Statistics Documents from 2012 expanded and accelerated digitalization.	1. Limiting the subjects to be collected due to the rapid increase in the number of accidents (assumption) 2. Strict limitations on information provision	1. Spread of electronic data 2. Enhancement of reliability and attribute data are issue
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Hazard & Risk Perception Lesson for Taxi Drivers Using the Near-miss Experience App.

1. Holding workshops

Using near-miss information collection activities as teaching opportunities

2. Teaching method using near-miss database

(1) One-point lesson during inspection before start of work

(2) Using the database for in-house training

1

Holding Workshops

July 17 (Tue) 15:00-17:00
Venue: Meeting Room, Rapid Academy

Using near-miss information collection activities as the teaching opportunities

1. Explanation of Purposes: Introduction

- To share information while driving and use it for safe driving
- To obtain information about dangerous sections that people have noticed and make safety maps to share information

2. Definition of Dangerous Places

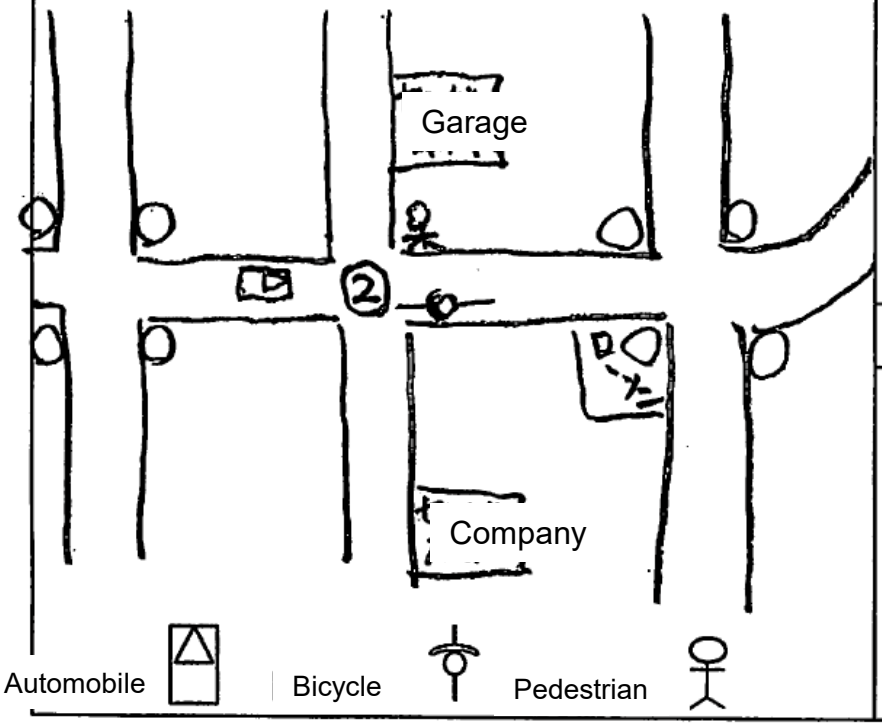
- Places where individuals experienced near-misses or accidents
- Places where individuals saw accidents
- Places where individuals feel a sense of danger on a daily basis
- Places where individuals feel a high potential for accidents

3. Input in Worksheets

- Noting dangerous locations with details
    1. Draw diagrams of the locations
    2. Explain details of the risks
    3. Establish measures to prevent accidents
- Indicating dangerous locations on maps
- Providing answers about the dangerous locations pointed out

*** Input on worksheets by each individual**

[QA] What is the risk at the dangerous location you pointed out? Please draw a simplified map, explain the state, and note measures to be taken.

Situation Map	Explanation
	At an intersection on the municipal road I use between garage and company, the signal for an industrial road and the municipal road is the same, which increases the speed of other vehicles. When I am checking for vehicles, I sometimes fail to check for bicycles and pedestrians. The reverse is also true.
	Measures to be Taken
	Thorough implementation of two-step stopping

[QB] Answer the following question about the risk mentioned above. Please circle the number of the items that apply.

(1) When does the risk mentioned above often occur? (Multiple answers allowed.)

1. Morning (Commuting time) 2. Daytime 3. Evening (Commuting time) 4. Night (When the traffic and flow of people is moderate) 5. Midnight – Dawn (When the traffic and flow of people is light) 6. Time does not matter 7. Other ( ) e.g. when it becomes dark, etc.

4. Information Sharing with the Group

- Sharing details of dangerous locations pointed out by individuals with the group (about 4 people)
- Exchanging opinions, including points individuals in the group notice

Immediate
Online Input

5. Sharing Information with Everyone

- Each group makes a presentation about major dangerous locations.
- Before presentations, dangerous locations should be registered in the Near-miss App.
- Detailed information about dangerous locations should be shared by everyone **while showing them on Google View.**

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Concept of Selecting Model Areas

- The Ministry of Transport (Thailand) and Ministry of Land, Infrastructure, Transport and Tourism (Japan) started joint approaches to traffic safety (November 2016 -)⇒ Meetings of traffic safety working groups have already been held eight times.
- Because it is impossible to target all of Thailand, we chose model areas as showcases.
  - National roads in mountainous areas: Utaradit, Phetchabun (DOH)
  - National roads running through the downtown areas of suburban cities: Suphan Buri, Khon Kaen (DOH)
  - Streets with heavy traffic in the downtowns areas of suburban of Bangkok: Nonthaburi, Samut Prakan (DRR)
  - Belt highways in suburban cities: Chiang Mai (DRR), etc.
- However, a focus was placed on measures taken by the Ministry of Transport (Road Bureau/ Regional Development Bureau/ Land Transport Bureau), prefectural police departments, city offices, and other stakeholders at the sites where accidents occur frequently
- We thought it would be necessary not only to share near-miss information, but also to promote understanding among residents through workshops focusing on why some locations have more frequent near misses to facilitate the creation of comprehensive measures. Then, we chose Suphan Buri and Khon Kaen, where cooperation with residents is strong.

Workshop with the Participation of Residents in Suphan Buri

- Among cities in Thailand, Suphan Buri has relatively strong cooperation among stakeholders. Traffic safety measures are taken with a high degree of cooperation among these stakeholders, and we can expect autonomous activities to continue in the future.
- In June 2017, we visited Suphan Buri and explained the purposes of the workshop.
- On August 19, 2017, the 1st workshop was held.
  - Met with Dr. Arkhom Termpittayapaisith, Minister of Transport, and Sujin Mungnimit, Director of the Bureau of Highway Safety on the previous day
- On January 20, 2018, the 2nd workshop was held.
  - Stakeholders held the workshop.
- On August 28, 2018, the 3rd workshop was held.
- On March 6, 2019, the 4th workshop was held.
  - 4 JICA specialists and 2 JICA Tokyo Office staff attended.

1st Workshop in Suphan Buri

FY2017

- Explanation of the purposes of the project
- Introduction of participants: Stakeholders, residents (including junior high and high school students), and ATRNS members
- Explanation of state of traffic accidents by Road Bureau and provincial police department staff
- Introduction of Kamagaya Project and activities in Penang by Professor Kobayakawa
- Introduction of usage of ATRANS Safety Map

Report by Prof. Kobayakawa as a Special Researcher

Introduction and Usage Guidance of ATRANS Safety Map

1st Workshop in Suphan Buris

FY2017

Creation of Near-miss Map by Participants

Summary of Near-miss Experiences

Advice at a Near-miss Location

Sharing Near-miss Experience among Participants

The 2nd Workshop in Suphan Buri

Report by ボラデート (Police Department)

Held by stakeholders

The 3rd Workshop in Suphan Buri

- August 28, 2018, the 3rd workshop was held (バンドン地区)

Report of Analysis on DOH Accident Data

Introduction and Guidance of ATRANS Safety Map

Report of Traffic Accidents in Thailand

The 3rd Workshop in Suphan Buri

Check Near-miss Locations using A0 Map

Explanation of Visited Locations and Report of Near-miss Experiences

Advice Given during Visits to the Locations where Accidents Frequently Occurred

The 4th Workshops in Suphan Buri

Explanation of Purposes of Project

Advice Given during Visits to the Locations where Accidents Frequently Occurred

Explanation of Visited Locations and Report of Near-miss Experiences

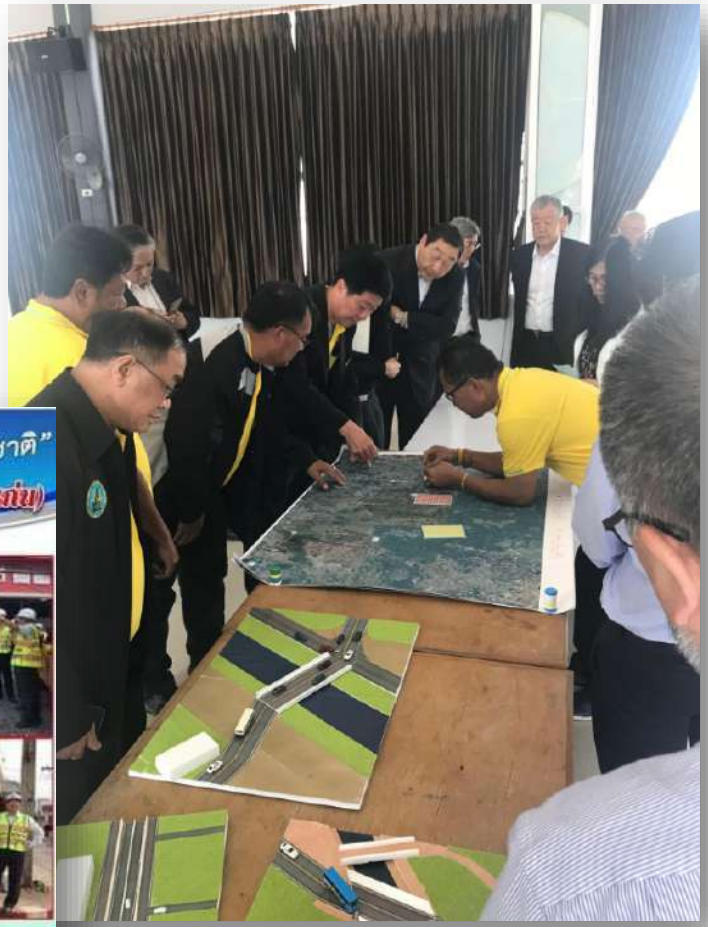
The 1st Workshop in Kohn Kaen

FY2017

- In February 2018, the 1st workshop was held in Kohn Kaen in cooperation with Regional Development Bureau, Road Bureau, Provincial Police Department, Kohn Kaen University, and ATRANS. JICA staff also participated in the workshop for cooperation.
- Residents in the 6th District participated in the workshop, created a near-miss map, and conducted safety monitoring.

The 2nd Workshop in Kohn Kaen

- In March 2019, the workshop was held with JICA specialists and staff in attendance.



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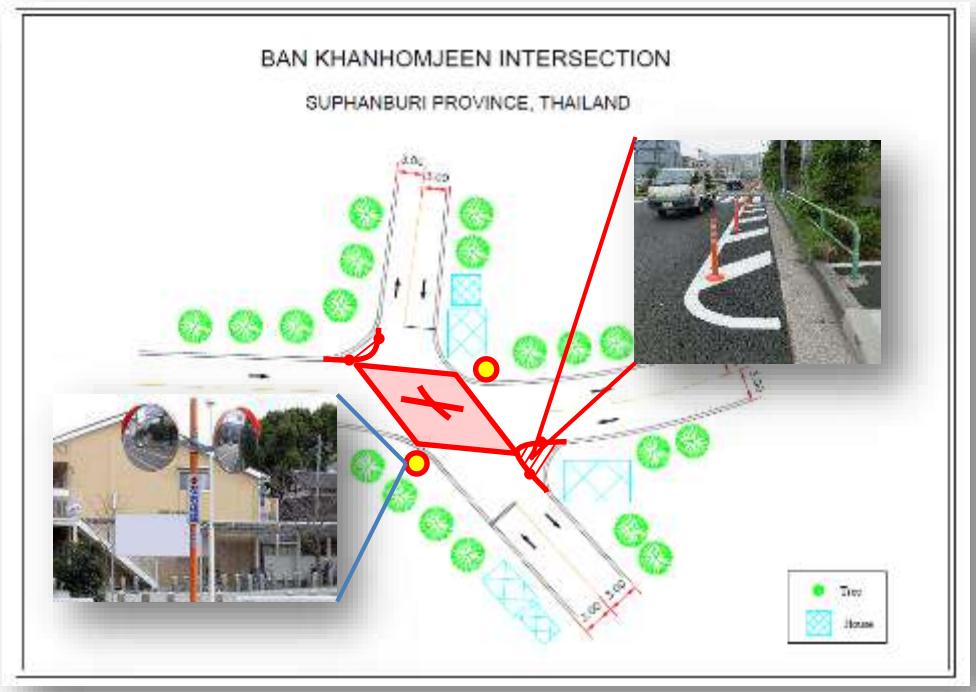
Extraction of Near-miss Areas, Implementation of Safety Monitoring, Proposals of Measures

FY2017

- Analyzed data and discussed measures
- Discussed measures
- Created improvement plans, examined through traffic flow micro-simulations to make proposals



Safety Monitoring and Proposals for Measures in Nonthaburi

FY2017

- The Regional Road Development Bureau asked for advice on measures to be taken for locations where accidents frequently occur in Nonthaburi.
- We confirmed in Nonthaburi in September that measures were taken in February

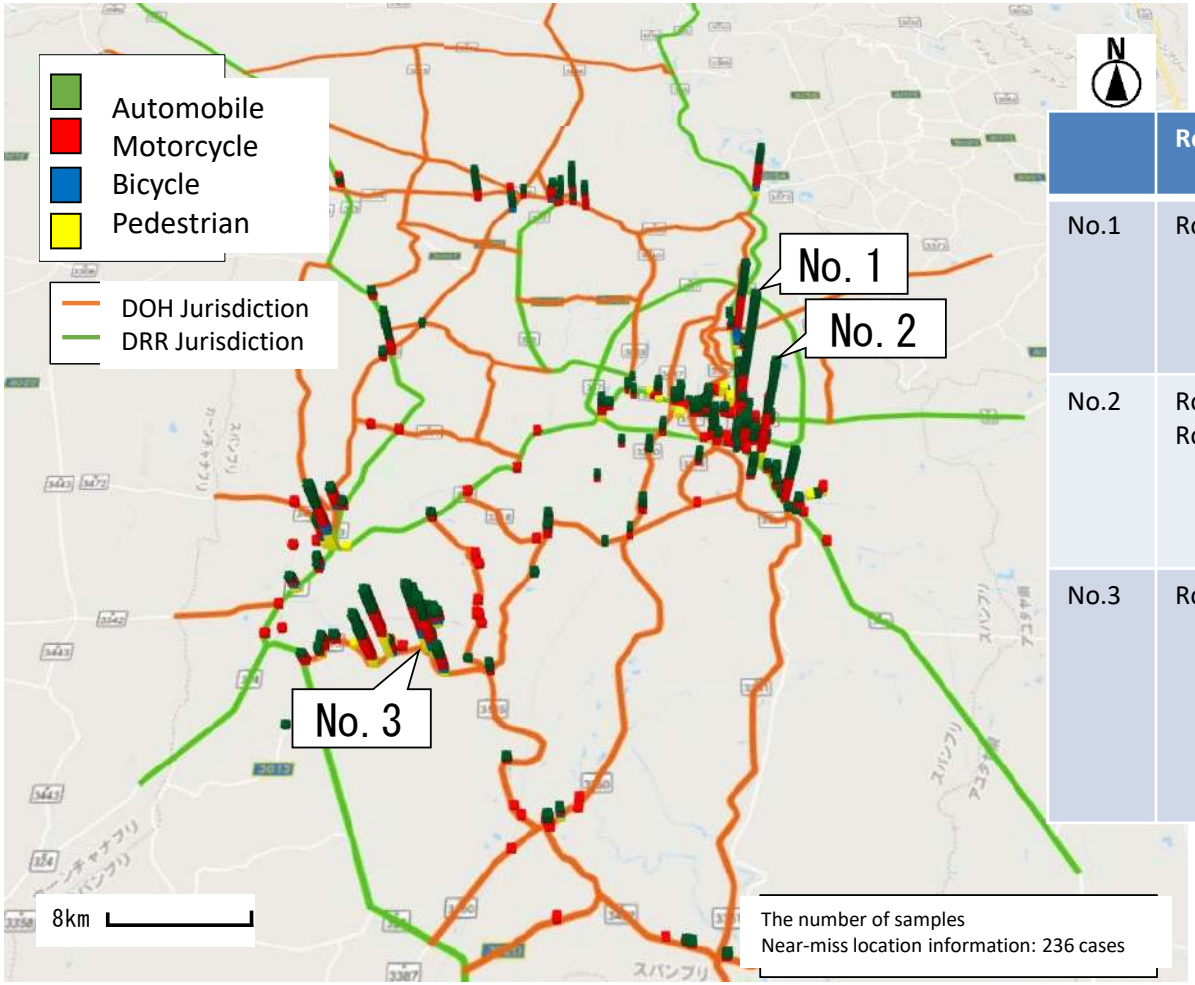
Before

After

Sphan Buri: Checking Near-miss Locations and Behavior Patterns

What we found from the analysis on near-miss locations and behavior patterns

- Arterial Roads→U turns, entrance of facilities and stores
- Community Roads→Defects in road structure at intersections

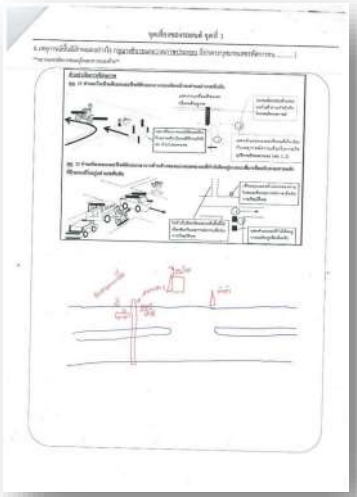


3 Locations where Near Miss Occurred the Most

	Road No.	Description	Number of Accidents
No.1	Route 340	In front of a shopping mall	23 Automobile: 15 Motorcycle: 7 Pedestrian: 1
No.2	Route 340 Route 3037	A community road crosses the U turn on Route 340 and becomes an intersection.	21 Automobile: 10 Motorcycle: 8 Pedestrian: 3
No.3	Route 3505	A three-way intersection of community roads Difficult to see because of the curve and plants	15 Automobile: 5 Motorcycle: 6 Bicycle: 2 Pedestrian: 2

Near-miss locations found through workshops and on ATRANS Safety Map

Near-miss Experience Totaled Results

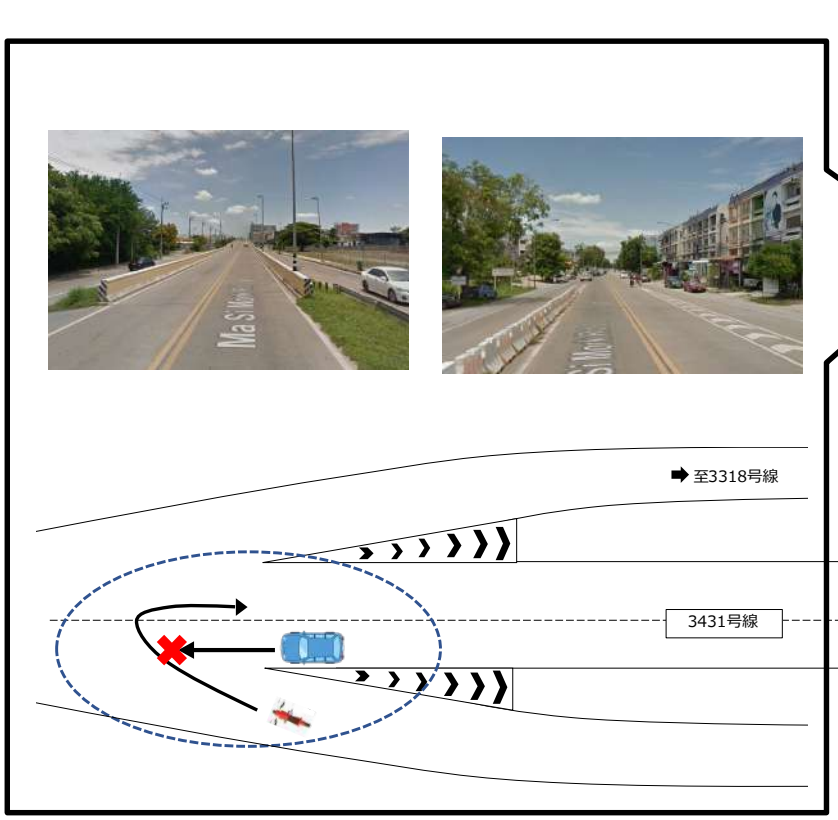


	Three-way Intersections		Four-way or More Intersections		U Turns	Entrance of Arterial Road	Total
	Community Roads	Arterial Roads	Community Roads	Arterial Roads	Arterial Roads		
Automobile vs. Automobile	8	4	2	3	7	3	27
Automobile vs. Motorcycle	19	4	1	1	4	2	31
Motorcycle vs. Motorcycle	3		1		2	1	7
Automobile vs. Pedestrian	5			1		6	12
Motorcycle vs. Pedestrian	5						5
Motorcycle vs. Bicycle	2						2
Total	42	8	4	5	13	12	84

- Near misses occurred frequently on three-way intersections and community roads.
- Most of the near misses on community roads were collisions at a crossing.
- U-turns frequently caused accidents on arterial roads.

Behavior Patterns at the Locations Where Accidents Frequently Occurred

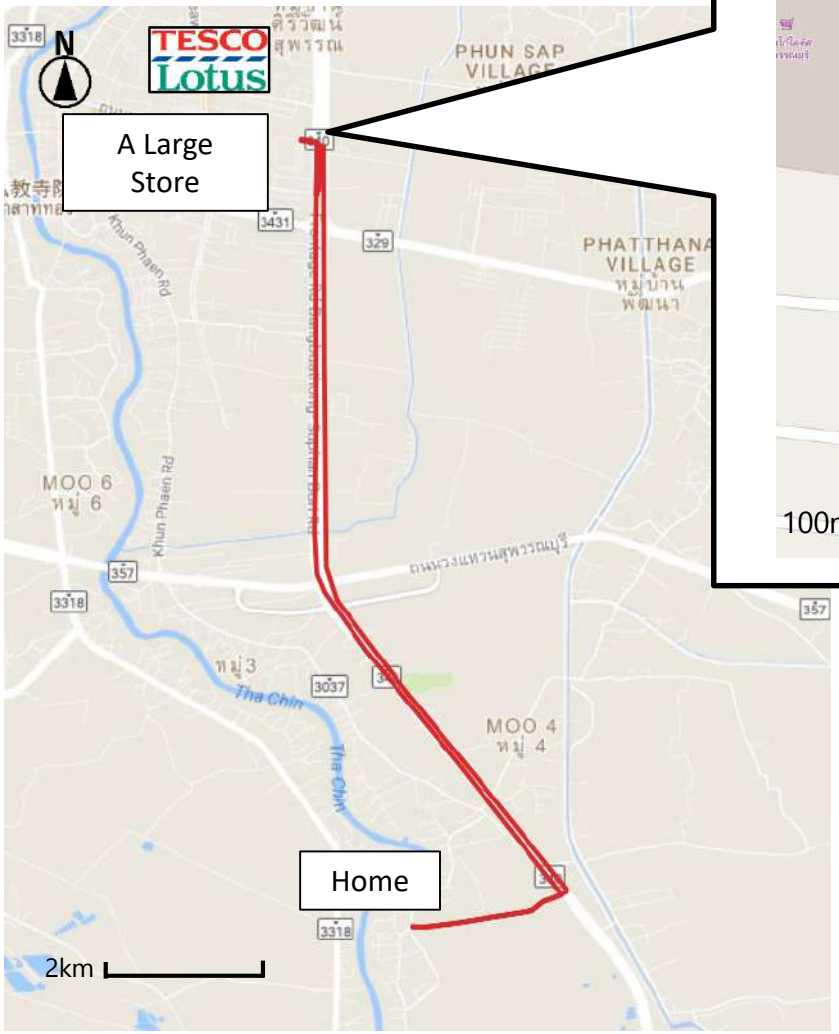
■ ① Location where Route 3431 and 3318 merge

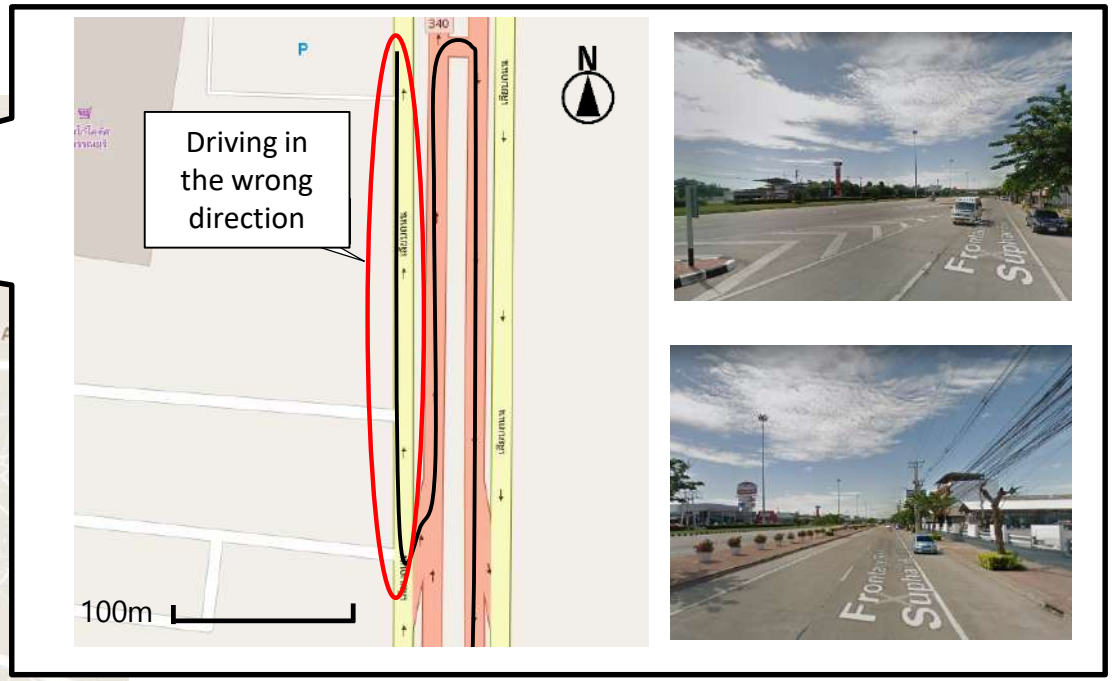


- Going shopping, and taking a child to and from school from home by a motorcycle
- Merging or making a U-turn at the location where Route 3431 and 3318 merge
- Crossing at the merging point has a high risk of accidents.

Behavior Patterns at Locations Where Near Misses Frequently Occurred

■ ② In front of a Shopping Mall

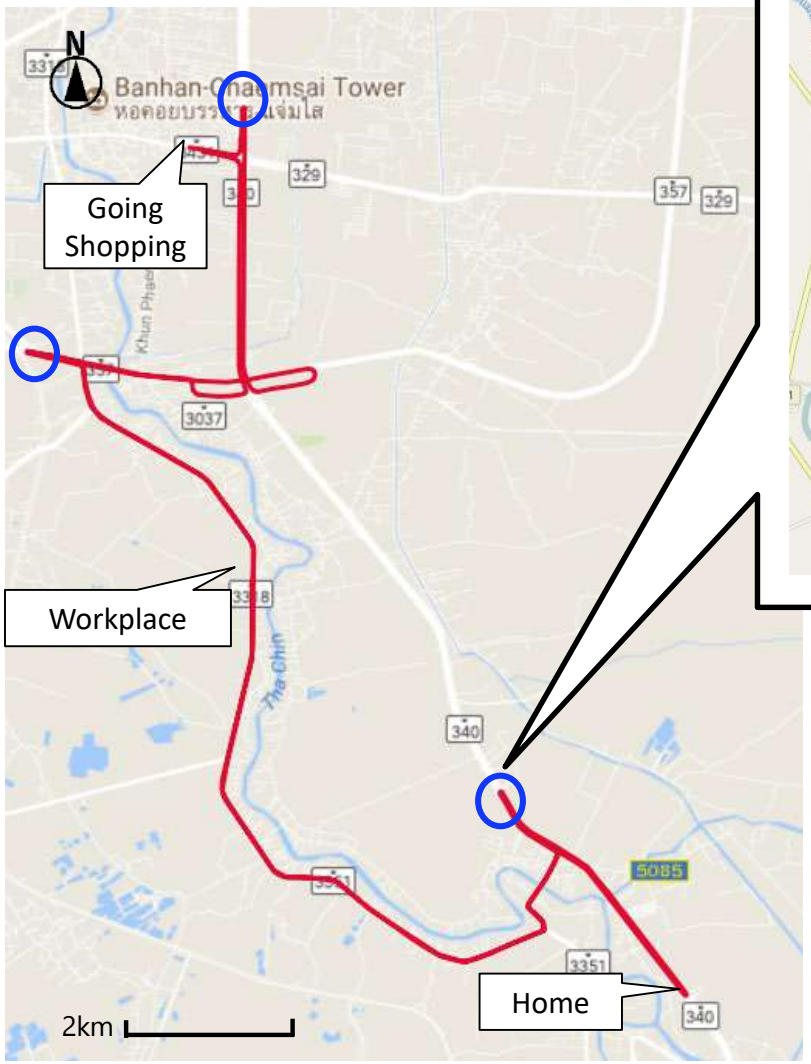


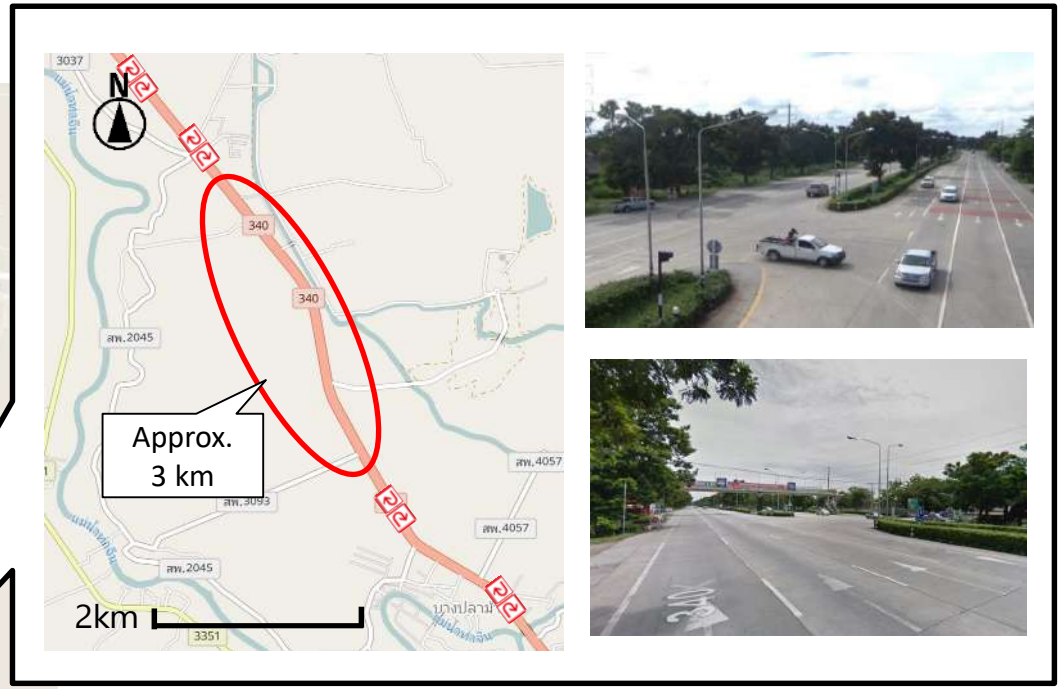


- Going to a large store from home
- Making a U-turn after the large store causes a detour, which is about 4 km longer.
- Because there is an entrance to an arterial road approx. 250 m from the large store, people tend to drive in the wrong direction on purpose to make a U-turn.
- There were six cases of people driving in the wrong direction.

Behavior Patterns at the Locations where the Most Requests for Improvement were Made

■ **Entrance in front of the School and U-turns**





- Going to workplace and a large store from home.
- The area right below in the behavior pattern map has only a few U-turns.
- There were three cases of U-turns in a location that residents often use. Because a school entrance is also located in the area, many people park vehicles on the road to take their children to and from school, which increases the risk of accidents.

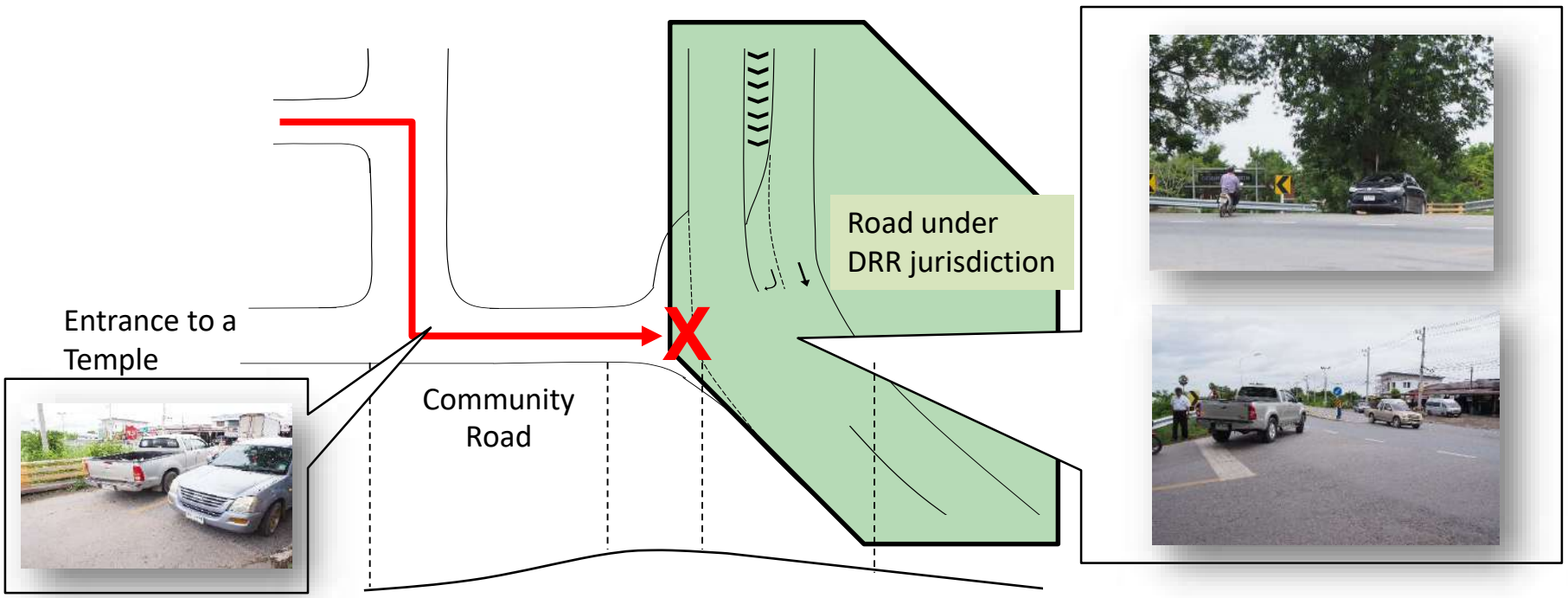
Issues Found in Suphan Buri

Community Roads→Defects in road structure at intersections

- Stakeholders took measures for road traffic safety within their jurisdictions.
- Near misses were frequently reported on the borders of jurisdictions.

e.g.) The Regional Road Development Bureau implemented sufficient measures within the roads that they have jurisdiction over.

←→There are problems at the connection with a municipal road in Nong Bua, which frequently caused near misses.



Suphan Buri: Locations where Traffic Safety Measures were Taken

- Locations where measures were taken to solve frequently occurring traffic accidents

A community road is connected to a U-turn on an arterial road, which formed an intersection.
When we visited in August 2018, an underpass was being constructed.

Before (June 2017)

After (August 2018)

After (March 2019)

Surveys on the State of Accidents using Models

- We made models of three locations: Two locations where accidents and near misses frequently occurred according to the 1st workshop and accident data; and One location that residents made the most requests for.
- Residents shared awareness of risk of traffic accidents in the area, including dangerous traffic behaviors.

Overall Project Composition

		Kamagaya City (Japan)	Penang (Malaysia)	Suphan Buri & Khon Kaen (Thailand)
Purposes of the Project		1. Establishment of PDCA cycle of safety measures based on accidents and near-miss data 2. Promotion of resident participation through information sharing and enlightenment activities	1. Application to the on-site society, systems, and traffic culture 2. Transition to system capable of operating PDCA cycle autonomously	
Themes		Formation of agreement on community road measures	1. Motorcycle accidents 2. Geometric structure of intersections and traffic control	1. Motorcycle accidents 2. Geometric structure of intersections and the traffic control 3. Splitting communities by arterial roads
Development and Operation of Information Systems	Development	Traffic Safety Measure Support System (TSMSS)	TSMSS is available in English, Malay, and Chinese	Road safety map application
	Near-miss Experience	1. Input by residents via the internet 2. Responses to paper-based questionnaires uploaded to the internet	1. Traffic safety campaign 2. Collaboration with a university(USM) 3. Collaboration with a bus company (Rapid Penang)	Workshops with the participation of local residents
	Traffic Accidents	Included latitude and longitude information in the Traffic Accident Statistics Documents from 2012 expanded and accelerated digitalization.	1. Limiting the subjects to be collected due to the rapid increase in the number of accidents (assumption) 2. Strict limitations on information provision	1. Spread of electronic data 2. Enhancement of reliability and attribute data are issue
Future Action		・Continuation of traffic safety measure project Revision of "5-year Plan for the Development of Safe and Secure Roads" ・Consideration of safety measures for school routes "Creation of School Route Hazard Map" "Consideration of implementation of ZONE 30"	1. Extraction of points where near misses frequently occur, integrated analysis with accident data, on-site surveys, selection of subject sections, establishment of measures, ex-ante and ex-post evaluations 2. Application of the near-miss data for the safe driving management of Rapid Penang bus services (using the community ID)	1. Extraction of points where near misses frequently occur 2. Safety monitoring by specialists at points where near misses frequently occur 3. Consideration for measures to be taken at the points where near misses frequently occur (road measures)
Technical Issues		Cultivation of specialists	Application of "searching sub-system for measures and evaluation results" and strengthening of on-site handling	

Search and Ex-ante Evaluation Systems for Traffic Accident Measures

- Database capable of accumulating ex-post evaluation results of the effects of measures by accident type and cause

→Tools to appropriately search and select safety measures

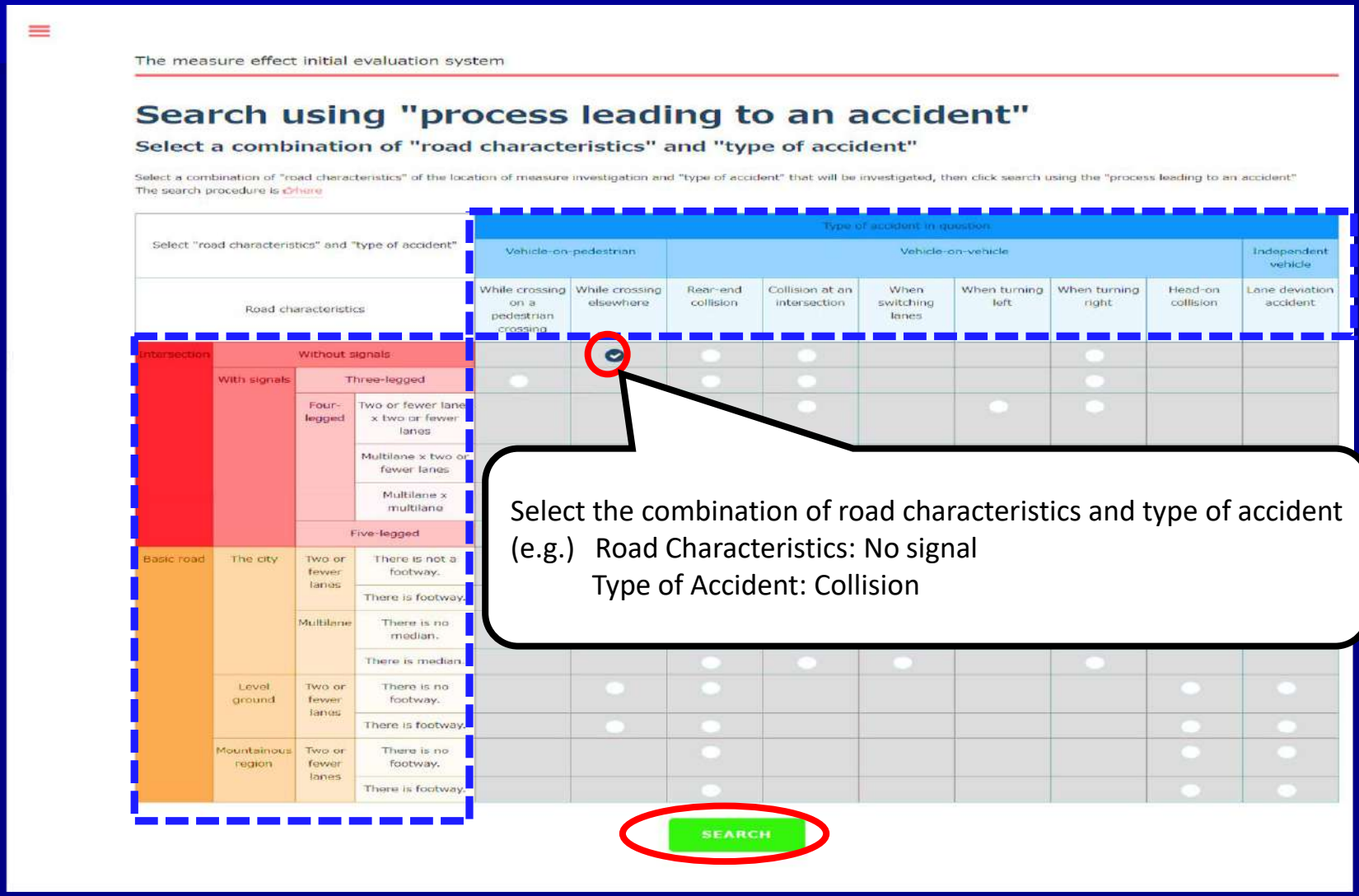
- Many achievements in Japan have been already registered.
- Website version has already been translated into English.

→In cooperation with on-site government offices and universities with which we have built relationships, we implement the systems at the actual sites.

- Using for the on-site implementation of traffic safety measures
- Accumulating data reflecting the actual conditions of individual countries
- Essential to use the systems in the areas where there are only a few safety measures.

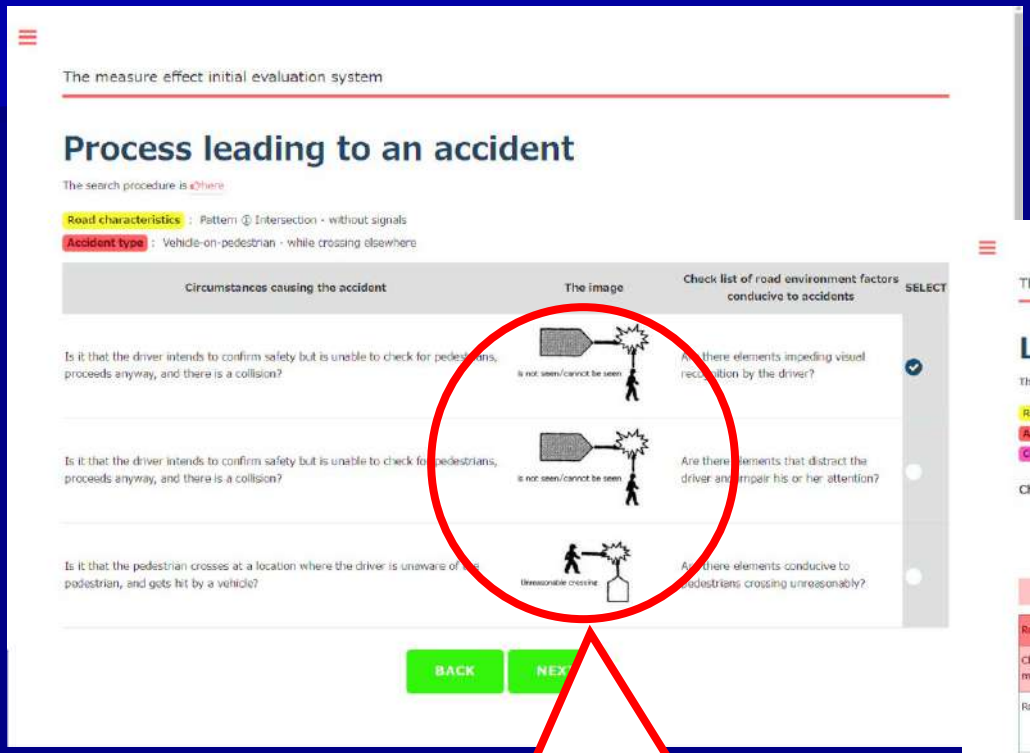
Function 1: Road Characteristics and Selection of Type of Accident

As the first step to accident cause analysis, we select accident occurrence patterns for each location to implement measures among 14 road characteristics and nine types of accident.



Function 2. Extracting Primary Factors in Accidents

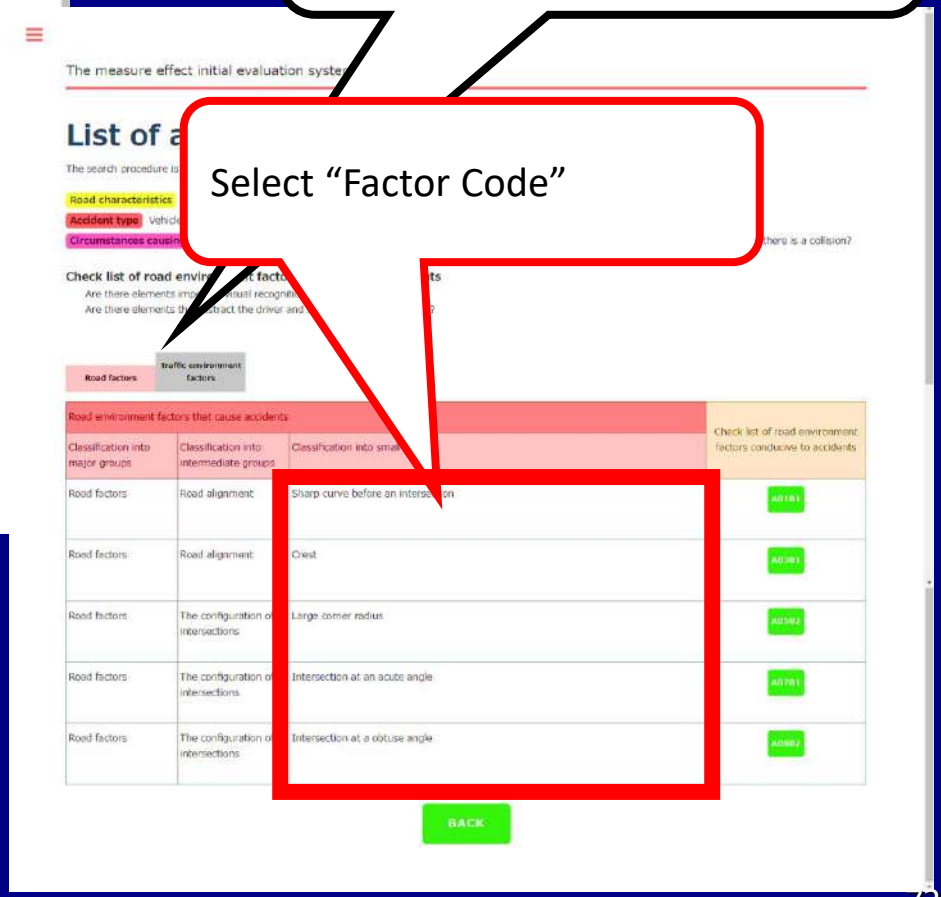
After selecting “Process Leading to Accident,” accident causes are searched and displayed on two windows which are “Road Characteristics Causing an Accident” and “Extracting Primary Factors in Accident.”



Select “Process Leading to an Accident”

Select “Road Factors” or “Traffic Environment Factors”

Select “Factor Code”



Function 3: Displaying Policies and Types of Construction based on the Factor Codes

Displaying Cases of Measures

The measure effect initial evaluation system

List of "measures": Table A Intersection - without signals

The search procedure is Ohere

Road environment factors related to which measures are being implemented Large corner radius

Factor code A0502

	Process leading to an accident and related factors	Related accident type									Drafting measures for accidents				Case/Example
	Impact on road environment	Collision at an intersection	Head-on collision	Rear-end collision	Collision while turning right	Collision while turning left	Collision while crossing elsewhere and not on a pedestrian crossing	Collision while crossing on a pedestrian crossing	Collision while switching lanes	Run-off-road incident/Lane deviation accident	Measure policy	Measure code	Measure name	Points to be borne in mind during implementation	
1	The speed while exiting the intersection is high, and drivers may not notice pedestrians in the vicinity						•	•			To control the speed of moving vehicles	0104	Improve alignment (reduce corner radii)	• It is desirable to carry out three measures at the same time • When there is a pedestrian crossing	0104
2	The speed while exiting the intersection is high, and drivers may not notice pedestrians in the vicinity						•	•			To control the speed of moving vehicles	1609	Stop line (advanced)	Same as above	Not registered
3	The speed while exiting the intersection is high, and drivers may not notice pedestrians in the vicinity						•	•			To control the speed of moving vehicles	0805	Pedestrian crossing (advanced)	Same as above	0805
4	The speed while exiting the intersection is high, and drivers may not notice pedestrians in the vicinity						•	•			To control the speed of moving vehicles	0804	Pedestrian crossing (new)	• When there is no pedestrian crossing	Not registered

Measure example

Number	Measure category	Location of works	Location of measure	Measure name	Start date for work	End date for work	Attached supplementary materials
1	Improve alignment (reduce corner radii)		Manual cases/examples	① Reduce corner radii			With attached

BACK

対策名	②右折専用車線の増設（2車線化）	目的	交通容量増加

＜対策箇所＞
右折の需要が多く、右折するために長時間の待ち時間となる箇所

＜対策内容＞
右折車線を増設することで右折の捌け容量が増加し、待ち時間が短縮されるため、無理な右折行動が抑制される。

＜留意点等＞
右折車線が２車線以上ある場合は、外側の右折車両が右折しようと待機すると、内側の右折車から対向直進車の視認性が悪くなる。このため、本対策実施にあたっては右折車と対向直進車を分離する右折専用現示の導入も組み合わせて検討することが望ましい。

＜ターゲットとなる主な事故類型＞
右折時、横断歩道横断中

＜対策写真＞

※写真上下：広島国道事務所_国道２号_広島県広島市中区舟入本町（343108k）

Future Issues: "Localization" and "Horizontal Expansion of the Measures

1. On-site implementation of traffic accident information sharing tools and search system for accident measures and evaluation results in cooperation with on-site government offices and universities with which we have built relationships.

2. Support for implementing PDCA cycle, including post-ante evaluation for accident measures

3. Support for autonomous development structure for safety measures by the consulting department of the on-site universities as an outsourced project by government offices
   → Establishment of survey and analysis methods according to the on-site conditions
   → Development and accumulation of technology required for survey and analysis
   → Organization of "On-site Manuals"
   → Expansion of the project to other regions

Implemented as the IATSS FY2019 "Social Contribution Project"


IATSS
公益財団法人 国際交通安全学会
International Association of Traffic and Safety Sciences